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ABSTRACT

Data from the High School and Beyond Study were used to study the pathways taken by members of the High School Class of 1982 to a college degree. The class of 1982 followed nine different pathways to a 4-year degree, paths formed by a combination of academic resources secured in high school and the first type of postsecondary institution attended. The pathway most likely to lead to 4-year degree is one defined by acquiring high academic resources in high school and entering a 4-year institution on high school completion. Those who followed this path had a 77% chance to graduate within 11 years. Most students of high socioeconomic status followed this pathway, and they with a 81% graduation rate. Most students of the lowest socioeconomic status studied journeyed on a pathway defined by moderate academic resources and first enrollment in a 2-year institution. Only 3.3% of these students earned a 4-year degree. Forty percent of the class of 1982 first entered a community college, and 29% of them transferred to a 4-year institution within 11 years. By 1993, 35% of the members of the High School Class of 1982 had obtained at least a bachelor's degree. Degree completion was affected most by socioeconomic status, academic resources, degree aspirations, enrollment patterns, taking college courses in mathematics and sciences, financial aid, and having children while attending college. (Contains 14 figures, 15 tables, and 131 references.) (SLD)

On the Right Path:
The Higher Education Story of One Generation

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May 30, 2001

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Executive Summary

Pathways to a Four-Year Degree. The High School Class of 1982 followed nine different pathways to a 4-year degree. These paths were formed by a combination of academic resources secured in high school and the first type of postsecondary institution attended. The chance to secure a 4-year degree varies in relation to the particular pathway followed.

- The pathway most likely to lead to a 4-year degree is one defined by acquiring high academic resources in high school and entering at a 4-year institution upon high school completion. Those who followed this path had a 77% chance to graduate within 11 years.
- Most Highest-SES students followed this pathway, resulting in an 81% graduation rate.
- Most Lowest-SES student journeyed on a pathway defined by moderate academic resources and first enrollment in a 2-year institution. Only 3.3% of these students earned a 4-year degree.

Transfer. Forty percent of the High School Class of 1982 first entered a community college. Of them, 29% transferred to a 4-year institution within 11 years. When the socioeconomic background of the student is examined, our analyses suggest a stratification pattern whereby:

- 50% of Lowest-SES students first enter a community college, while only 17% of them eventually transfer to a 4-year institution.
- 30% of all Highest-SES students first enter a community college, while 37% eventually transfer.
- The 20-percentage point gap in transfer rates between Lowest-SES and Highest-SES students is reduced to 8% when myriad factors are considered simultaneously.
- Transfer decisions are affected most by academic resources, degree aspirations, taking college courses in math and sciences, educational loans, and having children while attending the community college.

Degree Completion. Thirty-five percent of the members of the High School Class of 1982 obtained at least a bachelor's degree by 1993. When the socioeconomic background of the student is examined, our analyses suggest a stratification pattern whereby:

- Lowest-SES students have a 13% chance to graduate within 11 years. The graduation rate for Highest-SES students is 57%.
- The 44% SES-based degree completion gap separating Lowest-SES students from Highest-SES students is reduced to 25% when a myriad of factors are considered simultaneously.
- Degree completion is affected most by SES, academic resources, degree aspirations, enrollment patterns, taking college courses in math and sciences, financial aid, and having children while attending college.

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Acknowledgments

This report could not have been possible without the generous and fortunate assistance of key organizations and people. We are most indebted to the Association for Institutional Research whose financial support enabled us to systematically examine the journey to a 4-year degree followed by the High School Class of 1982.

The College Board provided us with seed funding to undertake a comprehensive review of the literature on college choice among low-income students (Terenzini, P. T., Cabrera, A. F., & Bernal, E. M. , 2001). This literature was instrumental for the analyses of the High School and Beyond for the 1980 Sophomore Cohort (HSB/So) database. Larry E. Gladieux and W. Scott Swail kindly gave us constant encouragement, guidance, and invaluable insight throughout this project.

The US Department of Education was our stepping-stone for unraveling the power of the HSB/So. Clifford Adelman, Senior Research Analyst, came to our rescue numerous times by providing invaluable technical advice and knowledge. His own seminal work (Adelman, 1999) gave us the tools to work with this wonderful database. Dennis Carrol's, Aurora D'Amico's, and Cynthia L. Barton's continuous guidance through our own journey is also gratefully acknowledged.

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A bachelor's degree is no longer considered a *potential* stepping-stone to a better life. It is fully acknowledged as the *gatekeeper* to a myriad of social and individual benefits. For instance, a college graduate is far less likely to commit criminal behavior and more prone to participate in civic activities than are less educated individuals. Bachelor degree holders are approximately 30% less likely to be unemployed as compared to those individuals who simply earned a high school diploma (Hossler, Braxton, & Coopersmith, 1989; Pascarella & Terenzini, 1991). Each additional year of schooling past high school seems to prolong life by 0.4 percent, or nearly 2 percentage points upon graduation from college (Hossler, Braxton, & Coopersmith, 1989). Moreover, earning a college degree is known to produce greater gains in occupational prestige (e.g. Lin & Vogt, 1996) and economic returns (e.g. Leslie & Brinkam, 1986) as compared to simply attaining a high school diploma. Though the social and economic benefits of a college degree are manifold, securing them is tied to a single steppingstone: completing a college degree (Adelman, 1999).

As early as the 1960s, federal, state and local governments have recognized the fact that completion of a 4-year degree can be an insurmountable step for individuals from disadvantaged socioeconomic backgrounds. Some student assistance programs like Chapter I, TRIO, and GEAR-UP recognize the importance that academic preparation, awareness of opportunities for college, and assistance in completing the college application process plays for low-income students whose parents are not college educated. Other efforts such as federal and state financial aid programs recognize the importance of ability-to-pay as a deterrent for access to higher education and persistence to degree completion. The importance our society places in making a college degree an affordable option for able and willing low-income individuals is evidenced even more when one examines the growth of college assistance programs during the last four decades. In the early 1980s, the cost of federal financial aid programs approached $20 billion per year (Lewis, 1989). By 1999, the tab for federally supported student aid programs amounted to $46 billion (College Board, 1999).

As important as these need-based programs have been in facilitating access to and success in college, economic need *per se* does not appear to fully explain why low-income individuals enroll in college. Nor do they explain why low-income students persist once enrolled (e.g. Adelman, 1999; Cabrera, Nora, & Castañeda, 1992; Gladieux & Swail, 1998; Swail, 1995; Terenzini, Cabrera & Bernal, 2001). In addition to students' socioeconomic background, a host of other factors that affect the chances of enrolling in college, transferring from a 2-year institution to a 4-year institution, and persisting to degree completion have been identified. These factors include: parental expectations; support and encouragement from family, high school friends, and teachers; developing clear educational and occupational aspirations by the 9th grade; high school experiences; high school academic resources; access to information about college offerings; gathering information about financial aid; preparation for entrance exams; the type of first institution attended; enrollment patterns; the nature and kind of remediation; curricular

patterns; collegiate experiences; performance in college; and family responsibilities (Adelman, 1999; Cabrera & La Nasa, 2001; Horn & Chen, 1998; St. John et al, 2000; Velez, 1985; Velez & Javalgi, 1987).

This study seeks to further our understanding of why post-secondary attendance patterns differ markedly between socioeconomically disadvantaged students and their better off peers. In so doing, two milestones along the college path for members of the graduating High School Class of 1982 are examined. These two milestones are: 1) transferring from the 2-year sector to the 4-year sector, and 2) persistence to degree completion. Before doing so, we first study enrollment patterns followed by students from different socioeconomic status. These enrollment patterns underscore the important role played by high school-based academic resources and first-type of postsecondary institution attended.

