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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, 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 large differences in academic background coupled with students being more likely 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.

JEL Classifications: K10, J15, I20

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# Racial Segregation Patterns in Selective Universities

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## 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. This past fall, the Supreme Court heard a similar case in *Fisher vs. University of Texas*, again raising the possibility that race-conscious admissions may no longer be permitted in higher education.

One of the justifications given for racial preferences in admissions is that such policies positively affect all students at the university. Since these policies are employed at only the most selective colleges, their effect on targeted minority students has not been to increase overall attendance

rates, but rather to influence the schools attended by these students (Kane, 1998, Arcidiacono, 2005). Nonetheless, in addition to the direct benefit of allowing those targeted by racial preferences to attend more selective institutions, non-targeted groups may benefit indirectly from increased diversity on university campuses. The benefit 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.

The goal of this paper is to investigate friendship formation within and across races in the context of selective universities. In particular, we are interested in the importance of similarity in academic background in interracial friendship formation. If similarity in academic background is an important determinant of friendship formation—particularly among those of different races or ethnicities—then one of the potential costs of affirmative action may be to lower the rate of interracial friendships through driving a wedge between the academic characteristics of different racial and ethnic groups.<sup>1</sup> 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, since affirmative action policies primarily affects the intensive margin (where minorities attend college), not the extensive margin (whether minorities attend college), more interracial interaction at the highly selective school may come at the expense of even more interracial interaction at less-selective schools.<sup>2</sup>

To examine the determinants of interracial friendships, we utilize 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. 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. Both data sets also contain information on friendship composition in high school as well as measures high school diversity.

We document significant patterns of racial segregation in friendships, both cross-sectionally and

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<sup>1</sup>The concern that affirmative action may reduce overall interracial friendships despite increasing interracial friendships 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.

<sup>2</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).

over time.<sup>3</sup> This is particularly true for blacks where on average their share of friends who are of another race is no higher in college than in high school despite their colleges having a much smaller share of black students than their high schools. However, the extent of interracial friendships, both before and during college, vary significantly depending on academic preparedness. The percentage of black friendships that are same-race is lower for those with SAT that are relatively low given the college they attend. Ordered probit estimates of the number of friends of different races show that, within a college, increasing one’s own academic preparation makes inter-racial friendships with blacks less likely while increasing friendships with whites and Asians.

The multiple waves of friendship reporting in the CLL dataset tell a story of substantial racial isolation among blacks that slightly increases over time.<sup>4</sup> Despite only comprising eight percent of the Duke student body, Black students report on average that 68% of their friends are black during their freshman year, a number which increases to 72 percent in their senior year. Ordered probit results again suggest that friendships with other races are more likely to occur the more similar one’s academic preparation is to those of other races.

Taken as a whole, our results suggest that similarity in academic background is an important determinant of interracial friendship formation. That black friendships are no more diverse in college than in high school, despite blacks being substantially less-represented in their colleges, points to a potential cost of affirmative action. Namely, by introducing a mismatch between academic backgrounds of different groups, interaction between these groups is discouraged.

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 discusses our estimation methods. Section 4 present our estimates, quantifying the importance of the similarity in academic background in interracial friendship formation. Section 5 concludes.

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<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 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). In addition to race, students may also interact on the basis of academic background or ability (Arcidiacono, et al., 2011; Foster, 2005; Mayer and Puller, 2008).

<sup>4</sup>Camargo et al. (2010) is one of the few studies that analyzes the dynamics of friendship 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.

## 2 Data

In this section we describe our two data sets and present descriptive evidence on racial segregation. We pay particular attention to how academic background is correlated with interracial friendships as well as how the diversity of one’s friends changes over time.

### 2.1 National Longitudinal Survey of Freshman

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>5</sup>. In total, 4573 students were surveyed. The baseline survey was administered in the fall of 1999, and compiles detailed information about students 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.

