Social Context on College Campus and Socioeconomic Differences in BA Attainment

Extended Abstract

Submitted to PAA 2019 Annual Meeting

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ABSTRACT

The recent expansion of open admission colleges in US higher education increased the rate of college attendance among low-income students, but have also contributed to greater income segregation between institutions, effectively changing the social environment students encounter on their campuses. Using data from nationally representative cohort of high school students in the 2000s (ELS 2002), along with information on the campuses they enrolled in from the College Scorecard Data, I examine whether and how college social environment impact student BA attainment. Results confirm that (1) low-income students are substantially more likely to enter campuses that serve primarily other low-income students, even net of social, academic and organizational factors; and (2) campus social context is a significant predictor of students' BA attainment: students who attended colleges characterized by higher share of low-income students were substantially less likely than observationally similar students attending other colleges to earn a bachelor's degree. These results hold even for the subset of students who attended open admission colleges. Together, college environment emerge as a key mechanism by which inequality is maintained during educational expansion.

INTRODUCTION

The first decade of the 21st century was marked with record expansion of postsecondary education. Enrollments in all types of postsecondary institutions increased by 35 percent during this time, from 22 million students in 2000 to nearly 30 million students in 2010. But not all types of postsecondary institutions expanded equally. Open admission colleges, especially community colleges and for-profit colleges, experienced the largest gains, both in enrollment and in the number of institutions (Deming et al 2012; Stevens 2015; Kirst, Stevens and Proctor 2010; Gelbgiser 2018). Between 2000 and 2010, the number of open admission colleges, primarily community colleges and for-profit colleges increased, by 14%, and enrollment at by 39%: from 11.5 to 16 million students. To compare, the number competitive admission colleges remained the same (and even decreased) throughout the period, and enrollment at these colleges increased by only 17%, or 1 million students (US Department of Education).[1]

This type of expansion—through the differentiation of institution types, and expansion of one tier of institutions—open admission colleges, in this case—can have complex implications for the composition of students in higher education. On the one hand, expending the number of slots available at open admission colleges is especially beneficial for the college attendance rates of low-income students, which habitually have weaker academic preparation and lower test scores that do not enable them to secure positions at competitive admission colleges (e.g., Sirin 2005; Reardon 2011; Alon 2009; Gelbgiser 2018; Leigh and Gill 2003; and Brand et al. 2014; Doyle 2009; Rouse 1995). Thus, it has the potential to increase the diversity of students who enter higher education (though not necessarily graduate). At the same time, if open admission colleges are becoming the main destination for low-income students, the diversity of the social environment low-income students are encountering on their respective campuses may be decreasing.

College campus, as a bounded social environment, is an important site for the formation of social, professional and romantic ties, especially during these formative college years. Lower social diversity on college campuses implies that low-income students in higher education will be less likely to socialize, study and engage with students from different social background. Ample evidence suggest that this can adversely impact the college outcomes of students and their chances for social mobility, especially low-income students. Exposure to different values, perspectives and goals can help students feel like they fit better in higher education, and increase their retention and graduation chances (Bowen and Bok 1998; Tinto 1987). Moreover, more diverse social networks are positively associated with finding better and more rewarding jobs (Granovetter 1973; Eagle, Macy, and Claxton 2010; Lin 1999; Son and Lin 2012) and marrying someone with better earning potential (McPherson, Smith-Lovin and Cook 2001; Musick et al 2012). Thus, above and beyond other factors, like college type of selectivity, the specific environment students encounter in colleges can be consequential for their outcomes.

Previous studies focused on how educational expansion impact the type of colleges students from different background attend (i.e., community colleges, for-profit colleges, 4- year

[1] Based on unduplicated 12 months head count enrollment files, author's calculations.

colleges), and how this variation is associated with inequality in student outcomes. Aggregate categories, valuable though they are, mask substantial variation in the environment students encounter on campus, even within the same types of institutions. I argue that this variation in college context—the organization level— can be an important mechanism that generates systematic variation in student' outcomes. To this end, I explore whether and how the social context students encounter on their campuses impact their outcomes, measured here as likelihood to earn a bachelor's degree.