PATHWAYS TO A FOUR-YEAR DEGREE

In following members of the 1982 High School Class over a decade, Adelman (1999) concluded that the quality and intensity of academic preparation secured in high school was one of the most important determinants of securing a 4-year degree. Regarding postsecondary tracks, however, Velez (1985) and Carroll (1989) found that members of the High School Class of 1980 were more prone to obtain a bachelor's degree if their port of entry to postsecondary education was a 4-year institution. This section describes how members of the 1982 High School Class used these two major stepping-stones, academic resources and postsecondary tracks, to pave their way to a 4-year degree.

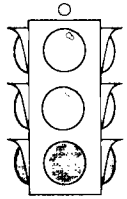
By 1994, the majority (92%) of the High School Class of 1982 enrolled in postsecondary education. Of them, 47% attended a 4-year institution, 41% opted for a 2-year institution, and 12% selected another type of institution. Forty-two percent were fully qualified for college, while 11% entered postsecondary education with low academic resources. Figure 1 depicts the nine different paths to a 4-year degree followed by the High school Class of 1982, resulting from combinations of academic resources[1] levels and the first-type of institution attended. The type of institution students first enter correlates strongly with academic resources secured in high school ($r=.412$, $p<.001$). Seventy-percent of those students highly prepared academically enrolled at 4-year institutions. In contrast, only 11% of the lowest prepared enrolled at a 4-year institution. For these academically deficient students, institutional choice appears almost exclusively confined to institutions offering the associates degree or less.

Academic Resources-Institutional Choice paths vary in their likelihood to produce a 4-year degree. In the aggregate, successful pathways to a bachelor's degree appear to

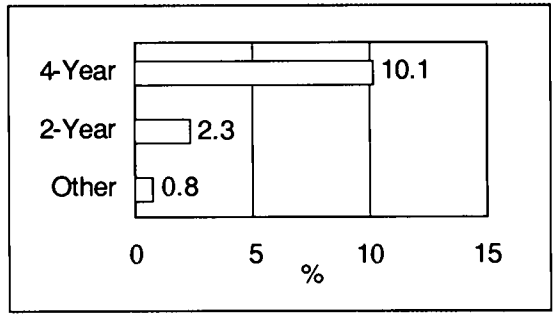
[1] Adelman (1999) created a composite measure, ACRES, capturing students' abilities, high school graduation rank, and quality and intensity of high school curriculum. Adelman reported ACRES to be one of the best predictors of degree completion among for members of the 1982 High School Class. To facilitate comparison, ACRES quintiles were transformed into thirds (low, medium, and high) by collapsing the two quintiles at both ends of the scale.

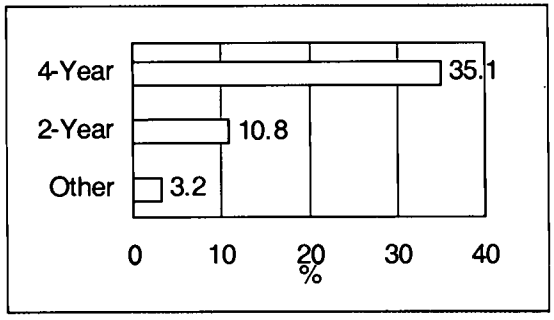
follow a logical progression: students that obtain the highest academic preparation and enter a 4-year institution tend to secure a 4-year degree. Those students who are poorly qualified and choose institutions other than colleges and universities see their chances to graduate diminished. Seventy-eight percent of those students who pursued the first path graduated within 10 years. In contrast, just 2.3% of those who were poorly qualified and entered at 2-year institutions graduated in the same timeframe. Although enrolling in a 4-year institution exerts a powerful effect, academic preparation seems to provide better chances to graduate from college regardless of port of entry. Even when students begin their post-secondary careers in the 2-year sector, those that are highly prepared have a 30% chance to earn a 4-year degree (see Figure 1).

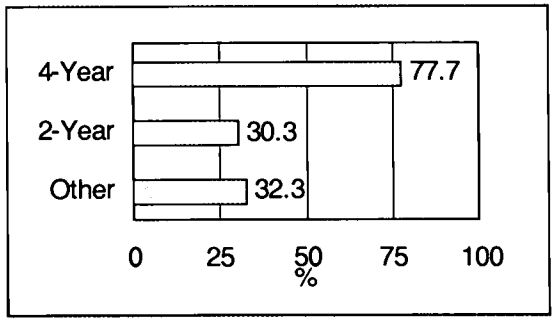
Figure 1. Degree attainment by ACRES and first institution type for all students



Academic Resources	First Institution of Attendance Type	Probability of Securing a 4-Year Degree
Low 11.8% (225,483)	4-Year 16.3% (36,653)	4-Year 10.1
	2-Year 57.5% (129,662)	2-Year 2.3
	Other 26.2% (59,168)	Other 0.8
Number of Students (1,913,269)		
Medium 38.2% (730,759)	4-Year 31.3% (228,856)	4-Year 35.1
	2-Year 53.3% (389,713)	2-Year 10.8
	Other 15.4% (112,190)	Other 3.2
High 50.0% (957,027)	4-Year 70.3% (672,914)	4-Year 77.7
	2-Year 24.3% (232,146)	2-Year 30.3
	Other 5.4% (51,967)	Other 32.3



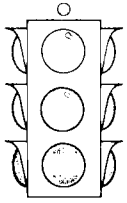




Based on High School and Beyond, Sophomore Cohort (NCES 2000-194). Only cases with verified data were used.

Securing different levels of academic preparation and choosing institutions of postsecondary education varies as one examines a student's socioeconomic status. Twenty-five percent of all Lowest-SES students secure high academic resources. Moreover, only 30% of Lowest-SES students first enrolled at 4-year institution regardless of academic resources (see Figure 2).

Figure 2. Degree attainment by ACRES and first institution type for Lowest-SES students