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. 89 percent of respondents report having at least ten friends. Partly reflecting affirmative action in admission policies, average test scores at these schools vary 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 score, at 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

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<sup>5</sup>Participating schools by type: Liberal art 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 interracial friendship, Howard University was dropped from the sample.

than first years grades for blacks and Hispanics.

Patterns of inter-racial friendships are given in Table 2, which displays the share of friendships that each racial/ethnic group 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 own-race preferences, as each group's share of own-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>6</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 own-race friends in high school is the same or slightly lower than their share of own-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 own-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 inter-racial friendships in college than in high school, even though their high schools have a higher percentage of black students than their colleges.

Given that blacks are much more segregated in college than other groups and given their share of inter-racial friendships does not rise in college, we next look to see if this correlates with the large differences in SAT scores between blacks and other groups. If students form friendships with students of similar levels of academic preparation, then this could lead to racial segregation.

Table 3 reports friendship shares by racial/ethnic group for those below and above the mean SAT score of their college. As before, Panel A focuses the composition of friends during college by racial/ethnic group. Blacks who have SAT scores below the mean (83 percent of the black sample) have friends that are 14 percentage points more likely to be black than black students with scores above the mean. For all racial/ethnic groups, having an SAT score below the mean increases the fraction of one's friends who are black. Similarly, Hispanics who have SAT scores below the mean (69 percent of the sample) have friends that are 10 percentage points more likely to be Hispanic than those with SAT scores above the mean. On the other hand, the 33 percent of Asians who have SAT scores below the mean have a lower share of Asian friends than those with above average SAT

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<sup>6</sup>It is important to note that the while the survey question refers to friends met since attending college, the friends reported may not necessarily be students.

scores.

While the results above may make it appear as though there is sorting into friendships by SAT score, similar patterns are also observed in the senior year of high school, as shown in Panel B of Table 3. Students with SAT scores below the mean were also more likely to have a greater share of black or Hispanic friends in high school. Asians with SAT scores above the mean were also more likely to have a greater share of Asian friends in high school. Later in this paper we will attempt to separate the importance of SAT scores and the racial makeup of past friendships in determining interracial friendships in college. Next, however, we use richer survey data to investigate the dynamics of racial composition of friends throughout college at a particular elite university.

## 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 enrolled at Duke University in 2001 and 2002 (graduating classes of 2005 and 2006). 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>7</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 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>8</sup> Hence, even though up to eight friends could be listed,

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<sup>7</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.

<sup>8</sup>The background for the friendship questions were “Other than your family members, think about your closest friends and most important people in your life.”



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

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%

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. Number of observations is 938, 858, 906, and 923 for blacks, Hispanics, Asians, and whites respectively.

Table 3: Patterns of Friendships Before and During College Conditional on SAT Score Category:  
NLSF

<i>Panel A: Share of Friends During College</i>						
		Black	Hispanic	Asian	White	Obs
Black	$SAT \leq \overline{SAT}$	59%	7%	9%	25%	582
	$SAT > \overline{SAT}$	45%	7%	9%	38%	120
Hispanic	$SAT \leq \overline{SAT}$	14%	22%	12%	52%	476
	$SAT > \overline{SAT}$	10%	12%	12%	65%	218
Asian	$SAT \leq \overline{SAT}$	10%	5%	33%	52%	254
	$SAT > \overline{SAT}$	7%	4%	38%	51%	527
White	$SAT \leq \overline{SAT}$	8%	4%	11%	76%	304
	$SAT > \overline{SAT}$	6%	5%	13%	76%	495

  

<i>Panel B: Share of Friends Before College</i>						
		Black	Hispanic	Asian	White	
Black	$SAT \leq \overline{SAT}$	58%	6%	7%	29%	
	$SAT > \overline{SAT}$	42%	5%	11%	42%	
Hispanic	$SAT \leq \overline{SAT}$	10%	32%	10%	48%	
	$SAT > \overline{SAT}$	6%	18%	11%	65%	
Asian	$SAT \leq \overline{SAT}$	9%	6%	31%	54%	
	$SAT > \overline{SAT}$	4%	4%	40%	51%	
White	$SAT \leq \overline{SAT}$	6%	5%	9%	80%	
	$SAT > \overline{SAT}$	5%	4%	10%	81%	

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.

