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Potholes on the Road to College: High School Effects in Shaping Urban Students' Participation in College Application, Four-year College Enrollment, and College Match

Melissa Roderick[1], Vanessa Coca[2], and Jenny Nagaoka[2]

Abstract

This article examines the extent to which indicators of the college-going climate of urban high schools are associated with students' application to, enrollment in, and choice among four-year colleges. The investigators examine two mechanisms by which high schools may shape college enrollment among low-income students in an urban school system: (1) by ensuring whether seniors who aspire to a four-year college degree take the steps to apply to and enroll in a four-year college, and (2) by influencing whether students enroll in colleges with selectivity levels at or above the kinds of colleges they are qualified to attend (a "college match"). We investigate different approaches to measuring college-going climate and develop new indicators. Findings suggest that qualifications and college aspirations will not necessarily translate into four-year college enrollment if urban high schools do not develop organizational norms and structures that guide students effectively through the college application process. Urban students who attend high schools where there is a pattern of four-year college-going, where teachers report high expectations and strong supports for college attendance, and where there is high participation in financial aid application are more likely to plan to attend, apply to, be accepted into, and enroll in a four-year college that matches their qualifications.

Keywords

urban high schools, social capital, college-going culture, college access, college match

Two recent evaluations of policy initiatives aimed at increasing access to the nation's top colleges for low-income students came to strikingly similar conclusions: The high school that students attend matters in terms of whether qualified low-income students are able to respond to new policy initiatives (Avery et al. 2006; Koffman and Tienda 2008). These findings are quite consistent with prior studies. Low-income students with similar qualifications are less likely than their more advantaged peers to apply to top-tier private and flagship state universities (Pallais and Turner 2006), and high school college-going patterns

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are strongly associated with individual students' likelihood of college application and enrollment and the quality of college that students attend (Alexander and Eckland 1977; Manski and Wise 1983).

These findings present a significant challenge to policy efforts aimed at increasing access to college for low-income and minority students. Over the past several years, the policy discussion around increasing college access has coalesced around two central explanations: (1) poor academic preparation and (2) the declining real value of financial aid, combined with rising college costs (Advisory Committee on Student Financial Assistance 2006; U.S. Department of Education 2006). Implicit in these policy discussions is the assumption that low-income students have the information and support they need to respond to new incentives and opportunities. They presume that if students were more qualified, they would be able to navigate the college search and application process and translate those qualifications into enrollment in four-year colleges. The potential importance of high school effects, however, suggests that the extent to which students have access to supports and norms for college within their high schools may shape the efficacy of new policy initiatives and, ultimately, whether efforts to increase college access reach those students who are the intended beneficiaries.

The goal of this paper is to examine the extent to which indicators of the college-going climate of urban high schools are associated with students' application to, enrollment in, and choice among four-year colleges. We examine two mechanisms by which high schools may shape college enrollment among low-income students who aspire to a four-year degree: (1) by ensuring whether seniors effectively take the steps to apply to and enroll in a four-year college and (2) by influencing their choice among four-year colleges, as indicated by whether graduates enroll in a four-year college with selectivity levels that matches their qualifications (a ''college match''). This article first describes patterns in urban students' college application and enrollment on these two sets of outcomes using data from the Chicago Public Schools (CPS). We then investigate different approaches to measuring the college-going climate of high schools and examine the extent to which these indicators are associated with whether urban students take the steps necessary to apply to and enroll in four-year colleges and whether they enroll in a college match.

BACKGROUND

Missing from the Application Pool?

A consistent finding in educational research is that low-income students with qualifications similar to their more advantaged peers are less likely to attend college, are more likely to attend two- versus four-year colleges, and are less likely to apply to top-tier institutions (Hanson 1994; Hearn 1991; Kane 1999; Manski and Wise 1983; Pallais and Turner 2006). Many looking at these differences in college enrollment suggest that the problem is credit constraints and the rising cost of four-year colleges (Advisory Committee on Student Financial Assistance 2006; U.S. Department of Education 2006). Another interpretation is that the problem is not simply one of college costs but rather the extent to which low-income and minority students do not attend high schools that guide them successfully into the application pool. There is emerging evidence that high schools matter. Avery and others (2006) evaluated early effects of Harvard's financial aid initiative, which guarantees full financial aid to students with family incomes below $60,000. They found evidence that the initiative led to an increase in applicants from lower-income families, yet many highly qualified students—identified through the College Board search files—did not apply to Harvard. These students missing from the application pool tended to be concentrated in high schools with little or no tradition of sending students to selective colleges.

A similar conclusion was reached by Koffman and Tienda (2008) in their evaluation of the effect of the Texas top 10 percent law. In this case, the policy did not remove financial constraints but removed possible qualifications constraints. The Texas top 10 percent law guarantees admission to any Texas public college for students who graduate in the top 10 percent of their class regardless of their standardized test scores. The evaluators found that although the policy led students from a larger number of high schools to apply to the Texas flagship universities, the increase in applications was largely driven by applicants from more affluent high schools (Koffman and Tienda 2008; Long, Saenz, and Tienda 2010). They conclude that the admissions guarantee ''did little to raise flagship applications from poor high schools'' (Koffman and Tienda 2008). How can we explain these two sets of findings? Addressing this question requires that we bring

together two sets of literatures. First, what does previous research tell us about the processes by which low-income students fall short in college application? And, second, what does previous research tell us about how high schools may shape those outcomes?

Constrained College Application and Constrained College Choice

There is a substantial body of research that suggests that low-income and minority students often do not have access to the information and guidance needed to effectively navigate the college application process (Cabrera and La Nasa 2000a, 2000b; Gonzalez, Stoner, and Jovel 2003; Howard 2003; McDonough 1997; Person and Rosenbaum 2006; Schneider and Stevenson 1999; Stanton-Salazar 2001; Wimberly 2002). To be more specific, prior research identifies two mechanisms by which differential access to guidance, information, and norms for four-year college attendance may contribute to observed differences by race/ethnicity and income in college enrollment among similarly qualified students: (1) whether seniors effectively take the steps to apply to and enroll in a four-year college and (2) whether students conduct a broad college search and do not constrain their college choice.

First, low-income and minority students with high aspirations often lack knowledge of and struggle with the college application system (Avery and Kane 2004; Kao and Tienda 1998). Kirst and Venezia (2004) found that few minority students and their families fully understand the requirements of college admission and often lack knowledge of the financial aid system. Avery and Kane (2004), in a study of seniors with college aspirations in the Boston Public Schools and in nearby suburban schools, demonstrated how this lack of knowledge results in differential participation in college application. Among students who planned to attend a four-year college, only slightly more than half of the Boston sample compared with 91 percent of the suburban sample obtained an application from the college they were interested in attending by the fall of their senior year. Only 18 percent of the Boston sample versus 41 percent of the suburban sample had applied to a four-year college by the fall. Similarly, Plank and Jordan (2001), using national longitudinal data, found that differences in whether students took concrete steps and participated in college search and application (e.g., took the ACT/SAT, took courses to prepare for college entrance examinations, visited colleges, received concrete guidance from their school, applied to a four-year college, and applied for financial aid) explained a large part of differences by socioeconomic status in students' likelihood of attending a college and a two- versus four-year college. Research also finds that many low-income students believe that financial aid is too complicated to apply for, misunderstand the real costs of different types of colleges, and are less likely to apply for financial aid early to maximize their ability to get institutional and state aid (King 2004; De La Rosa 2006; Kirst and Venezia 2004). Thus, research suggests that low-income students are less likely to effectively participate in both college and financial aid application.

A second important strand of research suggests that low-income and first-generation college students only consider a constrained set of colleges and do not know how to identify a range of college options available to them that best meets their needs (McDonough 1997). This perspective argues that too often urban low-income students rely on their own familial and friendship networks that often only have limited college information (Hearn 1991; De La Rosa 2006; Kim and Schneider 2005; Person and Rosenbaum 2006). Limited information results in many urban students focusing their entire college search within traditional feeder patterns, largely public, two-year, or nonselective and somewhat selective colleges. Furthermore, low-income students often constrain their college options due to other issues such as misunderstandings of the net versus sticker price of college and how to conduct a college search (Roderick et al. 2008). These constraints on what colleges students consider may lead to enrollment in colleges that are of lower levels of selectivity than students are actually eligible to attend (Alexander and Eckland 1977).

Distinguishing between these two sets of outcomes is important in examining high schools' effects on college enrollment. For students to enroll in a suitable four-year college, they must effectively negotiate two sets of tasks. First, they must take the basic steps to enroll: They must submit applications on time, apply for financial aid, gain acceptance, and enroll. Second, students must engage in the often overwhelming task of college choice. These two sets of tasks are

intertwined but it is important to distinguish between these two ideas: taking the steps to enroll in a four-year college and engaging in the process of choosing among four-year colleges.

Most importantly, both of these sets of outcomes—whether students enroll in a four-year college and the choice among four-year colleges—may shape the likelihood of degree attainment. Research finds that the likelihood of completing a four-year college degree is significantly higher if a student begins at a four- versus two-year college (Goldrick-Rab, Pfeffer, and Brand 2009; Long and Kurlaender 2009). Nationally, only about 10 percent of students who initially enroll in public two-year colleges complete a bachelor's degree within six years (Berkner, He, and Cataldi 2002). Among students who aspire to a four-year degree, bachelor's degree attainment is nearly three times higher among those who initially enroll in a four- versus two-year college (Berkner et al. 2002). The negative impact of two-year college choice may be particularly large for the most qualified students. Using data from CPS and propensity score analysis to address selection effects, Goldrick-Rab and her colleagues (2009) estimated that the odds of finishing a four-year degree within six years were 77 percent to 87 percent lower if a student with qualifications to attend a selective four-year college attended a two-year college instead. Because the likelihood of obtaining a four-year degree differs dramatically by whether students choose to begin at a two- or four-year college, this article focuses on whether students who aspire to four-year degrees take the steps to apply to and enroll in a four-year college.

The choice among four-year colleges may be equally as important. Four-year colleges with higher selectivity tend, on average, to have significantly higher graduation rates. College graduation rates of high-achieving low-income students, moreover, vary significantly more by college selectivity than do those of middle- and upper-income students (Mortenson 2007). Using multiple data sets and multiple methods to address student selection, Alon and Tienda (2005) found that students of all racial/ethnic backgrounds were more likely to obtain a four-year degree if they attended more selective four-year institutions, even if they were ''overmatched,'' compared with similarly qualified students who attended less selective four-year institutions. Similarly, Light and Strayer (2000) found positive associations between attending a more selective four-year college and degree attainment, but only for students who enrolled in colleges that constituted a ''match'' to their qualifications. Thus, their results diverged from Alon and Tienda (2005) in that they found positive effects of matching but not overmatching.

In their recent book, *Crossing the Finish Line*, Bowen, Chingos, and McPherson (2009) went further to conclude that high rates of college undermatch among highly qualified, low-income students may contribute to gaps by income in degree attainment. These authors replicated the analysis of college matching presented in this paper using data from North Carolina. They found, as we illustrate later in this article, evidence of substantial undermatch for low-income students. In addition, after controlling for student characteristics and high school attended, they found that highly qualified students in North Carolina took more time to degree and were 10 percent less likely to graduate if they undermatched to a four-year, non-flagship university. They conclude: ''The scale of the undermatch phenomenon among students from modest backgrounds suggests that addressing this problem offers a real opportunity to increase social mobility and simultaneously to increase overall levels of educational attainment'' (Bowen et al. 2009:103).