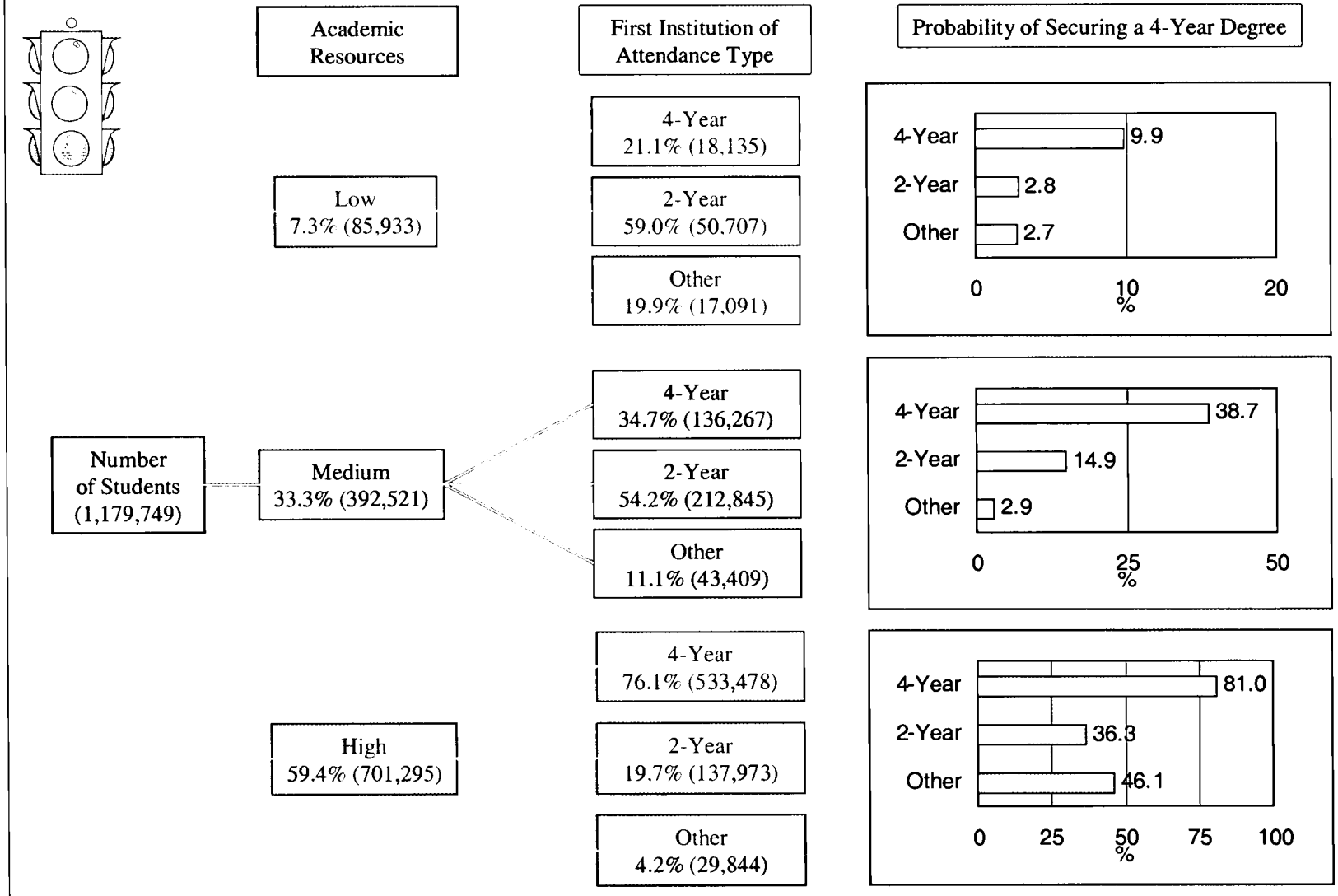


Academic Resources	First Institution of Attendance Type	Probability of Securing a 4-Year Degree
Low 22.0% (64,567)	4-Year 14.2% (9,175)	20.8
	2-Year 51.3% (33,090)	0.7
	Other 34.5% (22,302)	0.0
Number of Students (292,691)		
Medium 53.0% (155,037)	4-Year 27.7% (42,968)	26
	2-Year 47.4% (73,442)	3.3
	Other 24.9% (38,627)	2.9
High 25.0% (73,087)	4-Year 49.9% (36,452)	58.5
	2-Year 39.4% (28,841)	18.2
	Other 10.7% (7,794)	13.0

Based on High School and Beyond, Sophomore Cohort (NCES 2000-194). Only cases with verified data were used.

In contrast to the case of Lowest-SES students, 59% of students from the Highest SES background obtained high academic resources. Additionally, 58% of all Highest-SES students first entered a 4-year institution regardless of their academic resources (see Figure 3). These figures confirm a pervasive national trend more fully documented elsewhere (Cabrera & La Nasa, 2001).

Figure 3. Degree attainment by ACRES and first institution type for Highest -SES students



Based on High School and Beyond, Sophomore Cohort (NCES 2000-194). Only cases with verified data were used.

Paths pursued by students to earn a bachelor's degree do, in fact, vary by socioeconomic status. Lowest-SES students are most likely to journey on the path of medium academic resources and entrance at a 2-year institution. The degree completion chances of those who journey on this path are only 3.3 % (see Figure 2). At the opposite end, is the case of Highest-SES students who travel on the path of high academic resources and entrance in a 4-year institution. Eighty-one percent of Highest-SES students traveling on this path graduate with a bachelor's degree (see Figure 3).

Students from high socioeconomic backgrounds appear to have a relative advantage over students from the lowest socioeconomic levels for most of the pathways to a college degree. In all but one path, students from the highest socioeconomic backgrounds are more likely to secure a 4-year degree than their disadvantaged peers, regardless of academic preparation or port of entry.

Nevertheless, the results are not entirely dismal for disadvantaged students—because these students display remarkable success along a very important path. Lowest-SES students who secure only minimal academic resources and enter a 4-year institution are approximately 10% more likely to secure a 4-year degree than their better-off peers that follow the same path. This fact speaks highly to these students' resilience to overcome the high hurdles they face.

Given the wide disparity in academic resources secured at the secondary level, and the propensity of Lowest-SES students to enter the post-secondary system in the 2-year sector, those concerned with access are left to guess as to how these students can best be supported. The High School Class of 1982 data has the potential to eliminate the guesswork associated with this problem, however. Examination of this database has already revealed much about the important role academic preparation has on persisting to degree completion (Adelman, 1999). What remains is to use this database to hear what students have to tell about the factors that facilitate the navigation between the two separate, distinct, and very often, distant sectors of higher education in the United States. The next section, *Determinants of Transfer*, examines critical factors enabling a student to transfer to the 4-year sector.

DETERMINANTS OF TRANSFER

First Type of Institution Attended and SES

It is known that low-income students are more prone to enroll at 2-year institutions than are their economically better off counterparts (McPherson & Shapiro, 1998). This institutional attendance pattern seems to support the claim of inequity of educational opportunities based on one's socioeconomic background (Karabel, 1972, 1986).

Our examination of the college destinations for the High School Class of 1982 supports McPhearson and Shapiro's findings, and is in line with Karabel's notion of SES-based inequity of higher education opportunity. As shown in Table 1, a small but significant association between socioeconomic status and college destinations of the high

school graduates exists (X^2=206,703, 6, p<.001, r=.290). Compared to the average high school graduate, whose chances of enrolling at a 4-year institution are almost 50%, the average poor student's chance of enrolling at a 4-year institution is only 30%. When comparing the enrollment rate at 4-year institutions between the Lowest-SES students and the Highest-SES students, a huge disparity is evident. Highest-SES students are 37% more likely to enroll in a 4-year institution than Lowest-SES students.

Table 1. First type of postsecondary institution attended for the High School Class of 1982.

Socioeconomic Status	First Type of Postsecondary Institution Attended		
	Other	2-year	4-year
Lowest	22.3%	47.8%	29.9%
Medium Low	14.4%	49.5%	36.1%
Medium High	13.7%	42.5%	43.9%
Highest	3.9%	29.2%	66.9%
Overall	12.0%	40.4%	47.6%

NOTE: Estimates are based on the HSB/So panel weight PSEWT1 that estimates participation in postsecondary education and degree attainment for the whole 1980 population cohort of High school sophomores (n=2,155,164).

Transfer Patterns and SES

Compounding the problem of the moderate associate between college destination and socioeconomic factors is the fact that few students enrolled in the two-sector actually transfer to a 4-year institution. Tinto (1987), while examining the high school class of 1972, estimated that only one out of four community college students eventually transfer to a 4-year institution. Other articles report that enrolling at a 2-year institution substantially reduces one's chances of eventually securing a 4-year degree (e.g. Astin, 1977; Breneman and Nelson, 1981). These two pieces of evidence further support Karabel's (1986) conclusion that entrance in a community college ironically helps to perpetuate a system of unequal access to a college degree.

Our descriptive analyses of transfer rates among community college students enrolled during the 1983-84 academic year corroborate Karabel's contention. The overall transfer rate among this group was 29%, a transfer rate remarkably close to Tinto's estimates. We also found transfer to a 4-year institution to be significantly associated with a student's SES (X^2 = 13380.9, p < .001, r =.164). Differences in transfer rates by SES are vast. Lowest-SES community college students were 20%, 17%, and 6% less likely to transfer to a 4-year institution than their counterparts in the Highest-, Medium High-, and Medium Low-SES quartiles (see Table 2).

Table 2. Transfer Rates by SES among students enrolled in a community college during the 1983-84 academic year.