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 Admission's rankings. These private Duke rankings covered 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 4. 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 5 shows friendship patterns over time, where only those who responded to all surveys are included in the sample.<sup>9</sup> As with the NLSF, all racial groups display own-race preferences, with the strongest own-race preferences exhibited among blacks. For example, black students represent 8 percent of the Duke student population, however their share of own-race friends ranges from 68 to 72 percent between their freshman and senior years in college. Even more striking, Table 5 shows that black students have a higher percentage of black friends in college than they did in high school.<sup>10</sup> Note that this is not true for any other racial/ethnic groups: all other groups have a lower share of own-race friends in their freshmen year of college than they did in high school.

We next investigate homophily by academic preparedness. Given the relatively small sample sizes, we compare friendships patterns for those above and below their group's median SAT score.

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<sup>9</sup>Results were similar if we did not condition on responding to every survey.

<sup>10</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.

Results are given in Table 6. Blacks with SAT scores below the black median SAT score have slightly fewer Duke friends as freshmen (Panel A), with the gap growing by their senior year (Panel B). Blacks with relatively lower SAT scores also have a greater share of friends who are black. However, for blacks with either high or low relative SAT scores, friendships are less diverse as seniors than as freshmen. For Hispanics with relatively low SAT scores we also see a higher fraction of Hispanic friends. Also, Hispanics with low relative SAT scores have a higher share of black friends.

In summary, both the NLSF and CLL data show significant patterns of own-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. Finally, there is some evidence that similarity in academic backgrounds may be playing a role in these patterns. Namely, more integration appears to be occurring for blacks when they have higher SAT scores, with some evidence that this is also occurring for Hispanics.

### 3 Empirical Approach

In our empirical approach, we aim to disentangle similarity in characteristics from tastes for friendships with individuals of certain races/ethnicities. 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.

#### 3.1 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,  $A_j$ , 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

Table 4: 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 5: 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 6: Friends by Race and SAT Score Category: CLL

<i>Panel A: Share of Duke Friends Freshmen Year</i>							
		Black	Hispanic	Asian	White	Total	Obs
Black	$SAT \leq Med.SAT_b$	71%	3%	7%	18%	2.6	64
	$SAT > Med.SAT_b$	62%	2%	7%	29%	2.8	66
Hispanic	$SAT \leq Med.SAT_h$	11%	17%	7%	65%	3.1	56
	$SAT > Med.SAT_h$	6%	6%	6%	81%	2.9	48
Asian	$SAT \leq Med.SAT_a$	3%	4%	42%	50%	2.9	58
	$SAT > Med.SAT_a$	8%	4%	39%	50%	2.7	68
White	$SAT \leq Med.SAT_w$	7%	6%	7%	79%	3.2	138
	$SAT > Med.SAT_w$	4%	4%	9%	84%	3.3	148

  

<i>Panel B: Share of Duke Friends Senior Year</i>							
		Black	Hispanic	Asian	White	Total	
Black	$SAT \leq Med.SAT_b$	76%	4%	5%	16%	3.0	
	$SAT > Med.SAT_b$	69%	3%	5%	23%	3.8	
Hispanic	$SAT \leq Med.SAT_h$	14%	18%	10%	59%	4.3	
	$SAT > Med.SAT_h$	7%	5%	8%	80%	4.0	
Asian	$SAT \leq Med.SAT_a$	3%	4%	53%	40%	3.9	
	$SAT > Med.SAT_a$	8%	5%	48%	40%	3.8	
White	$SAT \leq Med.SAT_w$	4%	6%	8%	82%	3.7	
	$SAT > Med.SAT_w$	4%	4%	11%	82%	4.2	



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 own-race friendships with race  $r$  and then considering only cross-race friendships with race  $r$ .