Results from a large, nationally representative cohort of students who were in high school in the 2000s (ELS 2002), along with information on the composition of colleges they attend (the College Scorecard Data), indicate that (1) low income students are substantially more likely to encounter social environments that are characterized by high concertation of other low-income students; and (2) the context students encounter on their campus is a significant predictor of their likelihood to obtain a BA, even net of other social, academic and intuitional characteristics. These results hold even when only students who attended open admission colleges are considered: Low-income students who attended colleges characterized by lower family income were significantly less likely to a bachelor's degree than observationally similar students who attended open admission colleges characterized by higher family income. Thus, although the rate of college attendance among low-income students had increased, they are crowded in less favorable social context and institutions, which inhibit their chances for social mobility. Together, these results suggest that campuses' context is an important, yet unexplored, mechanism that contributes to the intergenerational transmission of inequality.

DATA AND VARIABLES

Data and sample

The empirical investigation in this study is based on the Educational Longitudinal Study of 2002 (hereafter "ELS"), a large, nationally representative longitudinal survey of students who were in 10th grade in 2002 and were re-surveyed in 2004, 2006 and in 2012 (NCES 2007). The main advantage of using the ELS to study changes in college composition on college campuses is the wealth of information on students collected prior to entering higher education, which allows for a careful assessment of changes in the relationship between students' background and the composition of the campuses they attend. The ELS contain detailed and comparable information about students' destinations in higher education, including the US Department of Education identifier of the institution ("unitid") and the year they began their schooling.

Information on college campuses context is taken from the College Scorecard Data, a publically available data compiled by the US Department of Education that contains institution-level information on college campus every year collected by NSLDS, the US Treasury Department, and IPEDS.[2] The main advantage of these data is that they are exogenous to the characteristics of the ELS respondents, and reflect the characteristics of all students on the campus, including older students, returning students and other non-traditional student

[2] The college scores data is available at https://collegescorecard.ed.gov/data.

populations. Since the data is collected for all accredited colleges in US higher education, they provide an accurate snapshot of the variation in college contexts encountered by students.

The analytic sample of this study consist 9,295 ELS (of which 8,173 attended college) respondents who (1) participated in all relevant waves, and (2) have valid non-missing information on the composition of their first college destination. I also limited the sample to students who graduated high school on time to avoid potential biases in students' transition to college, but I constructed appropriate sample weights that allow projections to the entire population of tenth graders in 2002.[3] I use item-specific best subset linear regression to impute missing information on the adjustment variables.[4]

Variables

Student Outcomes

The main outcome of interest is

- Degree obtained by 2012: a categorical variable indicating whether a student obtain a bachelor's degree by 2012.

College Context

Campus Social Context: The main predictor of interest, is measured composite measurement to characterize campus social composition, which takes information from five dimensions: (1) median family income on campus; (2) weighted average family income on campus (which takes into account both dependent and independent students); (3) the average Median household income in student home zip code; (4) average poverty rate at students' home zip code; (5) the % of students who receive federal student loans.[5] I used principle component analyses on these five dimensions to generate a campus social context factor scores. The factor scores are calculated for the entire population of accredited US postsecondary institutions in 2005 (N=5,540), regardless of the ELS cohort destinations. The factors scores are centered, with a lower score indicating fewer family income resources in college, and higher score indicates higher family income resources.[6] To detect non-linear effects of college campus, I also collapse factor scores into three main campus context categories: (1) *primarily* l*ow family income campuses,* which consists of campuses at with factor scores at the bottom 25% of the campus scores distribution; Campuses with scores in the middle 50% of the social context factor distribution are categorized as *mixed*

[3] In both surveys, I weight the data by the 10th grade and last follow-up panel weight developed by the data distributors, multiplied sequentially by two estimated inverse probabilities that account for (a) non-participation in all four waves of the survey and (b) non-response on the dependent variable (college destination and campus composition). The estimated probabilities for (a) and (b) for each study are drawn from separate logit models that predict inclusion in the relevant restricted sample (estimated separately in each study) with demographic characteristics, family background, and base-year indicators of academic engagement.

[4] The comparable NELS analytic sample is N=9,109 of which 7,385 attended college. I constructed comparable weights for the NELS respondents.

[5] Dimensions 1 and 2 and 5 are derived by the NSLDS, dimensions 3 and 4 are calculated by the US Treasury Department.