Taken together, if college choice matters in shaping the likelihood of graduation, then high schools can influence the postsecondary outcomes of their students by first increasing the likelihood of enrolling in four-year college and second by influencing the choice among four-year colleges. Indeed, Strayer (2002) concludes that the effect of high school quality on later earnings largely operates through college choice. Students who attend higher quality high schools are more likely to attend college and to attend four- versus two-year colleges, enrollment decisions that are associated with significant wage payoffs (Strayer 2002). This extends to the choice among four-year institutions where research finds that the economic payoffs to attending more selective colleges are particularly high for students from low-income families (Dale and Krueger 2002; Hoxby 1998).

High School Effects on College-going

For most students, their parents and larger social networks are the primary influence on college

plans (Hossler, Schmidt, and Vesper 1999). Yet, in predominantly low-income and minority urban school systems, where many students come from families without a college-going history, students may have less access to the supports and information needed to effectively manage the college search and application process. As a result, first-generation college students are especially dependent upon their teachers, counselors, and other nonfamilial adults in making educational plans and decisions (Howard 2003; Stanton-Salazar 2001; Wimberly 2002). There is a debate in the literature, however, about what it means for high schools to create effective supports to promote college access.

Several studies have examined the effects of concrete practices within high schools. Using data from the National Educational Longitudinal Study (NELS), Hill (2008) used school administrator surveys to characterize specific school practices related to college attendance. Using latent class analysis, Hill grouped schools into three types of college-linking strategies: (1) traditional, (2) clearinghouse, and (3) brokering. High schools characterized as traditional were those that encouraged college visits and assisted with college applications but reported limited outreach to parents. Clearinghouse schools directed substantial resources to college planning, provided direct assistance with college applications, and conducted outreach to college representatives but did limited parental outreach. Brokering schools had all of these characteristics and did substantial outreach to parents, thus creating in Hill's term ''norms for facilitating access to these resources.'' Controlling for student characteristics, students in brokering schools were more likely to enroll in college and in a four- versus two-year college. Brokering schools were less likely to serve minority populations and those of low socioeconomic status (SES). In sum, Hill (2008) suggests that the resources high schools dedicate to postsecondary planning and the extent to which school personnel are active in promoting college attendance (e.g., providing bridging social capital) shape college enrollment and college choice. Plank and Jordan (2001), using NELS data, similarly found strong associations between the degree to which students report obtaining guidance and support from adults in filling out applications and financial aid forms and the likelihood of attending any college as well as attending a four- versus two-year institution.

Much of this research on the influence of high school practices in shaping college access focuses on the activities of counselors and resources dedicated to counseling (Falsey and Heyns 1984). There is a longstanding debate, however, on the role and extent of influence of guidance counselors (Hossler et al. 1999). In the 1970s, guidance counselors were often portrayed as ''gatekeepers,'' acting as sorters rather than promoters of college attendance. But, Rosenbaum, Miller, and Krie (1996) argue that the combination of rising aspirations and open admission at two-year and nonselective colleges has substantially diminished counselors' influence. Rosenbaum and his colleagues (1996) revisited the gatekeeping hypothesis using interviews with counselors in Chicago and suburban high schools in the 1990s. They found that counselors increasingly see themselves as playing a limited role in college advising. As they conclude, in an era of ''college for all,''

> Counselors undoubtedly have less pressure to be social selectors or even wise advisors. If all students can attend college, counselors have no need to act as intermediaries . . . open admission policy allows counselors the easy alternative of avoiding college advising almost entirely. (Rosenbaum et al. 1996:276)

In a different approach, Schneider (2007:8) argues that ''the foundation of a college-going community is initiated, formed, and reinforced in the context of the high school classroom'' and is based on students' and their families' relationships with teachers. In Schneider's (2007) conceptualization, although high schools must provide concrete support to guide students through the process of college application, the efficacy of those approaches depends upon the extent to which they are embedded in a school climate and a set of social relationships among educators, students, and parents that set norms for college attendance and where the ''values, norms, and social roles associated with college-going are present and consistently reinforced'' (Schneider 2007:7). This begins by creating academic environments that focus on preparing all students for college, including engaging students in rigorous coursework and creating strong norms for performance. It also requires teachers and staff to develop shared goals that ''all students can go to college and it is their personal responsibility to

try and make that happen'' (Schneider 2007:8). Thus, to Schneider, the basis of effective high school practice, particularly in urban areas where many students are first-generation college students, lies in creating academic climates and college-going cultures that fill in knowledge gaps and create strong norms for college attendance. Filling these gaps means providing what Conley (2007) has termed ''college knowledge,'' such as an understanding of what college means, what preparation for college entails, and what steps students need to complete to apply and enroll in college. Schneider (2007) and Conley (2007) then view effective high school practices that promote college attendance as embedded in the academic program rather than as a set of activities designated to the guidance department.

Unfortunately, there is little empirical evidence to test the proposition that effective college-going support in urban high schools lies in creating ''college-going'' environments that are reflected in shared goals among teachers and staff and expectations for high levels of engagement in college planning. This paper seeks to address this gap by exploring the extent to which measures of the college-going climate in high schools are associated with two central outcomes for urban students who aspire to four-year degrees: whether seniors (1) effectively take the steps to apply to and enroll in a four-year college and (2) enroll in a four-year college match (i.e., enroll in a four-year college with a selectivity level at or above the highest selectivity of a college the student would likely be admitted to given his or her qualifications). Before discussing our analytic approach to identifying potential high school effects, the next section describes the data set and presents the descriptive patterns for these two central outcomes.

DATA, OUTCOMES, AND DESCRIPTIVE STATISTICS

The Chicago Public Schools and the Data Set

This article examines 2005 CPS graduates and draws on the data archive of the Consortium on Chicago School Research (CCSR). CPS is the third largest school system in the United States and serves a predominantly low-income, minority population. In 2005, the high school student population was 53 percent African American, 32 percent Latino, 10 percent white, and 4 percent Asian. Seventy-seven percent of CPS students qualify for free or reduced price lunch, and approximately 40 percent of African American and white and 80 percent of Latino seniors would be first-generation college students.[1] In 2005 CCSR surveys, 34 percent of Latino, 66 percent of Asian, and 34 percent of white CPS seniors report that they were born outside of the United States. In addition, 80 percent of Latino, 96 percent of Asian, and 44 percent of white seniors report that their mother was born outside of the United States.

Since 2004, CPS has tracked its graduates' college plans and enrollment using both an online Senior Exit Questionnaire (SEQ) and college tracking data from the National Student Clearinghouse[2] (NSC; see Appendix A). In this article, we draw on four main sources of data: (1) official school records, including transcripts, ACT scores, and demographic data; (2) 2004 and 2005 SEQ data; (3) 2005 CCSR teacher and senior surveys; and (4) NSC college-tracking data. The ACT is taken by all juniors in Illinois as part of the state accountability system. In addition, we used several measures of students' neighborhood context that were developed by geocoding addresses and linking them to 2000 census block data.

Student self-reports of their participation in the college application process (e.g., whether students submitted college applications, were accepted into a college, and completed the Free Application for Federal Student Aid, or FAFSA) are drawn from the SEQ which was completed by 93 percent of 2005 graduates in late spring. Information on seniors' college aspirations and plans; self-reports of background, involvement in extracurricular, work, and college planning activities; and reports of parental press for achievement, peer support, and achievement valuation are drawn from 2005 CCSR senior surveys. CCSR surveys are administered biennially to all teachers and high school students in Chicago public high schools. CCSR surveys are not mandatory. In 2005, students in 71 high schools participated in the senior survey, leaving an overall response rate of 55 percent of all CPS seniors. We also use the 2005 teacher surveys to construct a measure of teachers' assessment of college-going climate. Approximately 4,000 teachers in 87 high schools responded to the 2005 survey; on average, 63 percent of teachers in these schools participated. Finally, we use NSC data to identify whether graduates enroll in college in the fall.[3] In 2005, more than 2,800

colleges participated in NSC's enrollment verification program, covering 91 percent of postsecondary enrollment in the United States. Because not all colleges attended by CPS graduates participate in the NSC, we use SEQ self-reports to adjust our enrollment numbers to reflect enrollment in colleges that do not participate in the NSC (see Appendix A for our method for adjusting college enrollment based on SEQ data).

Throughout this article, we examine patterns of college application and enrollment by the level (two- versus four-year) and selectivity of colleges a student would likely gain acceptance to (see Appendix B). We characterized college access on the basis of course performance (unweighted, cumulative GPA in core classes), composite ACT scores, and involvement in Advanced Placement (AP) and International Baccalaureate (IB) coursework.[4] The college access rubric identifies cutoffs for each ''qualifications category'' using a multivariate analysis that modeled the likelihood of enrollment of CPS students in colleges of various selectivity levels and the modal college attendance patterns of CPS students with different GPA and ACT combinations in prior cohorts.

The sample is limited to students who were not enrolled in special education and alternative schools.[5] In analyses that use qualifications, moreover, we exclude students enrolled in charter high schools because CCSR does not have their transcript data.[6] This article focuses on patterns in college enrollment among CPS seniors who aspire to a four-year degree. Among CPS graduates not enrolled in special education and alternative schools, 92 percent state that they hope to complete some college and 83 percent aspire to complete a bachelor's degree or higher. Among students who stated in their senior year that they hoped to complete a four-year degree, 65 percent enrolled in a college, but fewer than half enrolled in a four-year college.

Descriptive Outcomes 1: Whether Students Who Aspire to a Four-year Degree Take the Steps to Enroll in a Four-year College

To examine the question of whether students take the steps necessary to enroll in a four-year college, we combined data sets to follow students as they progress through the college application process. Specifically, we identified whether seniors (1) aspired to complete a four-year degree (CCSR survey), (2) planned to attend a four-year college in the fall after graduation (CCSR survey), (3) reported applying to at least one four-year college by late spring (SEQ), (4) reported being accepted to a four-year college (SEQ), and (5) enrolled in a four-year college by the fall after high school graduation (adjusted NSC data). To follow students through the process, we examine the proportion of students who complete each step (e.g., apply to a four-year college) conditional on completing the previous step.

Figure 1 illustrates four critical points at which students who aspire to complete a four-year degree do not take the steps to enroll in a four-year college. First, 28 percent of students decide to attend two-year colleges, delay enrollment, or have other plans. Latino students were the least likely to plan to enroll in a four-year college after graduation. As seen in Table 1, 40 percent of Latino graduates who aspired to complete a four-year degree did not plan to attend a four-year college. Second, many students who plan to attend do not apply to a four-year college by late spring of senior year. Less than 60 percent of graduates in this sample reported that they planned to attend and had applied to a four-year college. Acceptance is less of a barrier than might be expected. Rather, many CPS students never face a college acceptance decision because they do not apply. Of students who report that they applied to a four-year college, 86 percent were accepted (0.51/0.59). For students with access to somewhat selective colleges, 88 percent were accepted, and for students with access to selective and very selective colleges, approximately 94 percent were accepted (see Table 1). This finding is consistent with Manski and Wise's (1983) conclusion that application, not acceptance, predominantly explains college enrollment patterns. And finally, even students who apply and are accepted to a four-year college do not always enroll. Approximately 10 percent of graduates report that they were accepted into a four-year college but were not enrolled in a four-year college the following fall. This means that among students who applied and were accepted into a four-year college, only 80 percent (0.41/0.51) were enrolled in college the following fall.