Socioeconomic Status (in quartiles)	Percentage Transferring
Lowest	17.0%
Medium Low	22.9%
Medium High	33.9%
Highest	36.7%
Overall	29.4%

NOTE: Estimates are based on the HSB/So panel weight PSEWT1 that estimates participation in Postsecondary education and degree attainment for the whole 1980 population cohort of High school sophomores (total n = 499,116).

Despite this data, the role of the community college as an SES-based gatekeeper for eventual college degree attainment is debated. At the core of this controversy lies the level of analysis and the type of controls different studies employ. Experts on the community college sector have long believed that simple descriptive statistics obscure the role played by a variety of factors critical to a student's chances to eventually transfer to the 4-year sector (e.g., Kinnick and Kempner, 1998; Breneman & Nelson, 1981; Adelman (1999), Berkner and Chavez (1997), Hearn (1988, 1991), and Lee and Frank (1990); Velez & Javalgi, (1987)). Their research suggests socioeconomic status plays a secondary role in transfer decisions when compared to other factors.

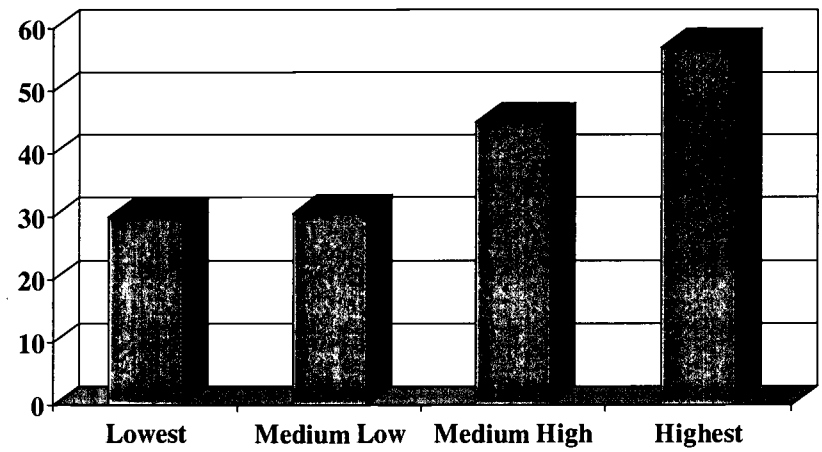
Educational Aspirations

Clear educational aspirations along with strong high school preparation for college seem to play a pivotal role in transfer decisions. Kinnick and Kempner (1988) found students entering a 2-year institution were able to secure a 4-year degree to the extent they had clear educational goals, were highly motivated, and were academically prepared. More recently, Adelman (1999) found the odds of eventually securing a 4-year degree among those students who started at a community college to be highly associated with collegiate degree expectations. Lee and Frank (1990) reported similar results when they examined transfer behavior for a representative sample of the High School Senior Class of 1980.

Degree Aspirations

When we examine those 1982 high school graduates who entered a community college between 1982-83, we found striking differences in degree aspirations across SES-quartiles. A moderate, but significant, correlation between SES and degree aspirations was observed, where degree aspirations increased across SES . Lowest-SES students were almost 30% less likely to aspire to a four degree than Highest SES students (see Figure 4).

Figure 4. Proportion of students entering a community college aspiring for a 4-year degree by SES.

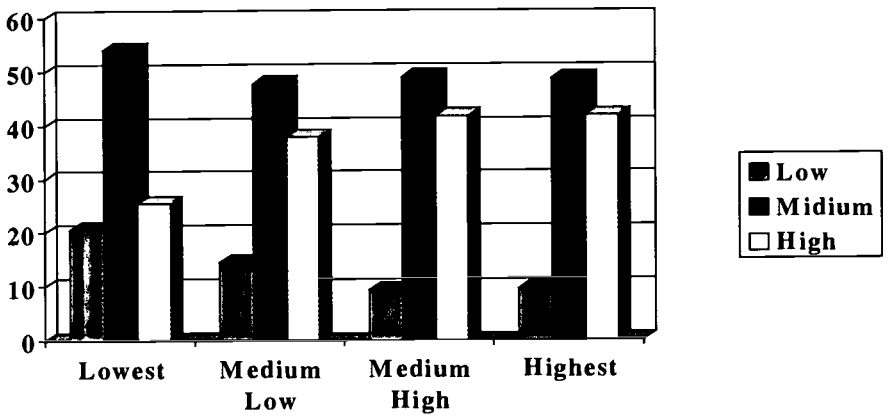


Note: Estimates based on those high school graduates who enrolled at a 2-year institution between 1982-83 (r=.224).

Academic Resources

Securing academic resources in high school seems to be a determinant of success in postsecondary education. Adelman (1999) found that the odds of securing a 4-year degree increased in tandem with the academic resources the college student secured in high school: the greater one's academic resources, the greater one's chances of securing a 4-year degree. We find that the level of academic resources among community college is moderately associated with SES. Lowest-SES students were less prepared. While 42% of Highest-SES students were highly academically prepared for college, merely 25% of Lowest-SES students enjoyed the same level of academic preparation (see Figure 5).

Figure 5. Academic resources among community college students across SES.



Note: Estimates based on those high school graduates who enrolled at a 2-year institution between 1982-83 (r=.106).

Community College Curricular Choice, Academic Success, and Collegiate Experiences

The type and quality of community college experiences are determining factors in decisions to transfer as well. Kraemer (1995) reported that academic performance in the community college affected a student's intent to, and actual, transfer. While examining factors that lead to transfer students' academic success at the 4-year institution, Montondon and Eikner (1997) found academic performance at the 2-year institution to be defining. In addition to academic performance, the quality of the interactions of community college students with faculty and peers matters. Nora and Rendón (1990) found intent to transfer was most affected by the extent to which the community college student was satisfied with the academic and social components of the community college. College curriculum also seems to play a role (e.g., Adelman, 1999). Velez and Javalgi (1987) found that students enrolled in a community college in 1972 were more likely to transfer if they had an on-campus work-study position and lived on campus. They also found the effect of SES on transferring was negligible after controlling for background and collegiate experiences. Curricular choices and collegiate academic performance also seem to facilitate transfer. For instance, Lee and Frank (1990) found taking courses in math and sciences, along with having strong academic performance, to be among the strongest predictors of transfer for members of the 1980 High School Class.

Table 3 highlights the degree of association between different collegiate experiences and decisions to transfer for our student population. It is evident that transfer decisions are mostly associated with the number of courses earned in math and sciences, a finding consistent with Lee & Frank (1990). How well the student performs in the community college is also a factor associated with eventual transfer. Positive out-of-classroom experiences also matter. The degree of association between the remaining

collegiate experiences, though positive, is small. We found no association between being satisfied with the cost of attending a community college and the likelihood of transferring to a 4-year institution. Taken as a whole, our results suggest transfer is more likely to be associated with a community college student's curricular choices and academic success than with any other collegiate experience.

Table 3. Degree of association between collegiate experiences and transfer among members 1982 High School class.

Variable	r
GPA	.178
Out of classroom experiences	.123
Quality of instruction	.088
Counseling	.067
Campus facilities	.078
Institutional prestige	.088
# of math courses	.291
# of science courses	.332
Satisfaction with cost of attendance	-.043

SES and Community College Curricular Choice, Academic Success, and Collegiate Experiences

The nature of collegiate experiences among socioeconomically disadvantaged students is an issue long neglected in the literature. When SES is brought to bear, it is done with the purpose of controlling for an alternative explanation, rather than with the explicit purpose of highlighting differences between socioeconomically disadvantaged students and their better-off peers (Terenzini, Cabrera, & Bernal, 2001). Table 4 highlights specific SES-based collegiate differences. While there are significant mean differences between Highest- and Lowest-SES students within each collegiate experience, the largest differences are again seen in the number of math and science courses and GPA. It is also noteworthy that these differences, though statistically significant, are rather small in absolute terms. For instance, Lowest-SES students' academic performance in college was only a quarter of a grade lower than Highest-SES students'.