[6] I focus institutions students attended up to three years after high school since these years are formative in terms of social, academic and professional ties. Due to data availability, information on the composition of campus for the ELS respondents is based on the 2004-5 cohort.

family income campuses; campuses at the top 25% of the social context factor distribution are classified as *primarily high family income campuses*.

While these dimensions do not exhaust all aspects of campus social context, they nonetheless capture substantial variation in the context students' encounter in higher education. Table 1, which presents the means and standard deviations of each dimension by the category of campus social context, confirms that differences contexts student encounter in higher education are substantial: The average median yearly family income at primarily low family income campuses is $11k in comparison to $49k in primarily high family income campuses. Similarly, the average poverty rates at student' zip code at primarily low family income campuses is more than double the rate at primarily high family income campuses: 16% v. 6.6%. On average, 69% of students at primarily low family income campuses receive federal aid, relative to only 28% of students at primarily high family income campuses.

[Table 1 about here]

In addition to social context, I account for other sources of variation in college campuses that can be associated with student outcomes, including total revenues, size of undergraduate population, and faculty/research staff to student ratio.

College type: I account variations in college type, which are correlated both with student outcomes, and with college context, including college level (4-year v. less than 4-year), control (for-profit, public, private not for-profit), and admission policy (open admission v. competitive admission).[7]

Since low income students are primarily concentrated at open admission colleges, most notably community colleges, I also present results only for the subset of students who attended community colleges.

Student Characteristics

Student Family Income: The main stratifying variable in this study is measured in the ELS base year (2002), and divided into 3 groups: *low income students* are students whose family income falls at the bottom 25% of the family income distribution (bellow 30k 2002 dollars); *Middle income students* whose family income is in the middle 50% of the distribution (between 30 and 88k 2002 dollars), and high-income students, whose family income is in the top 25% of the distribution (over 88k 2002 dollars)

Student college destinations, campus context, and outcomes are all associated with student social background, academic preparation, standardized test scores, aspirations and attitudes toward education. One of the main benefits of the ELS, is that it contains detailed information on student

[7] Information on competitiveness is obtained from the Barron's Competitive Admission Index Data (NCES 2009), and the IPEDS.

background prior to enrolling in college, which allow careful consideration of the relationship between campus context and student outcomes. The models in this paper include the following adjustments:

- Student Academic preparation: the ELS administrated math tests to respondents in the 10th and 12th grade, and reading tests in the 10th grade. I use the standardized score of students to capture the location of students on the distribution of math and reading relative to other students. I also include measures for college entrance exam (SAT and ACT), which were converted to percentile scores to enable comparisons over time.
- Attitudes and expectations: expectations and attitudes towards school are measured using two indicators: (1) *Students' educational expectations* is measured using a dummy variable coded 1 if students anticipated when they were in the 12th grade that they will earn a bachelor's degree. (2) *Students' commitment to school* is a composite measurement (standardized and centered) containing information reported from 32 different indicators about students' behavior in school reported in the 10th grader by parents, teachers and students at each cohort.
- Social and demographic factors: including gender, race (Hispanic, black, white, Asian or other), geographic regions (Midwest, northeast, south, west), type of locality (urban, rural, suburban), and high school type (private, public, catholic).[8]

RESULTS

[PAA Organizer: for brevity, I present here only some of the results. Additional sensitivity analyses, and models that address selection bias will be added to the paper. As you can see, the data is coded, and is currently being analyzed. The additional models will be completed before the required PAA deadline for uploading full papers.]

Social Background and Campus Social Context

Do students from different social background encounter different social contexts in college? Figure 1a graphs the distribution of campus social context scores by student family income for the ELS cohort. As expected, there are substantial differences in the social context low income students encounter on their colleges. Low income students are concentrated in campuses with lower social context scores, while middle income, and especially high-income students are concentrated in campuses with higher social context scores. Interestingly, the shape of the distributions is also different: low-income students have substantially less variance in the college context than middle-income and high-income students. Together, this suggest that low income students are encounter less diverse social environments than middle- and high-income students.

[Figure 1 here]

[8] I do not include measurements for parental education since it is highly correlated with students' family income and therefore is implicitly included in the model.