### 3.2 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:

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

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 ranking variables, etc.), we specify first year grades,  $G_i$  as following:

$$G_i = Z_i\gamma + \zeta_i \quad (5)$$

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

$$AI_i = Z_i\hat{\gamma} \quad (6)$$

where  $\hat{\gamma}$  are the estimated coefficients from (4).

## 4 Results

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

#### 4.1.1 Own-race friends

We begin by estimating ordered probits of the number of own-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 with a standard deviation of 1.4. A one standard deviation increase in the within-school SAT score of blacks is associated with a decrease in the number of black friends by 0.8 and 0.33 for the base model and the model with additional controls, respectively. A one standard deviation increase in the within-school academic index of blacks would similarly decrease the number of same-race friends by 0.9 and 0.45.

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.

#### **4.1.2 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

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

<i>Panel A: Own-Race Friends and SAT score</i>								
	Black	Hispanic	Asian	White	Black	Hispanic	Asian	White
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)
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)
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: Own-Race Friends and Academic Index (AI)</i>								
	Black	Hispanic	Asian	White	Black	Hispanic	Asian	White
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)
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)
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)

black friends. In contrast, higher levels of academic preparation are associated with more white and Asian friends.<sup>11</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. As before, adding additional controls mitigates the importance of the academic measures but does not remove it.

To get a sense of the importance of the results, the fraction of whites who listed at least one black friend was slightly less than fifty percent. A one standard deviation increase in the within-school SAT score of whites decreases the probability of having at least one black friend by 6.3 and 3.3 percentage points for the base model and the model with additional controls, respectively. A similar increase in the academic index decreases the probability of having at least one black friend by 5.5 and 3.6 percentage points.

## 4.2 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>12</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>13</sup>. The first set of columns controls for gender, indicators for friend race, and absolute difference in academic preparation, while the second set adds a second order polynomial of number of own-race friends in high school, and interactions between friend race and high school racial composition.<sup>14</sup>

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<sup>11</sup>No significant differences are found for the number of Hispanic friends.

<sup>12</sup>This implies that for each individual we have three observations (i.e. number of friends for each other racial group).

<sup>13</sup>The number of observations in columns 1 to 4 of Panel A are 2616, 2223, 2238 and 1923, respectively, while those for Panel B are 1958, 1695, 1917, and 1656.

<sup>14</sup>The CLL provides some information on high school diversity, i.e. mostly white, half white, mostly non white, or

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
Female	-0.083*	-0.052	-0.115**	-0.027	-0.058	-0.050	-0.108**	-0.042
	(0.049)	(0.054)	(0.050)	(0.046)	(0.050)	(0.054)	(0.050)	(0.046)
SAT (00's)	-0.149***	-0.014	0.099***	0.183***	-0.103***	-0.004	0.072***	0.101***
	(0.021)	(0.022)	(0.020)	(0.019)	(0.021)	(0.023)	(0.021)	(0.020)
Black		0.257***	-0.166**	-0.615***		0.230***	-0.169**	-0.465***
		(0.071)	(0.066)	(0.062)		(0.072)	(0.066)	(0.063)
Hispanic	0.408***		0.040	0.354***	0.354***		0.028	0.218***
	(0.061)		(0.060)	(0.057)	(0.061)		(0.061)	(0.058)
Asian	0.070	-0.005			0.036	-0.037		
	(0.058)	(0.063)			(0.059)	(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
Female	0.022	-0.048	-0.201***	-0.145***	0.010	-0.060	-0.169***	-0.111**
	(0.051)	(0.056)	(0.052)	(0.049)	(0.051)	(0.057)	(0.053)	(0.049)
AI	-1.084***	-0.111	0.513***	1.442***	-0.753***	0.036	0.336**	0.914***
	(0.165)	(0.177)	(0.160)	(0.145)	(0.174)	(0.180)	(0.164)	(0.153)
Black		0.215**	-0.087	-0.398***		0.235**	-0.126	-0.314***
		(0.095)	(0.087)	(0.077)		(0.096)	(0.088)	(0.078)
Hispanic	0.177**		0.080	0.595***	0.201***		0.040	0.382***
	(0.076)		(0.075)	(0.068)	(0.077)		(0.076)	(0.068)
Asian	0.025	-0.048			0.018	-0.068		
	(0.059)	(0.065)			(0.060)	(0.065)		
Additional								
Controls	N	N	N	N	Y	Y	Y	Y
					0.492***	0.359***	0.335***	0.272***