Table 4. Differences in collegiate experiences and curriculum patterns across SES (means and proportions comparison).

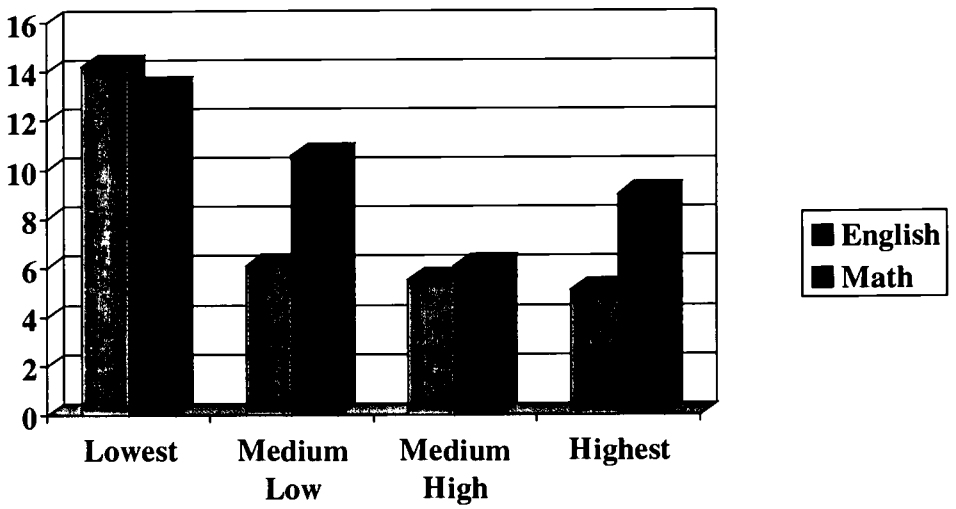
Variable	Socioeconomic Status (in quartiles)					
	Lowest	Middle-Low	Middle-High	Highest	F/X^2	r
GPA	2.23	2.49	2.54	2.50	3233.81, p<.001	.097
Out of classroom experiences	3.59	3.60	3.61	3.73	806.00, p<.001	.064
Quality of instruction	4.01	4.01	3.94	4.04	393.26, p<.001	.006
Counseling	3.36	3.37	3.31	3.49	670.08, p<.001	.039
Campus facilities	4.11	3.96	4.10	4.16	949.88, p<.001	.049
Institutional prestige	3.81	3.72	3.71	3.83	490.50, p<.001	.021
Enroll in at least 1 Math course	50.6%	53.6%	54.6%	61.7%	3311.31, p<.001	.081
Enroll in at least 1 Science course	29.3%	38.3%	41.9%	53.4%	13766.23, p<.001	.165
Satisfaction with cost of attendance	66.1%	66.6%	69.6%	65.8%	500.06, p<.001	.035

Remedial Education

The nature of remediation also plays a role in the likelihood of a community college student eventually attaining a 4-year degree. Adelman (1998), while examining college transcripts of the 1982 High School Class, found a negative relationship between taking remedial education and degree completion. However, in reviewing the data provided by Adelman (1998), Merisottis and Phipps (2000) reached an opposite conclusion. They concluded that remediation's effectiveness in enhancing the chances of completing a bachelor's degree among least prepared students rests on the number of remediation courses completed. Firm conclusions have not been reached regarding the role of remediation in transfer.

Our analysis indicates that the degree of association between SES and remediation is weak. Correlations between SES and remediation in English and in Math were 0.125 and 0.084, respectively. However, it is evident that Lowest-SES students are more likely to take remediation courses than Highest-SES students. Lowest-SES students were 9% and 4% more likely to take remedial English and Math, respectively, than their Highest-SES counterparts (see Figure 6).

Figure 6. Percentage of community college students taking remedial English and Math courses by SES.



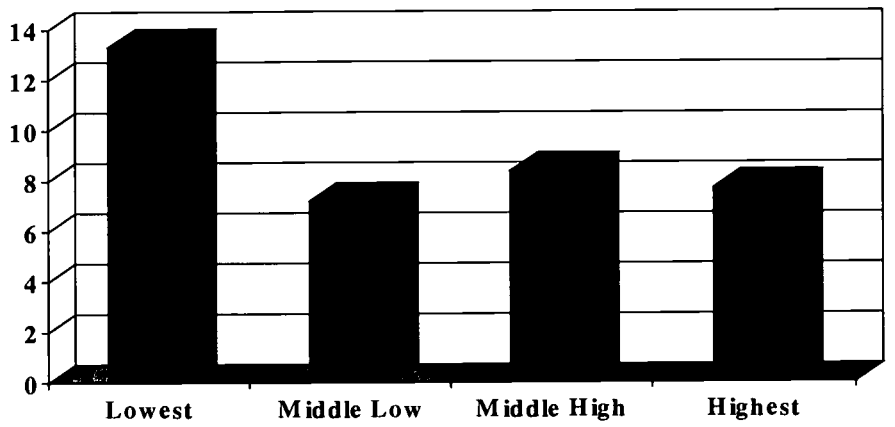
Note: Estimates based on those high school graduates who enrolled at a 2-year institution between 1982-83 (r=.125 for English, r=.084 for Math).

Family Responsibilities

Family responsibilities, particularly having a child while enrolled, has been found to diminish a student's chance of succeeding in college. For instance, Nora and associates (1996) found that family responsibilities decrease a students' likelihood to become involved with an institution, increasing the possibilities of dropping-out of college. Similarly, Adelman (1999), while examining the High School Class of 1982, found the long-term degree completion rate for students' who had a child while attending college decreased.

Overall, we find that community college students who have a child while attending college are 24% less likely to transfer than students without this type of family responsibility. The degree of association of having a child and transfer was moderately small (r=.148). This impact is exacerbated within the Lowest-SES quartile, as Lowest-SES students are more prone to have a child while attending college. As can be seen in Figure 7, Lowest-SES students were 6% more likely to assume family responsibilities of this nature than Highest-SES students. Though significant (X^2=2543.56, df=3, p<.001), the degree association between SES and having children is rather small (r=.073).

Figure 7. Percentage of students having a child while enrolled across SES.



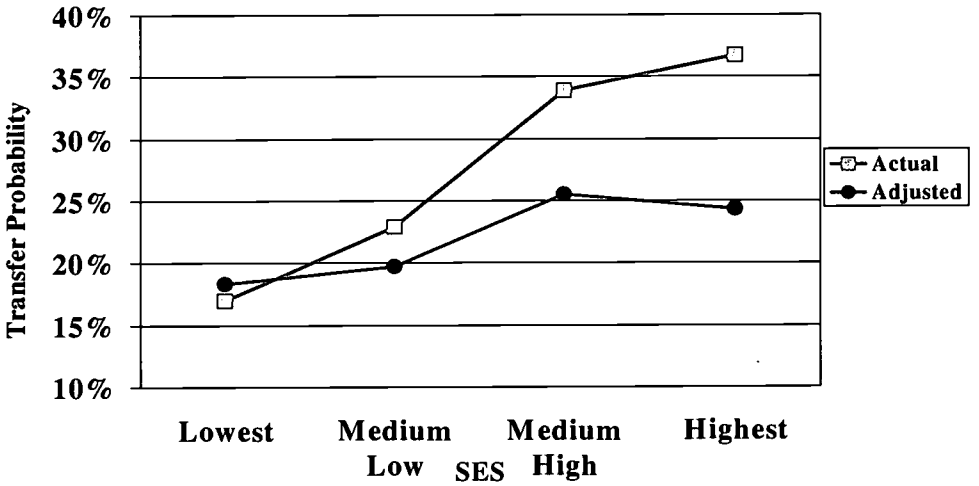
Note: Estimates are based on the High School and Beyond:80 (sophomore cohort). Panel weight (PSEWT1) (r=.073)

WHAT REALLY FACILITATES TRANSFER?