Figure 1 presents the proportion of students in our sample who met each of these benchmarks. As noted, this sample is limited to graduates who stated that they aspired to complete a four-year

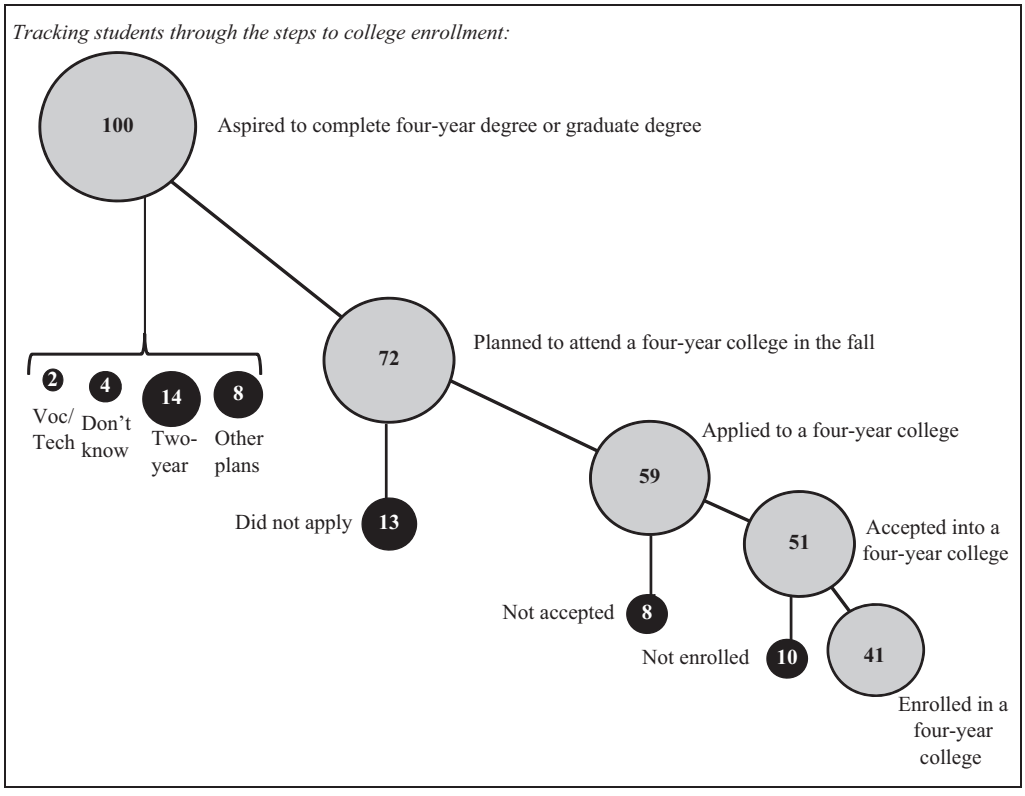

Figure 1. Percentage of 2005 Chicago Public Schools graduates who aspired to complete a four-year college degree who followed steps to enrollment in a four-year college
Note: An additional 9 percent of this sample managed to enroll in a four-year college without following the steps. These are students who did not initially plan to attend a four-year college in the fall but may have changed their mind over the summer, applied late or over the summer, or were not initially accepted into a four-year college by the spring of their senior year, but may have been accepted by a college over the summer. Almost half of these students enrolled in nonselective four-year colleges. The sample (N=5,194) in this figure includes 2005 CPS graduates who were not in special education or alternative high schools, took the CPS Senior Exit Questionnaire and CCSR Senior Survey, had information on each step towards college enrollment, and aspired to complete at least a four-year degree (see Appendix A for more details on this sample).

degree or higher and who completed the SEQ and CCSR surveys. As a result, the sample is significantly more qualified, as measured by average ACT scores and unweighted GPA, than the larger cohort of 2005 CPS graduates (see Appendix A for details about the samples). Because our sample has higher average achievement, we expect we are overestimating the proportion of all CPS students who meet specific benchmarks of participation in the college application. Even with this more qualified sample, only 41 percent met each of these benchmarks and enrolled in a four-year college the fall after graduation.

One explanation for these trends is that many CPS graduates have weak qualifications and may be appropriately gauging their likelihood of acceptance into a four-year college. In essence, students may be taking themselves out of the application pool to avoid facing rejection. Table 1 describes the percentage of CPS graduates who met each of these benchmarks by their qualifications for college. Students with low qualifications who aspired to a four-year degree were the least likely to apply to a four-year college. However, it is not just students with low qualifications who fail to meet benchmarks in the college

Table 1. Percentage of 2005 Chicago Public Schools Graduates Who Aspire to Complete a Four-year College Degree and Who Take the Steps to Enroll in a Four-year College the Fall after High School Graduation, by Race/Ethnicity and Qualifications for College

	Race/Ethnicity[a]			
	African American (n = 2,443)	Latino (n = 1,629)	White (n = 660)	Asian (n = 454)
Aspired to complete at least a four-year degree	100	100	100	100
Planned to attend a four-year college in the fall	77	60	76	83
Applied to a four-year college	64	46	65	72
Accepted into a four-year college	53	40	61	68
Enrolled in a four-year college	41	30	52	63

	Students Likely Qualified[b] to Attend a				
	Very-selective Four-year College (n = 682)	Selective Four-year College (n = 979)	Somewhat Selective Four-year College (n = 1,638)	Nonselective Four-year College (n = 888)	Two-year College Only (n = 954)
Aspired to complete at least a four-year degree	100	100	100	100	100
Planned to attend a four-year college in the fall	96	86	73	60	50
Applied to a four-year college	90	76	61	45	30
Accepted into a four-year college	89	72	54	31	16
Enrolled in a four-year college	81	61	43	20	8

Note: All values are percentages. The sample (N = 5,194) in this table includes 2005 Chicago Public Schools (CPS) graduates who were not in special education or alternative high schools, took the CPS Senior Exit Questionnaire and Consortium on Chicago School Research Senior Survey, had information on each step toward college enrollment, and aspired to complete at least a four-year degree (see Appendix A for more details on this sample).
a.There were only 8 Native American graduates in 2005, so we do not include them in this table.
b.We were unable to classify the access category for 53 students because they did not have GPAs. For a description of how we characterize students' qualifications for college, see Appendix B.

application process. Only 73 percent of students qualified to attend a somewhat selective college (the majority of in-state public four-year colleges) planned to attend a four-year college, only 61 percent applied, and ultimately, only 43 percent were enrolled in a four-year college in the fall.

Our look at CPS seniors' participation in the college application process confirms the findings of previous research that low-income urban students do not effectively take the steps necessary to apply to and enroll in a four-year college. We observe these patterns, moreover, in a state where all students are required to take a college admissions test, the ACT, a critical step that is most often missed by low-income students (Avery and Kane 2004; Plank and Jordan 2001).

Descriptive Outcome 2: Enrolling in a College Match

As discussed above, research has found that low-income urban students often engage in a limited college search and tend to enroll within the traditional feeder patterns of their high schools: predominantly two-year or large public universities with lower levels of selectivity. It is hard to quantitatively identify the extent to which students

Table 2. College Access Versus College Enrollment by Barron's Selectivity Ratings: 2005 Graduates of Chicago Public Schools

	Match Categories: College Access versus College Choice							
	Enrolled in:							
Access to:	Very Selective, %	Selective, %	Somewhat Selective, %	Nonselective, %	Two-year, %	No College, %	Total (by Access), *n* (%)	Percentage Match or Overmatch, %
Very selective	**38**	25	20	4	3	10	644 (15)	38
Selective	**11**	**16**	35	9	11	18	870 (20)	27
Somewhat selective	**3**	**6**	**34**	13	19	26	1,409 (33)	43
Nonselective	**0**	**1**	**20**	**11**	29	38	722 (17)	32
Two-year	**0**	**0**	**8**	**8**	**34**	51	672 (16)	50

Note: Boldface values in each row indicate whether a student enrolled in match or overmatch college. For a description of how we characterize students' access to college, see Appendix B. The sample (N = 4,317) in this table includes 2005 Chicago Public Schools (CPS) graduates who were not in special education, did not attend alternative or charter high schools, took the CPS Senior Exit Questionnaire and Consortium on Chicago School Research Senior Survey, had information on each step toward college enrollment, aspired to complete at least a four-year degree, and indicated on the Senior Exit Questionnaire that they planned to continue their education in the fall (see Appendix A for more details on this sample).

engage in broad college searches. One approach is to look at the outcome of a student's college enrollment. We developed a measure of ''college match''—whether students enrolled in a college with a selectivity rating at or above the types of colleges they would most likely be accepted given their ACT scores, unweighted GPAs, and participation in AP/IB and honors coursework—as a quantitative indicator of whether there is evidence that students have effectively engaged in college search and application.[7]

Table 2 uses our indicator to compare the selectivity of the college a student would likely be eligible to attend to the selectivity level of the college in which he or she actually enrolled, if any. We limit the sample in Table 2 to those graduates who aspired to complete a four-year degree and planned to continue their education at some type of postsecondary institution the fall after high school graduation. Students were characterized as enrolling in a ''match or overmatch'' if the college they enrolled in had a Barron's selectivity rating that met or exceeded their qualifications. For example, 15 percent of this sample graduated with qualifications for acceptance at a very selective four-year college. Of these highly qualified students, only 38 percent enrolled in a very selective college (a match). One-quarter attended a selective college and 20 percent enrolled in a somewhat selective college. Finally, an additional 7 percent enrolled in a two-year or nonselective four-year college and 10 percent were not enrolled in any college the fall after graduation.

Undermatch is an issue among CPS students at all levels of qualifications. Graduates with access to selective colleges were actually less likely to match or overmatch (27 percent) than graduates with access to very selective colleges. In addition, less than half (43 percent) of students with access to somewhat selective colleges matched or overmatched in their college enrollment. For these students, undermatch was largely attributable to the high proportion of those who ended up not attending college at all (26 percent) or enrolling in two-year colleges (19 percent). Thus, for students with higher qualifications (access to selective or very selective colleges), undermatch is driven both by whether they enroll in any four-year college and the selectivity of four-year colleges they attend. For students with access to somewhat selective colleges, undermatch is primarily driven by the fact that so many of these students do not effectively take the steps to enroll in any four-year college.

MEASURES AND ANALYTIC APPROACH

The previous section documented two important ways in which low-income students in an urban school system who aspire to complete a four-year college degree fall short in college enrollment: (1) not taking the steps to apply to and enroll in a four-year college and (2) college undermatch, enrolling in colleges with selectivity levels below the kinds of colleges to which they would likely be accepted. In the remainder of this article, we examine the association between measures of the college-going climate of high schools and these two sets of outcomes.

Measures of College-going Climate

What approach can be used to capture the ''college-going climate'' of a high school?

As discussed, research on the effects of high school practices in shaping college access has largely focused on the activities of counselors and resources dedicated to counseling. This approach is useful when evaluating whether counseling matters or what specific counseling strategies may be most effective. A focus on counseling strategies, however, is not adequate to assess the norms and climate in which these practices are embedded.