Differences in college social context reflect, to some extent, socioeconomic differences in student academic preparation, standardized test scores, attitudes and educational aspirations, and type of college they attend. I estimate a series of OLS models predicting the social context score of student campus as a function of student' income, while also accounting for variation in student social and academic background, attitude and expectations, and the characteristics of the college they attended (Model 1-4, Table 2). The reference category in these models is high income students, so the coefficient for low income students can be interpreted as the difference for between low- and high- income students. Model 1 estimate the raw differences between students from different backgrounds, indicating a raw difference of 1.16 between the campus context score low- and high-income students. This difference is mitigated by about .34 when adjustments for student' attitudes, social and academic background factors (Model 2), and the characteristics of the institution they attend (Model 3) are included in the model, though it remains significant.

Some of the differences in the college campus context are likely explained by low income students' higher rates of attendance at open admission colleges. Thus, it is possible that if we look only at open admission colleges, we will see less variation in the campus context students from different social background encounter. To examine this, I estimated the fully adjusted model only for the subset of students who attended open admission colleges (Model 4). Results indicate that while differences are smaller, they are still large and significant: net of other social, academic, attitudinal, and institutional factors, low- and high- income students who attend open admission colleges encounter substantially different social environments, with low- income students concentrated at campuses who serve primarily other low-income students. Similar results are obtained when I estimate the likelihood of students from different background to attend campuses that serve primarily students from low-income families (Model 5-8, Table 2).

[Table 2 here]

Differences in student contexts are evident in Figure 2a, which plots the raw and adjusted rates of students from different social background who attend campuses that serve primarily low family income students (based on Model 4 and 7 in Table 2). The differences in context are striking: 24% of low-income students attend colleges that serve primarily low-income students, relative to only 4% of high income students- a gap of 20 percentage points. Once social, academic, attitudinal and institutional factors are accounted for, the gap deceases by 75%- to only 5 percentage points. These results hold even when we focus only on students who attend open admission colleges (Figure 2a). The difference in the likelihood to attend open admission college that serve primarily low-income students between low- and high-income students decrease by more than half- from 20 percentage points to 9 percentage points.

[Figure 2a and 2b here]

College context and BA attainment

Low and high-income students, even those that attend open admission colleges, encounter substantially different social environments on their campus. How consequential are these differences to student outcomes? I fit a series of multinomial models predicting student degree attainment as a function of their campus composition to examine this question. First, I estimate bachelor's degree attainment as a function of campus composition alone. This model gives the naïve, or maximum, estimate of the effect of campus social context on BA attainment. Next, I add the vector of social, academic, attitudes, aspirations, and institutional characteristics to the model. The coefficient for campus context in this model can be interpreted as the adjusted effect of campus social context on student outcomes. I estimate these models first for low- and high-income student separately, and then for the entire population of students.

The results from these models, presented in Table 3, show that campus composition is a significant predictor of student' likelihood to earn a BA, even when detailed measures of student social background, academic preparation, test scores, attitudes and aspirations, and type of college they attend are accounted for: even in the adjusted models the effect is positive and statistically significant, indicating that net of all other factors, campus social context is positively associated with BA attainment. The interaction between student family income and social context are not significant, and the effects of campus social context for low- and high- income students is similar in magnitude, suggesting that the effect may not vary by student social origin. Model 9, which fit the full model (without interactions) to the subset of students who attend open admission colleges, the main destination for low-income students, suggest that even among this select group of students, the social context of campus is associated with students' likelihood to obtain a BA. The association between campus social context and student outcomes is evident in Figure 3A and 3B, which graph the adjusted probabilities of low-income students to obtain BA as a function of the social context of their college. Figure 3a plots the adjusted probability for all low-income students (based on Model 7), and Figure 3b plots the adjusted probability for low income students at open admission colleges (from Model 9).

[Table 3 here]

[Figure 3a and 3b here]

College Campus and Socioeconomic Differences in BA Attainment

Although the effect of campus composition does not vary significantly by student family income, Table 2 show that low income students are substantially more likely to attend colleges characterized by higher rate of low income students. Thus, they are substantially more likely to experience the negative implications of college campus. What is the relative importance of campus context to socioeconomic inequality in BA attainment? What share of the gap does it explain, above and beyond other factors?