SES

From a purely descriptive basis, SES plays an important role in shaping transfer decisions for our student population. As previously mentioned, however, descriptive statistics fail to account for the simultaneous effects of a myriad of factors identified as critical to the transfer process. Once the joint effect of these factors is included in the analysis, the vast differences attributable to SES substantially decrease (see Table 5 and Figure 8). The twenty point percentage gap between Lowest-SES students and Highest-SES students is reduced to 8 percentage points once demographic characteristics, encouragement, academic preparation, collegiate degree aspirations, performance in college, effort, remedial education, collegiate experiences, financial aid, and family status are controlled (see Table 5 and Figure 8).

Figure 8. Probabilities of transferring to a 4-year institution by SES for the High School Class of 1982. Actual & adjusted.



Note: Adjusted probabilities are estimated using a logistic regression model controlling for background, high school academic resources, degree aspirations, collegiate experiences and financial aid (see Tables 5 and B3).

Community College Curricular Choice

While aspirations, academic resources, remedial education, and family responsibilities were found to play a role in transfer, our analysis indicates taking math and sciences courses to be the most significant factor for all students (see Table 5, column "All"). Community college students who took two science courses were 36% more likely to successfully transfer compared to those who took no science courses. Similarly, community college students who took two math courses were 19% more prone to transfer (see Table 5, column "All"). The effect of taking science courses among Lowest-SES students is even more pronounced. For this group, taking only one science course increases the likelihood of transferring by 49% (see Table 5, column "Lowest").

Academic Resources

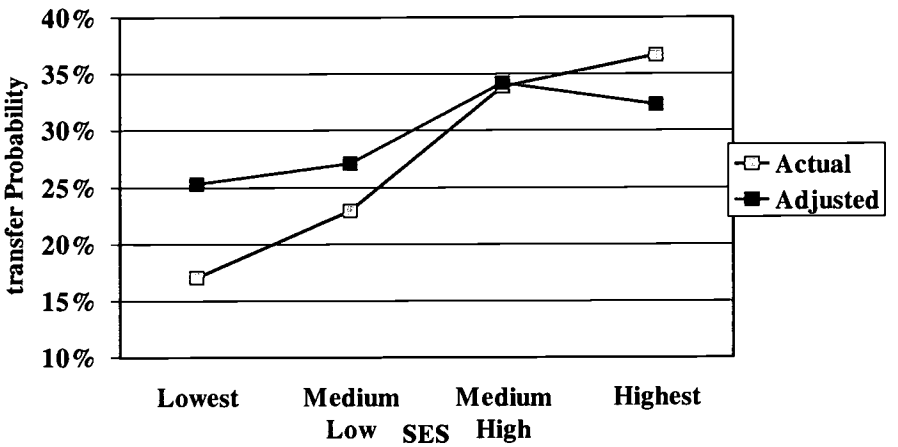
Sound preparation for college plays a key role in facilitating transfer. Compared to those students who had poor academic resources, middle, and highly academically prepared community college students were 8% and 23%, respectively, more likely to transfer to a 4-year institution (see Table 5, column "All"). Again, this effect is more pronounced among Lowest-SES students. Being highly academically prepared increases their chance of transferring by 34% (see Table 5, column "Lowest").

Educational Aspirations

Consistent with the extant literature (e.g., Adelman, 1999), we find that aspiring for a 4-year degree is a significant predictor of transfer. Net of other factors such as

academic ability, a community college student who aspired for a 4-year degree while a sophomore in high school had a 17% greater chance to transfer than high school sophomores holding lower educational aspirations. The literature also suggests that transfer rates are grossly underestimated by failing to account for the fact that not all community college students enroll with the intent to transfer (e.g. Adelman, 1999; Kinnick & Kempner, 1988). Isolating those students who aspired for 4-year degree, we find the adjusted probability of transfer substantially increases for most SES-groups. Interestingly, after adjusting for degree aspirations, probabilities of transferring among Highest-SES students decrease by three percentage points (see Figure 9). This indicates that without controlling for degree aspirations along with other factors, observed probabilities of transferring are not reliable indicators.

Figure 9. Adjusted probabilities of transferring to a 4-year institution by SES among those 1982 High School graduates aspiring at least a 4-year degree.



Note: Adjusted probabilities are estimated using a logistic regression model controlling for background, high school academic resources, degree aspirations, collegiate experiences and financial aid (see Tables 5 and B3).

Remedial Education

As noted before, the merits of remediation have been debated. While Adelman (1998) questions its role, Merisotis and Phipps (2000) consider it important in facilitating transfer. Our results are supportive of both. Across all students, and controlling for SES, we find remediation playing either a mediocre or negative role (see Table 5, column "All"). For all students, those taking math remediation courses were 2% more likely to transfer than those who did not. Taking remedial reading has a negative effect, by lowering the chances to transfer by 4%. However, among Lowest-SES students, the effect of taking remedial reading is particularly noteworthy. For this group taking remedial reading actually increases their likelihood of transferring by 24% (see Table 5, column "Lowest").

Financial Aid

Financial aid facilitated transfer to the 4-year sector. For all students, receipt of loans increased the chance to transfer by 10%, while receiving grants improved the chance by 6% (see Table 5, column "All"). For Lowest-SES students, receiving loans increased their chances to transfer by 19% (see Table 5, column "Lowest").

Parental Responsibilities

Adelman (1999) found that having family responsibilities plays a negative effect on a student's chance to succeed in postsecondary education. Our results are consistent with Adelman's. For all students, having children before completing a college degree reduces their chances to transfer to a 4-year institution by 19%. Among Lowest-SES students, this effect is about 14% (see Table 5, columns "All" and "Lowest").

Table 5. Changes in the probability of transferring due to background, encouragement, academic resources, performance in college, remediation, collegiate experiences, financial aid, and family responsibilities.

Factor	All	Socioeconomic Status			
		Lowest	Middle Low	Middle High	Highest
SES					
Middle Low	-				
Middle High	0.095*				
Highest	0.080*				
Female	-	-0.111**	-0.085**	-	-0.147**
Ethnicity					
African American	-	-0.101**	-	-0.147**	0.296**
Hispanic	-0.082**	-0.071*	-0.058*	-0.245**	-
Asian American	0.052*	-	0.482**	-0.112*	0.138*
High School Encouragement					
From Parents	-	-	0.088*	0.139*	-
From High School Professionals	0.041*	-	-	-	0.219*
From Friends	0.067*	0.224*	0.033*	0.159*	-
Academic Resources					
Moderately Prepared	0.084*	-	-	0.089*	0.190*
Highly Prepared	0.231*	0.335*	0.110*	-	0.403*
Collegiate Aspirations	0.167*	0.123*	0.302*	0.216*	0.278*
Grade Point Average	0.093*	-	0.023*	0.113*	0.327*
Earned Hours					
¾ and more of attempted	-	-	-	0.073*	-
Earned all hours attempted	-	-	-	-	-
Remediation Courses					
In Mathematics	0.018*	-	-	-	0.094*
In Reading	-	0.240*	-	-	-
Number of Math Courses					
One Course	0.042*	0.041*	-	0.113*	0.116*
Two Courses	0.189*	-	0.187*	0.162*	0.384*
Three or more Courses	0.142*	-0.040	0.291*	0.405*	0.057*
Number of Science Courses					
One Course	0.159*	0.488*	0.184*	0.186*	0.188*
Two Courses	0.356*	-	0.442*	0.375*	0.351*
Three or more Courses	0.279*	0.369*	0.293*	0.304*	0.234*
Collegiate Experiences					
Out-of-Classroom	0.061*	0.028*	-	0.121*	0.038*
Quality of Instruction	0.066*	0.075*	0.211*	0.062*	-
Counseling	0.021*	-	0.120*	0.035*	-
Campus Facilities	-	0.029*	-	-	-
Institutional Prestige	-	0.044*	-	-	0.147*
Satisfaction with Costs	-	-	-	-	-
Financial Aid					
Loans	0.104**	0.190**	0.191**	0.121**	-0.062*
Grants/Scholarships	0.062**	-	0.081**	-0.057*	0.309**
Having Children	-0.191*	-0.141*	-	-0.314*	-0.274*