The simplest approach to capturing school climate around postsecondary attendance, often used by economists, is to measure whether there is a pattern of college-going using a proxy indicator such as the percentage of students from the high school who attend four-year colleges (Avery et al. 2006; Manski and Wise 1983). Proxy measures are useful because they capture multiple aspects of the environment that could shape college-going. Past college-going rates will be influenced by whether (1) the school directs resources to counseling; (2) the school creates strong norms and supports for college attendance; (3) the academic curriculum is preparing students for college; and (4) students have access to peers and networks that promote college attendance (student body composition and context effects). Proxy measures are useful control variables but do not differentiate between the effect of school climate and practices attributed to educators and the effect of the characteristics of the students and families who attend the school.

A second related approach to capture school climate is to use indicators that may more directly measure whether the school is filling in knowledge gaps for first-generation college students. In doing so, one would want to choose intermediary indicators of participation in the college application process which research shows are barriers for first-generation college students and which can be shaped by the norms and supports within the school environment. Number of college applications submitted and FAFSA completion are two likely candidates. The degree to which students report obtaining concrete guidance and support from adults in filling out applications and financial aid forms is associated with college enrollment (Plank and Jordan 2001). There is also increasing evidence that the complexity of the federal student aid system and particularly the FAFSA poses barriers to low-income students (Dynarski and Scott-Clayton 2006). Results from a recent randomized experiment, for example, found that when low- and moderate-income families are provided assistance with FAFSA completion, students were more likely to enroll in college and receive financial aid (Bettinger et al. 2009). As we will see later in this paper, both numbers of college applications submitted and FAFSA completion are important predictors of college enrollment. FAFSA application, in particular, which requires technical support, may be a good indicator of the extent to which the school is more generally organizing students and providing concrete supports around college application. In the end, however, indicators of the extent to which students in the school report high levels of involvement in college and financial application are still proxy measures that will be influenced by both distinct practices within the school, student body composition, and context effects.

A final approach is to try to measure directly teachers' norms for college attendance and level of involvement in college application and search through surveys of either students or teachers. One approach would be to determine the school average of student survey reports of the extent to which they relied on counselors and/or teachers for assistance in identifying colleges and filling out college and financial aid applications. However, there are two limitations with using student reports. First, student reports of interactions may not adequately assess the quality and intensity of those interactions. Second, student reports of interactions do not capture the extent to which activities are student versus teacher initiated or whether they are embedded in a school climate

where teachers hold high expectations and there are shared goals among staff to provide students with information and supports around college attendance. Schneider's (2007) conceptualization of college-going culture draws heavily on the social trust literature, which has found that measures of relational trust among adults in schools are strongly associated with school improvement and student learning growth (Bryk and Schneider 2002). Drawing on this approach, we developed a new measure of college-going climate to explicitly capture whether teachers express shared goals, behaviors, and obligations regarding college attendance. This measure, *teacher assessment of college-going climate*, is based on teachers' responses to five questions on the 2005 CCSR high school teacher survey. Teachers were asked the extent to which they would agree (*strongly disagree* to *strongly agree*) that (1) teachers (in this high school) expect most students to go to college, (2) teachers help students plan for college outside of class time, (3) the curriculum is focused on helping students get ready for college, (4) teachers feel that it is a part of their job to prepare students for success in college, and (5) many of our students are planning to go to college. The measure was constructed using Rasch rating scale analysis and represents the average of teacher reports in the high school.

In summation, in this article we use four different measures of college-going climate to reflect these different approaches. First, we use the proxy measure: the *percentage of prior year graduates who enrolled in a four-year college* based on 2004 NSC data. Second, we use two indicators based on self-reports from the 2004 SEQ of the extent to which students report high levels of engagement in college and financial aid application: *the percentage of prior year graduates who applied to three or more colleges* and *the percentage of prior year graduates who report completing a FAFSA*. Each of these measures was standardized across schools. And finally, we use the school average of the new measure *teacher assessment of college-going climate*.

The Model and Analytic Sample

We use a two-level hierarchical generalized linear model (HGLM) with students at level 1 and high schools at level 2 to estimate two sets of outcomes: (1) the conditional likelihood of taking each step in the college application and enrollment process and (2) the likelihood of enrolling in a match or overmatch four-year college. The first set of models examine whether students took the steps to enroll in a four-year college by estimating the log odds of completing each step conditional on completing the prior step: (1) planning to attend a four-year college among students who aspire to complete a four-year degree, (2) applying to a four-year college among students who plan to attend, (3) being accepted among students who apply, and (4) enrolling among students who had been accepted.[8] When modeling the odds of matching, we use an ordered logistic regression that estimates the relative odds of three different college outcomes: (1) enrolling in a college with a selectivity level that matches or exceeds the selectivity level of the college the student would likely be accepted using our qualifications rubric, (2) enrolling in a college that is undermatch, and (3) not enrolling in college at all. Independent variables are grand mean centered so that the intercept represents the value for an ''average'' CPS graduate.[9] To illustrate, we present the base equation for estimating the student's likelihood of planning to enroll in a four-year college in the fall with teacher assessment of college-going climate at level 2:

$$\text{Plan} = 1 = \phi_{ij}$$

$$\log [\phi_{ij} / (1-\phi_{ij})] = \beta_j + \sum\beta_{1\text{-}11j}(\text{demographic characteristics})_{ij} + \sum\beta_{12\text{-}14j}(\text{qualifications for college})_{ij} + \sum\beta_{15\text{-}17j}(\text{school involvement})_{ij} + \sum\beta_{18\text{-}20j}(\text{student reports of valuation and press for academic achievement})_{ij} + \sum\beta_{21\text{-}nj}(\text{step specific predictors})_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{teacher assessment of college-going climate})_j + \gamma_{02}(\text{selective enrollment school})_j + u_{0j}$$

$$\beta_{pj} = \gamma_{p0}\text{ , for p = 1 to n}$$

Each model includes the same variables at the student level (level 1; see Appendix C). Demographic characteristics include race/ethnicity, gender, self-reports of whether and at what age a student immigrated to the United States, and students' reports of their mothers' highest level of education. We use two measures of

students' neighborhood context to control for students' resources within their neighborhoods: the concentration of poverty and the SES status of adults in the student's census block. We include dummy variables indicating students' qualifications for college. We use three measures to capture a student's integration into the school community: the number of hours a student reported working and two dummy variables indicating whether the student reported being involved in a sport or an extracurricular activity. Previous research has found negative effects of employment during high school on postsecondary outcomes whereas student involvement in extracurricular activities, particularly sports, is associated with higher grades, test scores, and college enrollment (Marsh 1992; Marsh and Kleitman 2005; Broh, 2002; Quirk, Keith and Quirk 2001). We include three student survey measures: (1) student reports of their perception of the value of high school for the future, (2) parental press for achievement and postsecondary planning, and (3) peer support for academic work. Finally, we include step-specific predictors (i.e., variables that are associated with a specific step but not previous ones). For example, filing a FAFSA application may shape the likelihood that a student who has been accepted into a four-year college enrolls, but it does not shape the likelihood of acceptance. Similarly, the number of applications submitted should not be used to model whether students apply because it is an endogenous variable. However, it may be important in shaping each subsequent step (acceptance conditional on application and enrollment conditional on acceptance). Step-specific predictors include dummy variables based on student reports for (1) attending a college fair, (2) using college guide books, (3) number of college applications completed, and (4) completing a FAFSA application.

The level 1 model for estimating enrollment in a match or overmatch college is identical to that presented above except that the dependent variable is modeled as an ordered logistic regression. For all of our HGLM models, at level 2, only one school-level measure of college-going climate is used at a time because the four measures are highly correlated with each other. Ideally, one would want to estimate the association between school-level measures of college climate and organization with substantial controls for student body composition. However, there are only 58 high schools at level 2, and in Chicago as in other urban school systems, school-level variables such as race/ethnicity, achievement, and SES composition are highly correlated, constraining the ability to estimate independent effects of multiple variables at level 2. The lowest performing high schools are predominantly low SES and African American and have much lower than average proportion of students attending four-year colleges. One of the problems with using broad proxy measures like our college-going climate measures is that they capture both the behavior of adults in the building and possible student composition effects. This makes sense in that high schools that serve students with very low academic achievement are less likely to report an emphasis on college and are not likely to have a high proportion of students attending four-year colleges. It means, however, that we need to be careful in interpreting the associations between measures of college climate and student outcomes. We interpret the coefficient on our indicators of college-going climate as the estimated difference in the log odds of each outcome if a student with ''average'' CPS characteristics attended a school with different college-going patterns and/or norms, which would likely also mean attending a school with, on average, higher achieving students. Student body composition effects are important in that they may contribute to more positive outcomes for individual students independent of the behavior of educators in the building.

Of particular concern is the effect of the six CPS selective enrollment high schools. To attend a selective enrollment school, students must apply. They are invited to sit for an admissions test if their seventh-grade test scores in reading and mathematics are at a stanine 5 or above. The highest achieving students based on test scores, attendance, and GPA are admitted. In 2009, roughly 13,000 students applied for fewer than 3,000 slots. We expect that these high schools have much stronger college-going climates and serve a different population because students apply for enrollment and gain acceptance based on their academic performance. On one hand, the college-going climate of these schools may be strongly driven by peer and compositional effects. On the other hand, students like those attending selective enrollment high schools are usually already college bound and very high achieving and may be less reliant on their high schools for college support. In this article, we include selective enrollment high schools in the

analysis but add an additional control variable at level 2 indicating whether the high school is selective enrollment. We should note that when each model is estimated excluding selective enrollment high schools, the magnitude of the coefficients on each of our measures of college-going climate is significantly larger (Roderick et al. 2008). Finally, we restrict our analysis to those students who have at least qualifications to attend a four-year nonselective college (i.e., we exclude students whose grades and test scores were so low that they would likely only have access to two-year colleges). By doing so, we estimate the association between measures of school climate/organization and the outcomes of only those students who have the option to enroll in four-year colleges.

RESULTS

Results for Conditional Likelihood of Taking Each Step to Four-year College Enrollment and of College Match

Table 3 presents the results of the full models estimating the conditional likelihood of a student taking each step in four-year college application and enrollment when teacher assessment of college-going climate is included as the measure of the high school's college-going climate. Table 4 presents the results of the full model for the likelihood that a student enrolls in a college match.

When we look first at the level 1 predictors, an important pattern emerges. Controlling for academic qualifications, we observe significant differences by gender, race/ethnicity, neighborhood poverty, and maternal education in whether students who aspire to a four-year college degree plan to attend a four-year college in the fall (Model 1). Latino and white students are less likely than African American students to plan to attend a four-year college, whereas students who report that their mother graduated from college were more likely. Similarly, the measures parental press and the value of high school for the future are significantly associated with the odds of planning to attend a four-year college in Model 1. The finding that African American students, after we control for qualifications, are more likely to plan to attend a four-year college is not surprising. A consistent finding in educational attainment research is that after we control for achievement and family income, African American students are more likely to graduate from high school and attend college (Kane 1999; Manski and Wise 1983; Rumberger 1983). We also find that students who live in census blocks with higher concentrations of poverty are more likely to plan to attend a four-year college, an association that may be confounded by the high correlation between being African American and living in high-poverty neighborhoods in Chicago. Of seniors who graduated from CPS in 2005, the average African American senior lived in a neighborhood a half standard deviation higher than the average senior, fully 0.8 standard deviation higher than the average Latino senior and nearly 1.4 standard deviations higher than the average white senior (Roderick et al. 2008).