To answer this question, I ask a counterfactual question: what would be the gap in BA attainment between low- and high- income students if low and high-income students studied at similar contexts, but everything else would remain the same?

[Dear session organizer: please note that results for these analyses, along with additional sensitivity analyses for other context variables, and models that address selection bias, will be added to the full paper]

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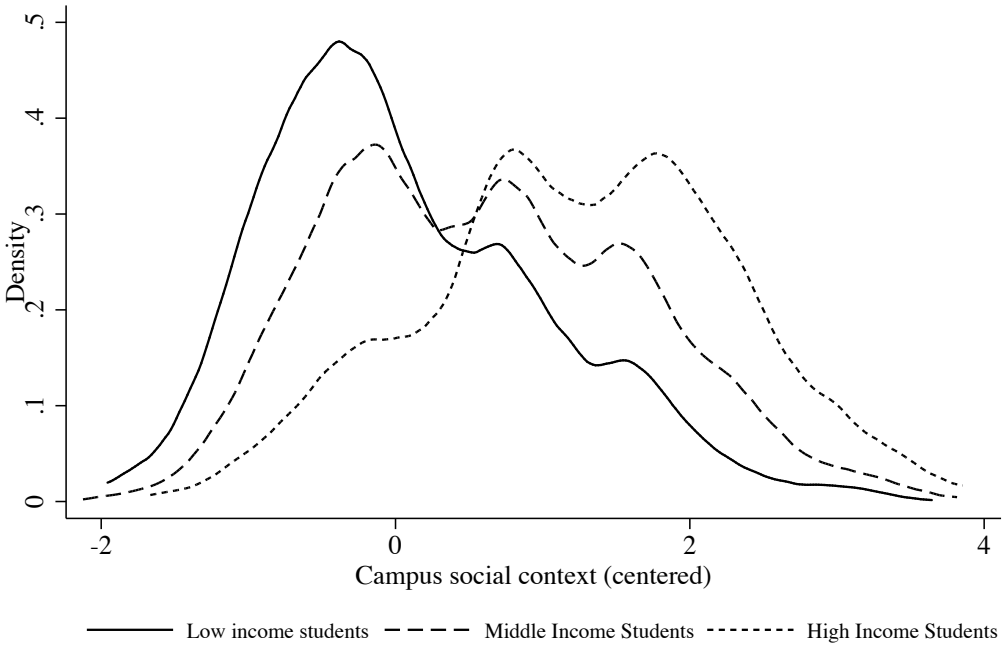
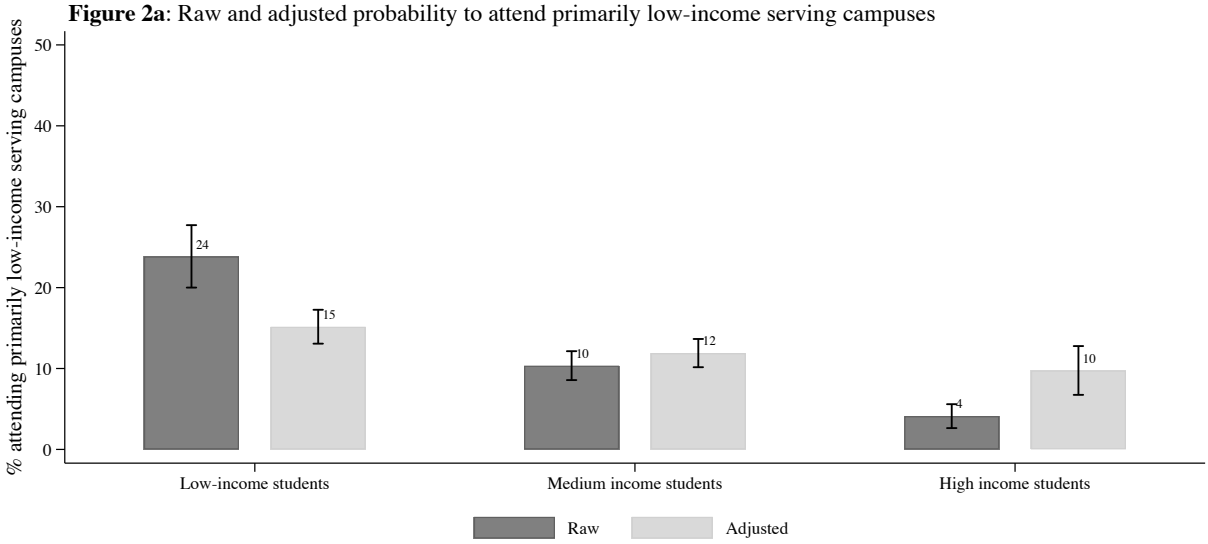
Figure 1: Social Context Scores in Students Campuses, by Student Family Income