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 white freshmen, a one standard deviation increase in the academic background measure decreases the probability of having at least one black friend by between 1.5 and 2 percentage points depending on the set of controls and the particular academic background measure.<sup>15</sup> The effect of academic background on limiting interracial friendship appears to remain fairly constant over time. For white seniors, a one standard deviation increase in academic background decreases the probability of having a black friend by between 1.1 and 2 percentage points. While these numbers may seem small, the overall probability of a white student having a black friend was around only 15 percent for both freshmen and seniors.<sup>16</sup>

## 5 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 on the role of academic background in forming friendships across races. Two measures of strength of academic background were considered: individual SAT scores and an academic index based on first year grades.

Our results suggest that both common race and similar academic background significantly in-

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<sup>15</sup>These calculations involve increasing each white student's academic background and then using the estimates to calculate the average change in the probability of having at least one black friend.

<sup>16</sup>As described previously, the fraction who have a black friend is much smaller here than in the NLSF, in part due to the CLL asking for fewer friends (8 instead of 10) and, among those friends, students could list both individuals that were at Duke and outside of Duke.

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
Black friends	-1.410*** (0.087)	-1.554*** (0.094)	-1.014*** (0.230)	-1.051*** (0.258)
Hispanic friends	-1.543*** (0.085)	-1.604*** (0.088)	-1.028*** (0.218)	-1.052*** (0.240)
Asian friends	-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)
$ SAT_i - \overline{SAT}_r $ (00's)	-0.102** (0.040)	-0.123*** (0.045)	-0.086* (0.046)	-0.063 (0.051)
Additional				
Controls	N	N	Y	Y
<i>Panel B: Other-Race Friends and Academic Index</i>				
	Freshman	Senior	Freshman	Senior
Black friends	-1.304*** (0.105)	-1.492*** (0.113)	-1.208*** (0.247)	-1.129*** (0.285)
Hispanic friends	-1.511*** (0.098)	-1.609*** (0.101)	-1.184*** (0.229)	-1.043*** (0.257)
Asian friends	-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)
$ AI_i - \overline{AI}_r $	-0.422** (0.175)	-0.415** (0.180)	-0.400** (0.184)	-0.328* (0.194)
Additional				
Controls	N	N	Y	Y



fluence friendship formation. Within the larger sample of colleges, 58 percent of friends reported by black students were themselves black. Conversely, only 7 percent of whites' reported friends were black. Friends were even more racially segregated at Duke, with such patterns holding constant or even increasing throughout one's college career. Further, students tended to have the same or less diverse friendship groups in college than they did in high school.

An ordered probit analysis of the number of same-race friends within the larger college sample suggest that both higher SAT scores and higher academic background index are associated with fewer same-race friends if the individual is black or Hispanic, but have no effect on the number of same-race friends for Asians or whites. Higher academic preparation is also inversely related to the number of black friends among non-black students, such that, for the typical white student, a one standard deviation increase in SAT score decreases the probably of having at least one black friend by 3.3 percent. An ordered probit analysis of Duke students' friendships confirms these findings. In particular, a one standard deviation increase in the strength of a white student's own academic background relative to average background of black students decreases the probability of having at least one black friend by between 1.5 and 2 percent. Discouragingly, these effects do not appear to diminish with more time in college.

These results suggest that affirmative action policies are likely to influence friendship formation in college. By introducing a substantial mismatch between the academic characteristics of targeted groups and the population of the campus as a whole, 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 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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