What is surprising is that demographic characteristics and our measures of student valuation of high school and parental press for achievement are only statistically significant in Model 1. Gender, race/ethnicity, maternal education, and student reports of parental press and their valuation of high school are not consistently associated with the conditional odds of applying to, being accepted into, or enrolling in a four-year college (Models 2-4). These variables are also not consistently associated with the odds of enrolling in a match or overmatch four-year college (Table 4). Why would demographic characteristics, parental press, and students' attitudes about high school only consistently predict the first step, planning to attend a four-year college? One interpretation is that although many students aspire to complete college, the decision to plan to attend college immediately after high school differentiates students by the concreteness of those aspirations, which varies by gender, race/ethnicity, maternal education, and educational support and attitudes (Kao and Tienda 1998). Research also finds that prior to senior year, students' aspirations are primarily influenced by their parents, but during senior year, students rely more on peers, counselors, teachers, and other adults during the choice and application process (Bell, Rowan-Kenyon and Perna 2009; Hossler et al. 1999). The general pattern of results in Tables 3 and 4 indicates that students' attitudes, parental support, gender, and race/ethnicity are strongly associated with plans to attend college but, at least in an urban system, are less correlated with whether students participate effectively in college application and search.

Table 3. HGLM Estimates of the Conditional Log Odds of a Student Planning to Attend, Applying to, Being Accepted in, and Enrolling in a Four-year College: 2005 Graduates of Chicago Public Schools

	Model 1 Plan|Aspire		Model 2 Apply|Plan		Model 3 Accept|Apply		Model 4 Enroll|Accept	
	(Level 1 students n = 3,315)		(Level 1 students n = 2,628)		(Level 1 students n = 2,340)		(Level 1 students n = 2,106)	
	(Level 2 schools n = 58)		(Level 2 schools n = 58)		(Level 2 schools n = 58)		(Level 2 schools n = 57[a])	
	Coeff.	p	Coeff.	p	Coeff.	p	Coeff.	p
Intercept	1.63	(0.00)	2.31	(0.00)	2.86	(0.00)	1.61	(0.00)
Level 1—Individual Characteristics								
Census variables of students' neighborhoods								
Concentration of poverty	0.15	(0.02)	−0.09	(0.33)	−0.08	(0.50)	−0.16	(0.10)
Census block socioeconomic status	0.09	(0.13)	−0.05	(0.64)	0.03	(0.82)	−0.05	(0.34)
Male	−0.28	(0.01)	0.15	(0.31)	−0.31	(0.10)	−0.01	(0.97)
Race/ethnicity (African American excluded)								
Latino	−0.82	(0.00)	−0.73	(0.00)	0.06	(0.86)	−0.31	(0.15)
White	−0.80	(0.00)	−0.19	(0.46)	0.42	(0.31)	−0.17	(0.52)
Asian	−0.31	(0.20)	−0.02	(0.96)	0.50	(0.21)	1.00	(0.00)
Age of immigration (born in U.S. excluded)								
Before age 10	−0.28	(0.17)	0.05	(0.83)	−0.63	(0.02)	−0.77	(0.00)
After age 10	−0.63	(0.00)	−0.73	(0.00)	−1.09	(0.00)	−0.90	(0.00)
Mother's education (don't know and <high school excluded)								
High school	0.03	(0.78)	0.19	(0.27)	−0.15	(0.61)	0.01	(0.95)
Some college/two-year	0.19	(0.13)	0.36	(0.04)	−0.34	(0.21)	−0.15	(0.42)
Four-year degree or higher	0.33	(0.03)	0.00	(0.99)	−0.17	(0.58)	−0.04	(0.84)

continued

Table 3. (continued)

	Model 1 Plan|Aspire (Level 1 students n = 3,315) (Level 2 schools n = 58)		Model 2 Apply|Plan (Level 1 students n = 2,628) (Level 2 schools n = 58)		Model 3 Accept|Apply (Level 1 students n = 2,340) (Level 2 schools n = 58)		Model 4 Enroll|Accept (Level 1 students n = 2,106) (Level 2 schools n = 57[a])	
	Coeff.	p	Coeff.	p	Coeff.	p	Coeff.	p
Qualifications for college (access to a nonselective four-year excluded)								
Very selective	2.49	(0.00)	1.67	(0.00)	3.33	(0.00)	1.31	(0.00)
Selective	1.49	(0.00)	1.34	(0.00)	2.06	(0.00)	0.96	(0.00)
Somewhat selective	0.58	(0.00)	0.52	(0.01)	1.22	(0.00)	0.81	(0.00)
School involvement								
Hours worked for pay	−0.05	(0.08)	−0.02	(0.60)	0.06	(0.26)	−0.02	(0.64)
Played sport	0.13	(0.25)	0.11	(0.43)	−0.08	(0.62)	0.16	(0.34)
Extracurricular	0.24	(0.08)	0.36	(0.02)	0.28	(0.11)	0.13	(0.35)
Student reports of valuation and press for academic achievement								
Value of high school for the future	0.14	(0.00)	0.05	(0.46)	−0.08	(0.28)	0.04	(0.58)
Parental press	0.14	(0.00)	−0.02	(0.78)	−0.02	(0.83)	−0.05	(0.49)
Peer support	0.02	(0.76)	−0.19	(0.01)	−0.14	(0.10)	0.03	(0.69)
Step specific predictors								
Went to college fair			0.53	(0.00)	0.70	(0.02)	−0.02	(0.95)
Used college guide books			0.49	(0.00)	0.39	(0.01)	−0.18	(0.10)
College application (applied to fewer than three colleges excluded)								
Applied to three to five colleges					0.65	(0.00)	−0.02	(0.88)

continued

Table 3. (continued)

	Model 1 Plan|Aspire (Level 1 students n = 3,315) (Level 2 schools n = 58)		Model 2 Apply|Plan (Level 1 students n = 2,628) (Level 2 schools n = 58)		Model 3 Accept|Apply (Level 1 students n = 2,340) (Level 2 schools n = 58)		Model 4 Enroll|Accept (Level 1 students n = 2,106) (Level 2 schools n = 57[a])	
	Coeff.	p	Coeff.	p	Coeff.	p	Coeff.	p
Applied to six or more colleges					1.61	(0.00)	−0.01	(0.97)
Completed FAFSA							1.28	(0.00)
Level 2—School Characteristics								
Measures of college-going climate								
Teacher assessment of college-going climate	0.50	(0.00)	0.65	(0.00)	0.84	(0.00)	0.23	(0.25)
Selective enrollment school	−0.41	(0.12)	−0.94	(0.11)	−0.67	(0.14)	−0.09	(0.87)

Note: The "|" indicates that the model for the current benchmark is conditional on completing the prior step. For example, the estimates for Model 1 (Plan|Aspire) are the estimates for students planning to attend a four-year college among students who aspire to complete a four-year degree. For a description of how we characterize students' qualifications for college, see Appendix B. The base sample (N = 3,315) in this table includes 2005 Chicago Public Schools (CPS) graduates who were not in special education, did not attend alternative or charter high schools, took the CPS Senior Exit Questionnaire and Consortium on Chicago School Research Senior Survey, had information on each step toward college enrollment, aspired to complete at least a four-year degree, and had access to a four-year college (see Appendix A for details). A more detailed summary of the standard errors from the HGLM estimates is available in the online appendix to this article at http://soe.sagepub.com. FAFSA, Free Application for Federal Student Aid; HGLM, hierarchical generalized linear model.

a. The dropoff of one school in Model 4 is because of the small sample size in this high school, partly due the way we constructed our sample (see Appendix A for more details on our sample) and because none of the students in the remaining sample from this high school completed the last benchmark.

Table 4. HGLM Estimates: Ordered Logistic Regression Estimates of the Log Odds of a Student Enrolling in a Match or Overmatch College Versus Enrolling an Undermatch or No College: 2005 Graduates of Chicago Public Schools

	Model 5 Match (Level 1 students n = 3,047) (Level 2 schools n = 58)		Model 6 Match Net of Taking Steps (Level 1 students n = 3,047) (Level 2 schools n = 58)	
	Coeff.	p	Coeff.	p
Intercept	−0.92	(0.00)	−0.93	(0.00)
Threshold 2	2.15	(0.00)	2.34	(0.00)
Level 1—Individual Characteristics				
Census variables of students' neighborhoods				
Concentration of poverty	−0.06	(0.25)	−0.07	(0.14)
Census block socioeconomic status	0.05	(0.32)	0.04	(0.40)
Male	0.01	(0.90)	0.06	(0.40)
Race/ethnicity (African American excluded)				
Latino	−0.37	(0.00)	−0.24	(0.02)
White	−0.14	(0.35)	−0.05	(0.75)
Asian	0.08	(0.57)	0.09	(0.53)
Age of immigration (born in U.S. excluded)				
Before age 10	−0.44	(0.00)	−0.45	(0.00)
After age 10	−0.44	(0.00)	−0.32	(0.02)
Mother's education (don't know and <high school excluded)				
High school	−0.01	(0.93)	0.01	(0.96)
Some college/two-year	−0.07	(0.47)	−0.07	(0.46)
Four-year degree or higher	0.06	(0.63)	0.05	(0.70)
Qualifications for college (access to a nonselective four-year excluded)				
Very selective	−0.25	(0.12)	−0.90	(0.00)
Selective	−0.13	(0.41)	−0.76	(0.00)
Somewhat selective	0.44	(0.00)	0.14	(0.15)
School involvement				
Hours worked for pay	−0.06	(0.01)	−0.06	(0.01)
Played sport	0.29	(0.00)	0.29	(0.00)
Extracurricular	0.22	(0.00)	0.16	(0.01)
Student reports of valuation and press for academic achievement				
Value of high school for the future	0.06	(0.18)	0.05	(0.26)
Parental press	0.05	(0.29)	0.04	(0.41)
Peer support	−0.03	(0.40)	−0.01	(0.73)
Step specific predictors				
Went to college fair	0.13	(0.25)	0.05	(0.64)

continued

Table 4. (continued)

	Model 5 Match (Level 1 students n = 3,047) (Level 2 schools n = 58)		Model 6 Match Net of Taking Steps (Level 1 students n = 3,047) (Level 2 schools n = 58)	
	Coeff.	p	Coeff.	p
Used college guide books	0.03	(0.69)	−0.04	(0.64)
College application (applied to fewer than three applications excluded)				
Applied to three to five colleges	0.37	(0.00)	0.12	(0.21)
Applied to six or more colleges	0.64	(0.00)	0.29	(0.00)
Completed FAFSA	1.27	(0.00)	1.01	(0.00)
Followed steps to application				
Planned to attend, applied to, accepted into a four-year college			1.66	(0.00)
Level 2—School Characteristics				
Measures of college-going climate				
Teacher assessment of college-going climate	0.44	(0.01)	0.32	(0.04)
Selective enrollment school	−0.22	(0.60)	−0.11	(0.76)

Note: Models 5 and 6 estimate the association between our level 1 and level 2 variables with the log odds of a student enrolling in a match or overmatch college, an undermatch college, or no college. The intercept represents the log odds of a student enrolling in a match or overmatch versus an undermatch or no college. Threshold 2 plus the intercept represents the log odds of a student enrolling in a match or undermatch versus no college. This ordered logit assumes the coefficients have invariant effects for each threshold. For example, the students who report participating in extracurricular activities would have 24 percent higher odds for both enrolling in a college versus no college and match versus undermatch and no college. For a description of how we characterize students' qualifications for college, see Appendix B. The sample (N = 3,047) in this table includes 2005 Chicago Public Schools (CPS) graduates who were not in special education, did not attend alternative or charter high schools, took the CPS Senior Exit Questionnaire and Consortium on Chicago School Research Senior Survey, had information on each step toward college enrollment, aspired to complete at least a four-year degree, indicated on the SEQ that they planned to continue their education in the fall, and had access to a four-year college (see Appendix A for details). A more detailed summary of the standard errors from the HGLM estimates is available in the online appendix to this article at http://soe.sagepub.com. FAFSA, Free Application for Federal Student Aid; HGLM, hierarchical generalized linear model

Thus, these findings are consistent with previous research.