Note: Only delta-ps associated with significant betas are reported. See Table 3 for significant betas. *p<.01 **p<.001

DEGREE COMPLETION

Complementing the research on transfer among community college students is a growing body of literature indicating that what happens to students *after* they enroll in college helps to explain why students eventually secure a 4-year degree (e.g., Adelman, 1999; Astin, 1993; Cabrera, Nora, & Castaneda 1992; Gladieux & Swail, 2000; Pascarella & Terenzini, 1991; Terenzini, Cabrera, & Bernal, 2001; Swail, 1995; Tinto, 1997). Factors associated to a completion of a 4-year degree include: a) background characteristics, b) encouragement received in high school, c) college preparation, d) degree aspirations, e) college path patterns, f) academic involvement and success, g) college curriculum, h) collegiate experiences, i) financial aid, and j) parental responsibilities (Adelman, 1999; Cabrera and La Nasa, 2001; Horn & Chen, 1998; St. John, Cabrera, Nora, & Asker, 2000; Velez & Javalgi, 1987). As is the case with transfer, most degree completion studies use SES as a control factor, thereby neglecting examination of Lowest-SES students' experiences within the postsecondary education system. In short, we do not know what specific factors lead some Lowest-SES students to succeed on their path to a college degree despite overwhelming odds.

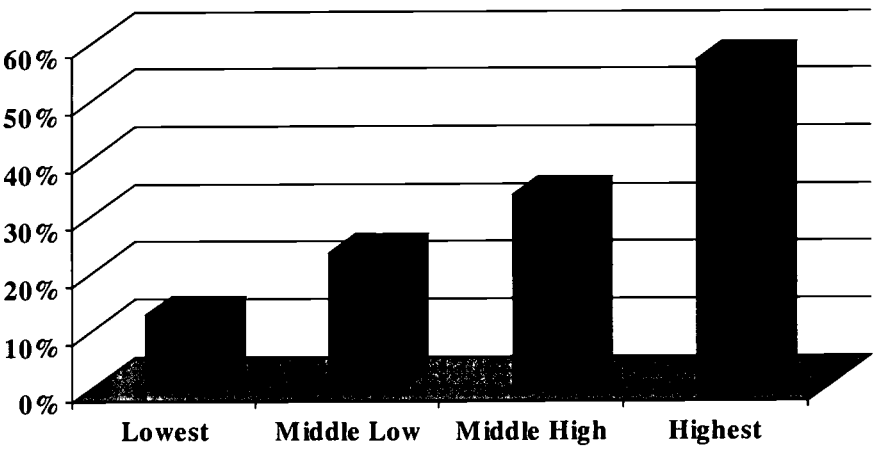
Degree Completion and SES

Terenzini, Cabrera, and Bernal's (2001) comprehensive review of the literature informs us that low-income students are already handicapped by a variety of adverse factors while attending college. These factors include: low participation rates at the 4-year sector; enrolling on a part-time basis; delayed enrollment after high school completion; working full-time; dropping, withdrawing from, or not completing college credits; and being a parent.

Upon high school graduation, almost half of the members of the 1982 class enrolled at a 4-year institution (see Table 1). However, the 4-year participation rate among Lowest-SES students is strikingly low compared to students for all other SES categories. The 4-year college participation rates for Lowest-SES students lags behind that of Highest-SES students by 37% (see Table 1).

As we examine degree completion rates of the class of 1982, we a find a moderate, but positive association between a student's socioeconomic background and her chances of earning a bachelor's degree (r=.335). Two important trends underlying degree completion rates across SES quartiles are evident: 1) the gap in degree completion rates across SES quartiles substantially increases as one moves up the SES ladder, and 2) Highest-SES students are 44% more likely to earn a college degree than Lowest-SES students (see Figure 10).

Figure 10. Observed probabilities of degree completion by 1992 for the High School Class of 1982 (by SES).



Note: Estimates are based on the High School and Beyond:80 (sophomore cohort). Panel weight (PSEWT1) (r=.335)

Encouragement

Development of degree aspirations as early as the 7th grade, securing high school academic qualifications, applying for college, as well as successful adjustment to college are related to the extent to which the student receives encouragement from parents, high school personal, and important high school friends (e.g., Cabrera, Nora & Castaneda, 1992; Cabrera & La Nasa, 2001; Flint, 1992; Hossler, Schmitt & Vesper, 1999). This type of encouragement takes different forms, ranging from motivational support, saving for college to being involved in school activities (Cabrera & La Nasa, 2001). This encouragement is key for subsequent college enrollment. Perna (2000), for instance, noted that parental involvement in school activities predicts whether the student would enroll at a 4-year college or university following high school graduation.

Some research suggests encouragement varies by SES. King (1996) observed that low-income high school seniors uncertain of whether their parents approved of their postsecondary plans were less likely than their better off peers to aspire to attend a 4-year institution. Saving for college provides the student a clear indication their parents are committed to their postsecondary education (Flint 1992, 1993). The amount of saving correlates with SES, as well. Miller (1997) reported that less than 33% of low-income parents saved enough money to cover more than 10% of their children's college education costs. Parental involvement also varies by SES. Cabrera and La Nasa (2000) reported that Lowest-SES parents were less likely to participate in school activities.

Our analysis of the 1982 High School Class reveals that a student's likelihood to

receive encouragement to secure a college degree from parents, high school personnel, and high school friends was related to his/her socioeconomic background. As a whole, Highest-SES students received more encouragement, while the reverse is true for Lowest-SES students. This encouragement-SES association ranged from .13 to .248. Ninety-two percent of Highest-SES students reported their parents encouraged them to pursue a college degree. In contrast, 69% of Lowest-SES students were similarly encouraged. While 77% of Highest-SES students reported encouragement from high school professionals, only 61% of Lowest-SES students reported receiving this sort of encouragement. The SES-based encouragement gap is even more pronounced when encouragement originates from high school friends. Less than 50% of Lowest-SES students were encouraged by their high school friends to earn a college degree, whereas over three-fourths of Highest-SES students were encouraged by their friends to become a college graduate (see Table 6). Given the connection between encouragement and success in college, this SES-encouragement association is troublesome.