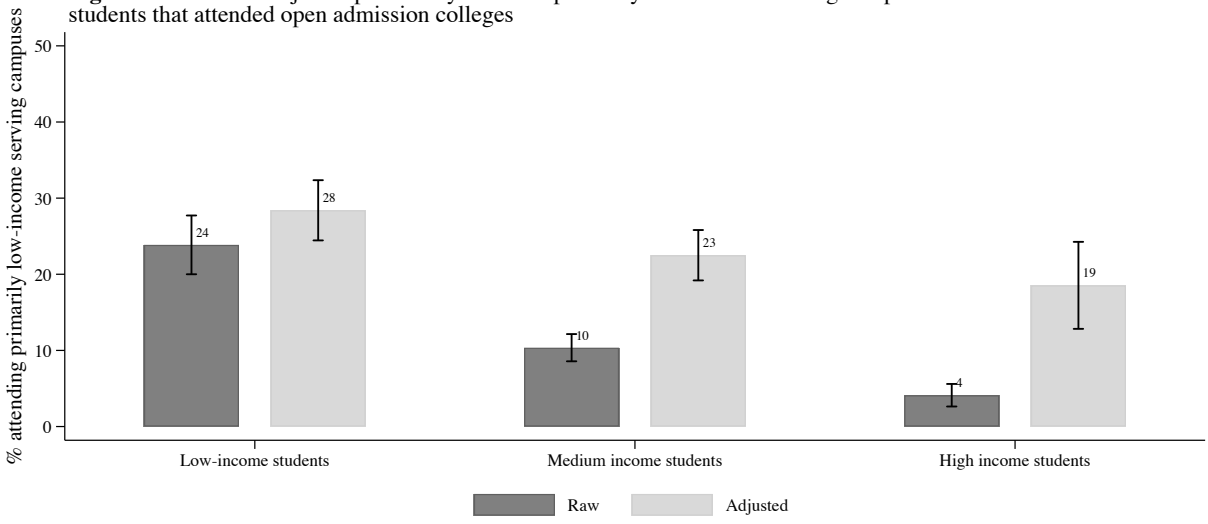
Source: ELS (N=8153) and College Scorecard Data

Figure 2a: Raw and adjusted probability to attend primarily low-income serving campuses



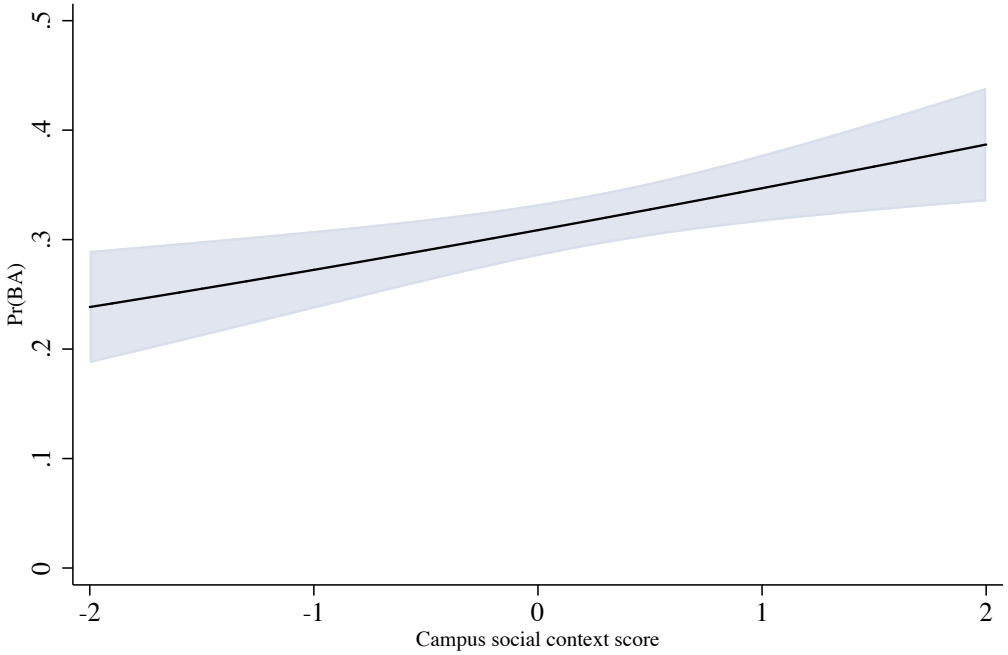
Source: ELS 2002 and College Scorecard Data