Two important exceptions to the demographic patterns in our findings are Latino and immigrant students. Consistent with our descriptive analysis, Latino students, after we control for academic qualifications, place of birth, age of immigration, maternal education, and parental press, are less likely than African American students to apply to a four-year college among those who planned to attend. Latino students are also significantly less likely to enroll in a match or overmatch college. Students who are immigrants, particularly students who report that they immigrated to the United States after age 10, are also less likely to take each step after we control for qualifications, race/ethnicity, neighborhood characteristics, and parental education, and parental press. One obvious interpretation is that these results reflect issues that undocumented immigrant students face in the college admissions process, an interpretation we cannot test in this paper.[10] Yet these results

suggest that native-born Latinos are also at risk of encountering difficulty in both college application and choice even after we control for maternal education. Qualitative research on college access consistently finds that Latino students may be particularly at risk of struggling with college search and application, results that this analysis suggests cannot be explained by quantitative controls for family background (Ceja 2001, 2006; Gonzalez et al. 2003; Person and Rosenbaum 2006; Perez 2007; Perez and McDonough 2008; Roderick et al. 2008).

Most of the remaining level 1 results are expected. The more qualified students are, the more likely they are to take each step in the application process. Students who are regularly involved in extracurricular activities are also more likely to plan to attend and apply to a four-year college. Being involved in sports and extracurricular activities senior year is positively associated with enrolling in a match or overmatch four-year college, whereas hours worked is negatively associated with the odds of college match. Similarly, students who participate in college search activities (attending a college fair and using college guide books) are also more likely to apply to and be accepted into a four-year college (Models 2 and 3) but not more likely to enroll in a match or overmatch college (Models 5 and 6). Because students are selecting into these extracurricular, work, and college search activities, it is unclear whether these associations represent the importance of participation or are simply indicators of students' own motivation and effort.

In Table 2, we demonstrated that college match was a problem for CPS students of all levels of qualifications. Model 5 in Table 4 presents estimates of the odds of enrolling in no college, an undermatch college, or a match or overmatch college for students with access to at least a nonselective four-year college. The initial pattern of results by qualifications for college suggests that the odds of enrolling in a match or overmatch college does not differ significantly across college access categories. Model 5, however, does not account for whether students took the steps to enroll in a four-year college, an event that by definition constitutes a match for students with access to nonselective colleges. To distinguish between these two elements of college choice—taking the steps to apply to any four-year college and choice among four-year colleges—Model 6 estimates the ordered logit model once we account for whether students took the steps to enroll in any four-year college. When we control for whether students applied to and were accepted into a four-year college (match net of taking steps), students with the highest qualifications (access to very selective and selective colleges) are much more likely to undermatch than their peers with access to somewhat selective and nonselective colleges. This is, in part, definitional. But it is important for practice. For students with more marginal qualifications, focusing on enrollment in four-year colleges and focusing on match are essentially the same outcome. However, the majority of highly qualified students followed these steps and enrolled in four-year colleges (see Table 1). For these students, undermatch reflects the kinds of four-year colleges they ultimately applied to and enrolled in.

Tables 3 and 4 also present estimates of the association between the measure teacher assessment of college-going climate and each outcome. This level 2 measure is significantly associated with all but one outcome, the odds that students who are accepted into a four-year college will enroll. Teacher assessment of college-going climate is also significantly associated with the odds of enrolling in a match or overmatch four-year college versus enrolling in an undermatch college or no college. The next section explores these results along with the results of our alternative measures of college-going climate in greater detail.

Effects of Measures of College-going Climate

Table 5 presents the level 2 results for each of our indicators of the college-going climate of the high school. To make these results easier to interpret, Table 6 shows the predicted probability for each outcome for a typical student at the average CPS high school and at a school both weak (one standard deviation lower) and strong (one standard deviation higher) on each measure of college-going climate. As seen in Table 6, we estimate that a student with similar qualifications for college, family background, and school involvement would be approximately 9 to 13 percentage points more likely to plan to attend, apply to, and be accepted into a four-year college if he or she attended a high school that was strong versus weak on teacher assessment of college-going climate. Controlling for whether students applied

Table 5. Summary of Level 2 Effects of Measures of College-going Climate: Controlling for Student (Level 1) Characteristics

Dependent Variable: Log Odds of Completing Step	Teacher Assessment of College Climate		Percentage of Prior Year Graduates Attending a Four-year College		Percentage of Prior Year Graduates Who Applied to 3 or More Colleges		Percentage of Prior Year Graduates Who Completed a FAFSA	
	Intercept	Coefficient (*p*)	Intercept	Coefficient (*p*)	Intercept	Coefficient (*p*)	Intercept	Coefficient (*p*)
Plan to attend four-year college	1.63	0.50 (0.00)	1.59	0.43 (0.00)	1.67	0.15 (0.13)	1.68	0.50 (0.00)
Apply to a four-year college	2.31	0.65 (0.00)	2.27	0.43 (0.00)	2.35	0.19 (0.11)	2.36	0.48 (0.01)
Accepted into a four-year college	2.86	0.84 (0.00)	2.78	0.60 (0.00)	2.88	0.22 (0.08)	2.89	0.45 (0.02)
Enroll in a four-year college	1.61	0.23 (0.25)	1.55	0.44 (0.00)	1.63	0.15 (0.26)	1.63	0.41 (0.02)
Match or overmatch net of taking steps	−0.93	0.32 (0.04)	−0.95	0.44 (0.00)	−0.93	0.03 (0.78)	−0.89	0.38 (0.00)

Note: These coefficients come from HGLM models predicting the conditional odds of completing each step in the college application process among students who completed the previous step (Table 3). The coefficient for match net of taking steps is from an ordered logit model in which the intercept represents the log odds of a student enrolling in a match or overmatch versus an undermatch or no college (see Table 4, Model 6). Thus, the coefficients in this table represent the estimated difference in the log odds of each outcome controlling for a student's qualifications for college, demographic and neighborhood characteristics, school involvement, involvement in college search activities, and student reports of valuation and press for academic achievement and postsecondary (see Tables 3 and 4). Model predicting the log odds of acceptance, enrolling, and enrolling in a match or overmatch four-year college includes additional controls for number of college applications submitted and whether the student reported completing a FAFSA. A more detailed summary of the standard errors from the HGLM estimates is available in the online appendix to this article at http://soe.sagepub.com.

and were accepted into a four-year college, we estimate that a student would be approximately 12 percentage points more likely to enroll in a match four-year college if he or she attended a high school that was strong versus weak on this measure. Thus, differences across high schools in teachers' reports of their and their colleagues' expectations for and involvement in helping students prepare and plan for college are associated with substantial differences in the extent to which students with similar characteristics take the steps to apply to a four-year college as well as their choice among colleges.

We see similarly strong associations between the percentage of prior year graduates attending a four-year college and the probability that students will take the steps in college application and the odds of college match. Interestingly, with one exception, the magnitudes of the association between these two measures of college-going climate are quite similar. The exception is that teacher assessment of college-going climate is not associated with the odds that a student who is accepted will enroll, whereas we do find an association with the high school's four-year college attendance patterns.

We use two school-level indicators of the extent to which the high school actively engages students in postsecondary application: (1) percentage of prior year graduates who applied to three or more colleges and (2) percentage of prior year graduating cohort who completed a FAFSA. At level 1, both of these indicators are important predictors of whether students take the steps to college enrollment as well as college match (see Table 3 and 4). At level 2, however, differences across high schools in the percentage of the prior graduating class who applied to three or more colleges do little to predict whether students take the steps to enroll in a four-year college or their college choice. The average level of FAFSA application in the previous years' graduating class, however, emerges as a consistent and strong predictor of individual student behavior in college application and choice. This indicator is strongly associated with the log odds that a student who aspires to complete a four-year degree plans to attend a four-year college, applies to, is accepted into, and enrolls in a four-year college as well as whether the student attends a match or overmatch college. Thus, in urban school systems, FAFSA completion may be a particularly useful indicator of the extent to which the school engages and organizes students around the college application process.

In sum, indicators of the high school's college-going climate are strongly associated with students' choice among four-year colleges. As seen in Table 6, we estimate that a student with similar qualifications for college, family background, and school involvement who applied to and enrolled in a four-year college would be approximately 12 to 17 percentage points more likely to enroll in a match or overmatch college if he or she attended a high school that was strong versus weak on our indicators of college-going climate. To the extent that college choice matters in shaping a student's likelihood of degree attainment as well as future earnings, as previous research has shown, this finding suggests that high schools have important impacts in shaping the distribution of college opportunities as well as college access.

DISCUSSION

To summarize, this article focused on the question: Is there evidence that indicators of the college-going climate of urban high schools are associated with students' participation in college application and college choice? We define college-going climate as the extent to which adults within the high school create an environment that promotes norms for college attendance and provides the information, resources, and supports students need to effectively navigate college search and application. We used three different types of indicators to measure college-going climate: (1) a broad proxy measure (the percentage of the prior graduating class that enrolled in a four-year college); (2) indicators of the extent to which students report engaging in activities that suggest that the school is filling in college-knowledge gaps (the percentage of prior year graduates who applied to three or more colleges and the percentage of prior year graduates who report completing a FAFSA); and (3) a measure of college-going climate embedded within teacher expectations and practices (teacher assessment of college-going climate).

This section began by discussing the results for student-level predictors of our two sets of outcomes: (1) whether seniors who aspire to a four-year degree and are qualified to attend a four-year college take the steps to apply to and enroll in a four-year college and (2) whether students who are qualified to attend a four-year

Table 6. Difference in the Predicted Probability of Taking Each Step and of College Match Net of Following Steps as a Function of College-going Climate (Level 2) Indicators Controlling for Student (Level 1) Variables

Measures of College-going Climate	Predicted Probability for a Typical Student Attending a School	Steps to Apply and Enroll in a Four-year College				Model 6: Match Net of Taking Steps to Enroll
		Model 1: Plan	Model 2: Apply	Model 3: Accepted	Model 4: Enroll	
	Average	.84	.91	.95	.83	.28
Teacher assessment of college-going climate	Strong on measure	.89	.95	.97	.86	.35
	Weak on measure	.76	.84	.89	.80	.23
	Difference	**.13**	**.10**	**.09**	.06	**.12**
Percentage of prior year graduates attending four-year college	Strong on measure	.88	.95	.97	.88	.37
	Weak on measure	.76	.84	.90	.75	.20
	Difference	**.12**	**.10**	**.07**	**.13**	**.17**
Percentage of prior year graduates applying to 3 or more colleges	Strong on measure	.86	.93	.96	.85	.29
	Weak on measure	.82	.90	.94	.82	.28
	Difference	.03	.03	.02	.04	.01
Percentage of prior year graduates completing a FAFSA	Strong on measure	.89	.94	.96	.88	.36
	Weak on measure	.78	.88	.93	.79	.23
	Difference	**.10**	**.06**	**.04**	**.09**	**.12**

Note: Probabilities were estimated for a student who is "average" on level 1 variables. Thus, these probabilities represent the predicted difference in the likelihood of each outcome controlling for a student's postsecondary qualifications, demographic and neighborhood characteristics, school involvement, involvement in college search activities, and student reports of valuation and press for academic achievement (see Tables 3 and 4). Models 3, 4, 5, and 6 include additional controls for number of college applications submitted and whether the student reported completing a Free Application for Federal Student Aid. "Strong on measure" is the predicted probability for a student attending a high school whose measure is one standard deviation higher on average and "weak on measure" is a high school whose measure is one standard deviation lower than average. Boldface difference denotes whether effect is statistically significant at 0.05.

college and plan to continue their education do not enroll college, enroll in a college that represents an undermatch to their qualifications, or enroll in a college that represents a match or overmatch to their qualifications. The general patterns of results confirm the importance of investigating high school effects. A student's demographic characteristics, valuation of high school, and parental press are only associated with whether seniors who aspire to a four-year degree plan to attend a four-year college in the fall after graduation. For example, female students, African American students, students who report that their mother had graduated from a four-year college, and students who report strong parental press for achievement and postsecondary planning were all more likely to plan to attend a four-year college after graduation. Yet, none of the same student characteristics consistently predicted whether students who planned to attend a four-year college took the next steps and applied to, were accepted into, and enrolled in a four-year college, particularly a college that represented a match or overmatch to their qualifications. As we described in our literature review, research on college access finds that first-generation college students and their families often lack knowledge of the requirements and details of the college admission and financial aid processes. Parents of first-generation college-goers may have limited ability to support their children in making critical college decisions beyond imploring their children to value their education and strive for a college degree. As a result, they are often dependent on high school educators and other nonfamilial adults to fill in knowledge gaps and to assist them in effectively making educational plans and decisions. In this article, we went beyond the importance of the high school attended to ask, do measures of the college-going climate of urban high schools predict across-school variation in the extent to which students with similar aspirations and qualifications, family backgrounds and neighborhood contexts, and levels of school involvement take the steps to enroll in four-year colleges as well as their choice among four-year colleges? We find that variation across urban high schools in all but one measure of college-going climate—applying to three or more colleges—significantly predicts these outcomes. We find particularly strong effects of college-going climate on the odds that a student will enroll in a match or overmatch college.

These associations, however, are descriptive and correlational. We do not know the extent to which measures of college-going patterns, teacher norms and attitudes, and indicators of the average behavior of students are driven by the characteristics of the students in the school (selection effects), the impact of student body composition (peer and contextual effects), or the effects of teachers and staff behavior. Thus, even after we control for measured characteristics and qualifications, students with a greater orientation to college may be selecting into high schools that are perceived as offering greater access to supports.[11] Because we control for an individual student's qualifications at the end of high school, we can argue that we have adjusted for the impact of the quality of the high school in shaping an individual student's qualifications. Nevertheless, because each of our indicators of a high school's college-going climate is correlated with school achievement, we know that students who attend high schools with more positive values on college-going indicators have, on average, higher achieving peers. For example, we estimate that a student who attended a high school with strong teacher reports of college-going climate would be approximately 12 percentage points more likely to enroll in a match college, conditional on applying to and being accepted into a four-year college, than a student with similar characteristics who attended a high school with weak ones. To the extent this association may reflect selection, peer, or contextual effects, an individual high school that improves its college-going climate may not see an equivalent improvement in match rates because an individual high school would not simultaneously be changing the composition of its student body.

If peer and selection effects occur, we are likely to overestimate the effects of college-going climate. However, an important counter effect may occur because schools that advance more of their students to the next benchmark face a more heterogeneous population at each successive step. The simplest analogy is the tradeoff between lowering dropout rates and achievement. High schools that retain students who would have dropped out in other schools may have lower average achievement test scores because they retain more students who may be more likely to struggle. The same phenomenon occurs when we examine the odds of students taking steps in college application. Schools in which, conditional on student

characteristics, more students plan to attend a four-year college have more students who could take the next step of applying. This means that on unmeasured characteristics, the students in their school who apply to four-year colleges include those who would not have planned to attend a four-year college if they had attended a school with lower college-going norms. Thus, we would expect that schools with greater effects in one step could face a more difficult task in moving their students through the next step. This negative selection would lead us to underestimate the effects of college-going climate and teacher behavior, a problem that could be addressed by identifying instruments for each step in college application.

CONCLUSION

Thirty years ago, the task of applying to college was not on the agenda of most seniors in American high schools. But from 1980 to 2002, the percentage of tenth graders who aspired to attain a bachelor's degree or higher nearly doubled from 41 to 80 percent, with the largest increases in aspirations occurring among low-income students (U.S. Department of Education 2004). Rising aspirations certainly reflect the dramatic shift in the economic landscape facing today's students. But racial/ethnic minority students are lagging in translating their aspirations into college enrollment (Roderick et al. 2008). In his first address to Congress, President Obama set the goal of ensuring that by 2020 America once again leads the world in the proportion of the population who are college graduates. As public schools in the United States increasingly serve a majority minority student body, closing racial/ethnic and income gaps in college enrollment is imperative for pursuing this goal, and urban high schools must become the epicenter of reform. What will it take to transform high schools from institutions that prepare a select group of students for college enrollment to institutions that prepare the majority of their students for this goal? Most of the policy debate around high school reform has focused on improving college access and performance by increasing college readiness. This policy focus is well-placed. Minority and low-income students are much less likely to graduate from high school with the qualifications that provide access to four-year colleges with minimal admission criteria.

This article focused on a second neglected but potentially critical role for urban high schools: that of bridging what could be termed the social capital gap for first-generation college students. As is vividly illustrated in this article, too often low-income urban students with the qualifications to attend four-year colleges do not effectively take the steps to apply to and enroll in a four-year college. And too often, urban students enroll in four-year colleges with selectivity levels below the kinds of colleges they are qualified to attend. Our findings suggest that high schools have an important role to play in guiding students into the application pool and shaping their college choices. Urban students who attend high schools where there is a pattern of four-year college-going, where teachers report that they expect students to go to college and take responsibility for preparing and supporting their students in college application, and where greater proportions of students are active in financial aid application (as indicated by the proportion of seniors who file a FAFSA application) are more likely to plan to attend, apply to, and be accepted into a four-year college as well as enroll in a four-year college with selectivity levels that match their qualifications. Thus, high school reform efforts to increase college access must couple a focus on increasing qualifications with attention to developing environments in which students and their families have access to the expectations, information, resources, and supports they will need to translate aspirations into enrollment and effective college choice.

APPENDIX A

Samples and Method for Adjusting NSC Data for Students Who Planned to Enroll in College Not Participating in the National Student Clearinghouse

	N	ACT	GPA (Unweighted)
2005 graduates who were seniors in the spring of 2005	16,544	17.1	2.30
Not in special education	14,228	17.7	2.35
Not in alternative high schools	13,795	17.7	2.38
Took SEQ	13,641	17.7	2.39
Took CCSR survey	7,765	17.9	2.44
Students have information on each step toward college enrollment (completed both CCSR survey and SEQ)	6,212	18.1	2.49
Figure 1 and Table 1: Students who aspire to complete at least a four-year degree	5,194	18.6	2.57
Table 2: Students who aspire to complete at least a four-year degree who said in the SEQ that they planned to continue their education and who are not graduates of charter schools	4,317	18.9	2.63
Table 3: Students who aspire to complete at least a four-year degree, who are not graduates of charter high schools, who have access to at least a nonselective four-year college, and who have no missing values	3,315	19.7	2.81
Table 4: Students in Table 2 who have access to at least a nonselective four-year college and have no missing values	3,047	19.9	2.83

This article uses college enrollment data from the National Student Clearinghouse (NSC). In 2005, more than 2,800 colleges participated in NSC's enrollment verification program, covering 91 percent of postsecondary enrollment in the United States. Because not all colleges attended by Chicago Public Schools (CPS) graduates participate in the NSC, we adjust our enrollment numbers based on student reports of the college they plan to attend on the CPS's Senior Exit Questionnaire (SEQ). Students who report on the SEQ that they plan to attend and are accepted into a college that is not in the NSC are counted as enrolled in that college after adjustment for the college enrollment rate in the larger sample among students with similar qualifications. To adjust, we match students who are enrolling in a non-NSC college to students in our NSC sample by their qualifications. The non-NSC group's college enrollment is then adjusted based on the percentage of their matched NSC group who report having been accepted into a four-year college and ultimately enroll. For example, if in the NSC sample, 90 percent of students with access to very selective college who were accepted into a four-year college ultimately enrolled, we assume that 90 percent of the non-NSC sample with access to a very selective college would also enroll. When including these students in our HGLM analysis, we then conduct a random draw (with uneven probabilities). This means that if 90 percent of the NSC sample with similar qualifications who were accepted ultimately enrolled, we give each matched student a 0.9 probability of getting a value of 1 and then run a random draw assigning them a 1 or 0 based on their underlying probability.

There were 16,544 graduates in the spring of 2005; 13,795 of those graduates were not enrolled in special education of alternative high schools. More than half of those students (7,765) completed the Consortium on Chicago School Research (CCSR) survey, and when this information is combined with results of the SEQ, we have full information on the path to college enrollment for 6,212 or 37.5 percent of graduates. Eighty-four percent of these students, 5,194 of 6,212, aspired to a four-year degree and thus form the core analytic sample for our analysis. To check that we were not biasing our results by limiting the sample to students who filled out the CCSR survey, we ran a more restricted version of our model for students who planned to attend college and completed the SEQ (13,641) and found quite similar associations between our indicators of college-going climate and the log odds of applying to a four-year college, being accepted into a four-year college, and enrolling.

APPENDIX B

Identifying College Access Based on Students' Likelihood of Acceptance at Colleges with Different Selectivity Ratings and Qualifications for College of the 2005 Cohort

Throughout this article, we draw on a rubric developed by Roderick, Nagaoka, and Allensworth (2006) that indicates the minimum unweighted GPA, composite ACT scores, and advanced coursework that Chicago Public Schools (CPS) graduates need to have a good chance of being accepted into certain classifications of colleges. We categorize colleges by their selectivity using *Barron's Profile of American Colleges* (2005) rating[12]: (1) nonselective four-year colleges, a rating that combines Barron's ''less competitive'' and ''noncompetitive'' categories; (2) somewhat selective four-year colleges; (3) selective four-year colleges; and (4) very selective four-year colleges, a rating that combines Barron's two top categories (most competitive and highly competitive). Because all CPS students take the ACT as part of the state's assessment system, we are able to look at qualifications for college for all CPS graduates. We identify cutoffs for each ''qualification category'' (e.g., access to a selective college) using a multivariate analysis that allows us to identify the most likely college outcome for CPS students with different GPAs and ACT scores. These cutoffs were then verified by descriptively identifying the modal college attendance patterns of CPS students with different GPA and ACT combinations. The ACT cutoffs we use are lower than the definitions used in college ratings such as Barron's because we base the rubric on the actual college-going patterns of CPS graduates given their GPAs and ACT scores. Our definition of qualifications does not encompass all of the criteria that colleges use in their acceptance decisions such as class rank.