Figure 2b: Raw and adjusted probability to attend primarily low-income serving campuses students that attended open admission colleges



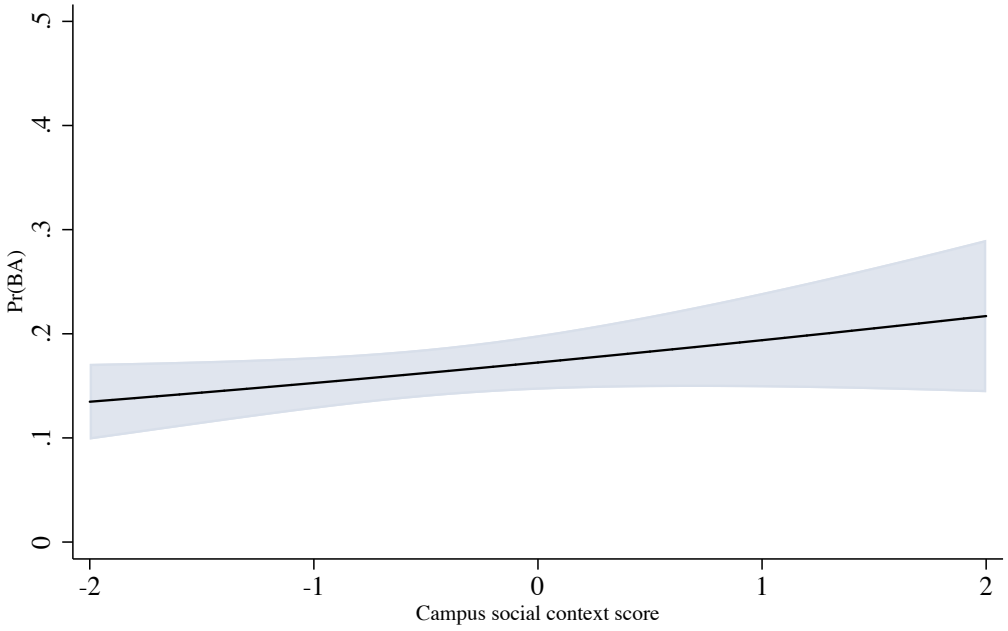
Source: ELS 2002 and College Scorecard Data

Figure 3a: Adjusted predicted probabilities to obtain BA among Low Income Students



Source: ELS (N=8153) and College Scorecard Data

Figure 3b: Adjusted predicted probabilities to obtain BA,
Low Income Students at Open Admission Colleges



Source: ELS (N=8153) and College Scorecard Data

Table 1: Means and SD of campus family income context variables

Dimensions of Campus Social Context	Primarily low family income campuses		Mixed family income campuses		Primarily high family income campuses	
	Mean	SD	Mean	SD	Mean	SD
Campus factor score	-1.1	0.3	-0.1	0.4	1.4	0.7
Average family income	13,281.5	3,521.6	24,079.6	6,918.1	52,362.9	14,209.6
Median family income	11,171.4	3,382.3	20,825.6	6,498.0	48,836.8	13,494.8
Avg. median household income in student home zip code	46,621.7	6,518.2	58,469.2	8,737.8	68,942.5	8,946.5
Avg. poverty rates in student home zip code	16.0	4.7	9.2	2.4	6.6	1.5
Avg. % of students who receive federal aid on campus	69.3	20.3	48.8	21.4	28.0	13.3
Number of colleges rated	1,385.0		2,770.0		1,385.0	