Because all high school graduates have the option of attending a two-year college, we categorize graduates with ACT scores and GPAs that fall below the level necessary for likely admittance to a nonselective four-year college as being limited to attending two-year colleges. We also take into account the role of advanced coursework (i.e., enrollment in an International Baccalaureate [IB] program or taking at least six honors courses and two Advanced Placement [AP] courses) in classifying the type of colleges to which students have access based on college enrollment patterns. Students who have ACT scores and GPAs that place them at the higher end of our selective access category and who took advanced coursework are moved to the very selective category. With the consideration of coursework, an additional 3 percent of 2005 graduates are classified as having access to a very selective college. These are students who take at least two AP and six honors courses or are enrolled in an IB program.

Appendix C: Variables Used in the Analysis (Means and *SD*s Are for Sample in Table 3)

Variable	Mean	*SD*	Description
Level 1—Individual Characteristics (*N* = 3,315)			
Census variables of students' neighborhood (based on geocoding student addresses to block group)			
Concentration of poverty	−0.09	(1.01)	Based on 2000 U.S. census information on the block group in which students live on two reverse-coded indicators: (1) the log of the percentage of male residents over age 18 employed one or more weeks during the year and (2) the log of the percentage of families above the poverty line
Census block socioeconomic status	0.13	(1.03)	Based on 2000 U.S. census information on two indicators: (1) the log of the percentage of employed persons 16 years old or older who are managers or executives and (2) the mean level of education among people over 18
Gender and race/ethnicity			
Male	0.34	(0.47)	Demographic characteristics obtained from official school records
Female	0.66	(0.47)	
African American	0.44	(0.50)	
Latino	0.30	(0.46)	
White	0.15	(0.36)	
Asian	0.11	(0.31)	
Age of immigration			
Born in U.S.	0.79	(0.40)	Student self-reports (2005 CCSR senior survey) of whether he or she was born in the U.S. and age of immigration
Before age 10	0.11	(0.31)	
After age 10	0.10	(0.30)	
Mother's education			
Don't know	0.09	(0.29)	Student reports (2005 CCSR senior survey) of mother or female guardian's highest level of education completed
Less than high school	0.19	(0.39)	
High school only	0.23	(0.42)	
Some college/two-year degree	0.25	(0.43)	
Four-year degree or higher	0.23	(0.42)	

continued

(continued)

Variable	Mean	*SD*	Description
Qualifications for college			
Very selective	0.18	(0.38)	See Appendix B
Selective	0.24	(0.43)	
Somewhat selective	0.38	(0.49)	
Nonselective	0.20	(0.40)	
School involvement			
Hours worked for pay	2.14	(1.29)	Student reports (2005 CCSR senior survey) of how many hours per week were spent working for pay (none = 1, 1-10 hours/week = 2, 11-20 hours/week = 3, 21-34 hours/week = 4, 35+ hours/week = 5).
Played sport	0.34	(0.47)	Student reports (2005 CCSR senior survey) of involvement in a sport team at school
Extracurricular activity	0.46	(0.50)	Student reports (2005 CCSR senior survey) of participation in school clubs or after-school activities
Student reports of valuation and press for academic achievement			
Value of high school for the future	0.05	(1.00)	CCSR 2005 senior survey. Students were asked the extent to which they agree that (1) my classes give me useful preparation for what I plan to do in life; (2) high school teaches me valuable skills; (3) working hard in high school matters for success in the work force; (4) what we learn in class is necessary for success in the future; (5) I'm getting a good education at my school. The measure is constructed using Rasch rating scale analysis (Individual Separation, 1.33; Individual Level Reliability, 0.64; School Level Reliability, 0.85).
Parental press for achievement and postsecondary planning	0.06	(0.97)	CCSR 2005 senior survey. Students were asked the extent to which their parents (1) encourage me to work hard in school; (2) talk to me about how I am doing in my classes; (3) encourage me to continue my education after high school; (4) talk to me about what I am studying in class; (5) talk to me about my homework assignments; (6) help me select courses that will prepare me for college or work; (7) push me to take the steps I need to make my plans happen. The measure is constructed using Rasch rating scale analysis (Individual Separation, 1.33; Individual Level Reliability, 0.64; School Level Reliability, 0.81).
Peer support for academic work	0.09	(0.98)	CCSR 2005 senior survey. Students were asked the extent to which their friends (1) try hard in school; (2) discuss class activities; (3) help each other prepare for tests; (4) think it is important to do well in school; (5) help each other with homework assignments; (6) think it is important to attend every class. The measure is constructed using Rasch rating scale analysis (Individual Separation, 1.78; Individual Level Reliability, 0.76; School Level Reliability, 0.90).

continued

(continued)

Variable	Mean	*SD*	Description
Step-specific predictors			
Went to college fair	0.82	(0.39)	Student reports (CCSR 2005 senior survey) of whether he or she attended a college fair in high school
Used college guide books	0.57	(0.46)	Student reports (CCSR 2005 senior survey) of whether he or she used college guidebooks (online or print) while in high school
Applied to fewer than three colleges	0.45	(0.50)	Student reports (2005 CPS Student Exit Questionnaire) of the number of college applications completed
Applied to three to five colleges	0.41	(0.49)	
Applied to six or more colleges	0.14	(0.35)	
Completed FAFSA	0.73	(0.44)	Student reports (2005 CPS Student Exit Questionnaire) of whether a FAFSA was completed
Level 2—School Variables (*N* = 58)			
Selective enrollment school	0.10	(0.31)	Dummy variable for whether high school has competitive enrollment requirements
Teacher assessment of college climate	−0.64	(0.95)	2005 CCSR high school teacher survey. Teachers were asked the extent to which they would agree (strongly disagree to strongly agree) that (1) teachers (in this high school) expect most students to go college; (2) teachers help students plan for college outside of class time; (3) the curriculum is focused on helping students get ready for college; (4) teachers feel that it is a part of their job to prepare students to succeed in college; (5) many of our students are planning to go to college. The measure is constructed using Rasch rating scale analysis and represents the average of teacher reports in the high school (Individual Separation, 1.97; Individual Level Reliability, 0.79; School Level Reliability, 0.94).
Percentage of prior year graduates attending four-year college	0.10	(0.98)	The percentage of 2004 graduates, the prior cohort, in the school who enrolled in a four-year college after high school based on NSC data (standardized at school level)
Percentage of prior year graduates applying to three or more colleges	0.11	(0.86)	The percentage of 2004 graduates in the school who reported on the 2004 CPS Senior Exit Questionnaire that they had either applied to three or more postsecondary schools (standardized at school level)
Percentage of prior year graduates completing a FAFSA	0.13	(0.79)	The percentage of 2004 graduates, the prior cohort, in the school who reported on the 2004 CPS Senior Exit Questionnaire that they had completed the FAFSA (standardized at school level).

Note: CPS, Chicago Public Schools; CSSR, Consortium on Chicago School Research; FAFSA, Free Application for Federal Student Aid; NSC, National Student Clearinghouse.

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NOTES

1. In the 2005 CCSR senior surveys, 56 percent of both white and African American seniors reported that their mother had attended at least some college compared with 44 percent of Asian and only 22 percent of Latino seniors (Roderick et al. 2008).
2. NSC is a nonprofit corporation that began in 1993 to assist higher education institutions in verifying enrollment and degree completion. In 2004, NSC expanded its service to high school districts.
3. We chose to examine students' immediate enrollment in college because of the possible negative effects of delayed enrollment on degree completion (Bozick and DeLuca 2005).
4. We chose not to define college access by only using coursework requirements because the CPS graduation requirements are aligned with the minimum admission requirements of in-state public four-year colleges. Thus, by definition all graduates should be eligible to attend a four-year college if assessed on the basis of their coursework. In the 1990s, CPS raised graduation requirements to include four years of English, three years of mathematics (algebra, geometry, advanced algebra/trigonometry), three years of laboratory science, three years of social sciences, and two years of world language.
5. We omit special education students from our analysis because we rely so heavily on GPA and ACT scores to characterize qualifications for college. Grades for students in special education are determined by their Individual Education Plans, making GPAs not comparable to non–special education students. In addition, for these students, we do not know whether the ACT is an accurate measure of their abilities, thus introducing substantial measurement error.
6. In Chicago, charter schools receive public funding but operate independently from the Board of Education. Unlike selective enrollment schools in CPS, charter schools are open enrollment and admittance is based on a lottery if the number of applications exceeds the number of available spaces.
7. Ultimately, finding the right college means more than gaining acceptance to the most competitive college possible. It is about finding a good "fit": a college that meets a student's educational and social needs and that will best support his or her intellectual and social development. Fit may also include whether colleges have higher graduation rates and/or better financial aid.
8. The model can be expressed as a series of discrete steps or events that students must take in order to enroll in college. By estimating each step as a conditional likelihood in an ordered model, we make the assumption that at each point a student must complete the previous step in order for the event to occur and each event (applying to college versus enrolling in college) occurs in a sequence so that both may not occur in the same time period. The ordered nature of these steps over time allows us to estimate the conditional odds. In reality, because of open admission policies, these assumptions are not always met. As noted in Figure 1, some students enroll in a four-year college without completing any steps in spring. In theory, these competing sequences can be modeled but this requires information on the timing of events for students who do not follow the pathway and also requires competing sequences to be common enough to be estimated. Adding students back in if they did not follow a step (e.g., counting a student who enrolled without applying as the same as a student who enrolled in a four-year college after applying) could introduce bias in our estimates (e.g., the outcome enrollment without application may not be the same as the outcome enrollment with application). Because these competing events and sequences were relatively rare in this data set, we limit the analysis to describing whether students took or did not take the sequence of steps. Students who followed different sequences then are counted as not taking a step and then are excluded from the next step.
9. We chose to grand mean center our level 1 coefficients because we are interested in the relationship between our level 2 predictors and our student outcomes after we control for the effects of various student level predictors. This approach is consistent with Hoffman and Gavin (1998) and Raudenbush and Bryk (2002, chapter 5).
10. There are three main areas where undocumented students may face difficulties in enrolling in college. First, undocumented students may have concerns about applying to colleges and interacting with higher education institutions given their immigration status. Second, in many states, undocumented students must pay out-of-state tuition regardless of the length of their residency. Finally, undocumented students also face higher college costs because they are barred from receiving federal financial aid. Although the severity of the obstacles

faced by undocumented students is clear, we do not know how many of the students who report having immigrated after age 10 are undocumented.

11. Even among neighborhood, nonselective enrollment high schools, students exercise substantial choice and sort on the basis of perceived quality—a process that introduces selection effects. In 2005, only 43 percent of first-time freshmen in CPS attended their neighborhood high schools.
12. This college ranking system rates four-year colleges on the academic qualifications of the students who attend the college (e.g., ACT or SAT scores, GPA, and class rank), as well as the percentage of applicants who are accepted.

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