Source: College Scorecard Data, US Department of Education (entering cohorts of 2004-5)

Table 2: Coefficients from OLS and logit models predicting the social context in students' campus. Students who were in 10th grade in 2002

Outcome:	Campus social context score				Attend primarily low family income campuses			
Estimation method:	OLS				Logit			
Sample:	All students			Only students that attended open admission colleges	All students			Only students that attended open admission colleges
Model #	1	2	3	4	5	6	7	8
Student family income (high income=0)								
Low income students	-1.16**	-0.47**	-0.34**	-0.24**	1.99**	0.95**	0.65**	0.57*
	(0.052)	(0.040)	(0.034)	(0.048)	(0.201)	(0.211)	(0.220)	(0.241)
Medium income students	-0.63**	-0.35**	-0.22**	-0.12**	0.99**	0.60**	0.28	0.18
	(0.043)	(0.033)	(0.027)	(0.042)	(0.186)	(0.191)	(0.202)	(0.226)
Student Characteristics		Yes	Yes	Yes		Yes	Yes	Yes
College Characteristics			Yes	Yes			Yes	Yes
Constant	1.14**	-0.00	0.83**	0.14+	-3.15**	-2.71**	-4.21**	-2.82**
	(0.044)	(0.077)	(0.079)	(0.081)	(0.191)	(0.473)	(0.539)	(0.492)
Observations	8,145	8,145	8,145	3,514	8,145	8,145	8,145	3,514
R-squared/ Pseudo R-square	0.119	0.426	0.629	0.308	0.0539	0.201	0.304	0.160
Model chi-square					129.7	367.9	452.1	155.6
df					2	19	23	22
Log Likelihood2					-791759	-668375	-668375	-517210

Source: ELS 2002 and College Scorecard Data
Individual characteristics include gender, race, home region, HS type, locality, academic background (math and reading scores in 10th grade), standardized test scores, educational expectations, commitment.
Institutional characteristics include college control, level and admission policy.
Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1

Table 3: Coefficients from logit models predicting BA attainment. Students who were in 10th grade in 2002

Sample:	Low Income students		High Income students		All students				Students that attended open admission colleges
Model #	1	2	3	4	5	6	7	8	
Campus social context	0.90**	0.23*	0.81**	0.27*	0.87**	0.29**	0.22**	0.29**	0.16+
	(0.084)	(0.106)	(0.087)	(0.122)	(0.037)	(0.049)	(0.069)	(0.089)	(0.095)
Campus social context (squared)							0.05+		0.14+
							(0.029)		(0.074)
Student social background (high income=0)									
Low Income students					-0.82**	-0.47**	-0.47**	-0.48**	-0.55**
					(0.107)	(0.116)	(0.116)	(0.147)	(0.209)
Medium income students					-0.54**	-0.36**	-0.35**	-0.36*	-0.33+
					(0.095)	(0.100)	(0.101)	(0.141)	(0.198)
Low income*Campus social context								0.02	
								(0.114)	
Medium income*Campus social context								-0.00	
								(0.095)	
Student Characteristics	No	Yes	No	Yes	No	No	No	Yes	No
College Characteristics	No	Yes	No	Yes	No	No	No	Yes	No
Constant	-0.86**	-2.03**	0.02	-1.56*	-0.04	-1.60**	-1.60**	-1.60**	-2.05**
	(0.070)	(0.407)	(0.121)	(0.625)	(0.093)	(0.229)	(0.229)	(0.239)	(0.304)
Observations	2,021	2,021	1,563	1,563	8,145	8,145	8,145	8,145	3,514
Model chi-square	114.2	366.9	85.81	166.6	690.3	1472	1497	1481	344.9
df	1	21	1	21	3	23	24	25	23
Log Likelihood2	-324480	-280596	-188812	-169904	-1265061	-1121122	-1120529	-1121105	-494272
Pseudo R-squared	0.108	0.228	0.102	0.192	0.153	0.249	0.250	0.249	0.136

Source: ELS 2002 and College Scorecard Data
Individual characteristics include gender, race, home region, HS type, locality, academic background (math and reading scores in 10th grade), standardized test scores, educational expectations, commitment.
Institutional characteristics include college control, level and admission policy.
Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1