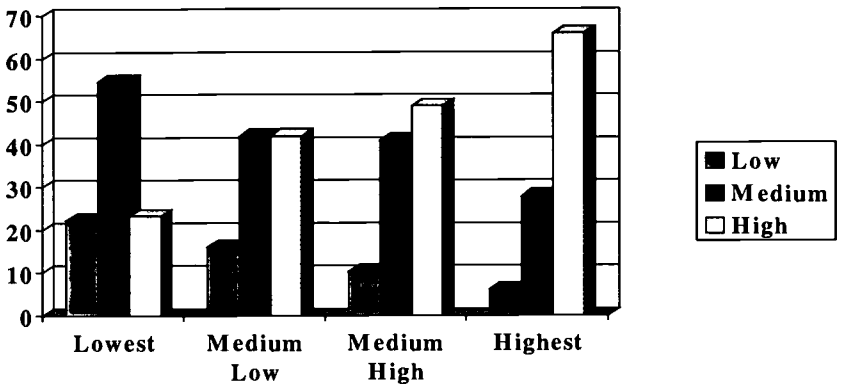
Table 6. Differences in encouragement across SES (proportions comparison)

Encouragement	Socioeconomic Status (in quartiles)					
	Lowest	Middle-Low	Middle-High	Highest	F/X^2	r
Parental	68.8%	71.1%	83.6%	92.7%	131125.46, p<.001	.248
High School Professionals	61.3%	63.5%	68.9%	76.7%	35994.37, p<.001	.130
Friends	47.7%	54.2%	64.9%	75.5%	98,770.08, p<.001	.216

Academic Resources

Adelman (1999) demonstrated that securing high school-based academic resources substantially increases a student's chance to complete a bachelor's degree within eleven years of high school graduation. We find a moderate association between SES and the level of academic resources among 1982 high school graduates who enrolled in higher education (r=.216). Lowest-SES students were less prepared. While 42% of Highest-SES students were highly prepared academically for college, merely 25% of Lowest-SES students enjoyed the same level of academic preparation (see Figure 11).

Figure 11. Academic resources among 1982 high school graduates across SES.



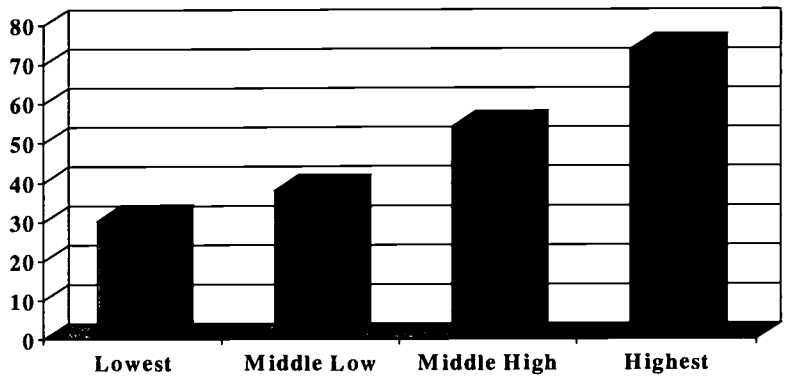
Note: Estimates based on 1982 high school graduates (r=.216).

Degree Aspirations

Aspiring for a 4-year college degree as early as the 8th grade enables middle school students, high school students, and their families to ready themselves for college (Cabrera & La Nasa, 2000). Students aspiring for at least a 4-year degree are more predisposed to take the appropriate course curriculum, complete high school, apply to college, enroll, and eventually graduate (e.g. Adelman, 1999 and Cabrera & La Nasa, 2000). Some research indicates that SES can moderate degree aspirations. While examining degree aspirations among 1988 middle school students, Terenzini, Cabrera, and Bernal (2001) found a difference of 29% between Lowest-SES and Highest-SES students' aspirations for at least a college degree.

As is the case for the 1988 middle school student cohort, we find significant SES-based differences in aspiring for a 4-year degree among 1982 High School graduates who entered post secondary education during the 1982-83 academic year (r=.335). As the SES level increases, so does the chance to develop college degree aspirations by the senior year in high school. The SES-based gap in degree aspirations is astounding. Seventy percent of the Lowest-SES students who attended postsecondary education did not aspire for a college degree while a high school senior. This pattern is reversed among Highest-SES students, whereby 74% of them had developed college aspirations before entering postsecondary education. In other words, Lowest-SES students were 44% less likely to aspire to a four degree than Highest-SES students (see Figure 12).

Figure 12. Degree aspirations by SES for the High School Class of 1982.



Note: Estimates are based on the High School and Beyond:80 (sophomore cohort). Panel weight (PSEWT1) (r=.335)

SES and Curricular Choice, Academic Success, and Collegiate Experiences

The degree to which a student engages with the different components of a college or university plays a key role in cognitive and affective development (e.g. Kuh, Douglas, Lund, & Ramin-Gyurnek, 1994). These positive experiences in turn affect the extent to which a student successfully adjusts to college (e.g. Cabrera, Nora, & Castaneda, 1992; Nora, Cabrera, Hegedorn, & Pascarella; 1996; Pascarella & Terenzini, 1991). The elements of collegiate engagement research have singled out several defining elements including: classroom experiences, interactions with faculty, interaction with peers, working on campus, involvement with college curriculum, and maintaining adequate academic performance (Pascarella & Terenzini, 1991). In all of this, the effort the student spends on academically related issues, such as maintaining adequate academic performance, seeking out and engaging faculty inside and outside the classroom, and curricular choices, is an important determinant of attainment of important educational outcomes (Astin, 1993; Cabrera, Colbeck, & Terenzini, 2001; Kuh, Douglas, Lund, Ramin-Gyurnek, 1994). These important outcomes include critical thinking, gains in competencies, clarity in vocational aspirations and even persistence.

Associated with these purely academic related activities, is a student's work location. On-campus work is seen to positively impact persistence and eventual degree completion (Hossler, 1984; Stampen and Cabrera, 1986, 1988; Olivas, 1985). Students who work on campus are more likely to interact with faculty and peers, develop transferable work skills, and become more integrated into the academic and social life of the institution. How the above factors play a role in degree completion is largely unknown. However, given the connection between persistence and collegiate experience, on the one hand, and persistence and degree completion, on the other, the connection between these collegiate experiences and degree completion is plausible.

The degree of association between SES and collegiate experiences among the High School Class of 1982 ranges from a low of .007 to a high of .239, signifying a relationship ranging from non-existent to moderately low (see Table 7). The degree of association between GPA and SES is significant, but rather small (r = .112). As a whole, Lowest-SES students had a GPA one quarter lower than the one exhibited by Highest-SES students. Of the non-academically related collegiate experiences, whether the student had an on-campus work position was found to be somewhat significant (r=.119). SES-based differences are noted here as well, with Lowest-SES students being 13% less likely to work on campus than Highest-SES students. SES-based differences with out-of-classroom experiences, quality of instruction, counseling, and institutional prestige, though significant in absolute value are, almost non-existent. What defines the nature of collegiate experiences between Lowest-SES students and their better off counterparts the most is the intensity of curriculum in math and sciences. The gap in the likelihood of taking at least one math and science course between Lowest-SES and Highest-SES is striking; on average, a Lowest-SES student is 22% less likely to take college math courses and 33% less likely to take college sciences courses than his/her Highest-SES counterpart.

Table 7. Differences in collegiate experiences and curriculum patterns across SES (means and proportions comparison).

Variable	Socioeconomic Status (in quartiles)					
	Lowest	Middle Low	Middle High	Highest	F/X^2	r
GPA	2.33	2.51	2.49	2.65	11143.99, p<.001	.112
Out of classroom experiences	3.61	3.64	3.65	3.83	9114.92, p<.001	.108
Quality of instruction	4.05	4.11	4.04	4.09	961.74, p<.001	.007
Counseling	3.36	3.44	3.31	3.43	1472.62, p<.001	.011
Campus facilities	3.97	3.97	9.97	4.06	1155.36, p<.001	.035
Institutional prestige	3.81	3.81	3.81	3.94	2451.29, p<.001	.051
Worked on campus	27.5%	32.9%	42.9%	40.7%	33522.06, p<.001	.119
Enroll in at least 1 Math course	34.9%	41.9%	46.3%	57.2%	61,551.38, p<.001	.162
Enroll in at least 1 Science course	24.4%	33.9%	41.1%	56.7%	134,332.16, p<.001	.239

College Path

Popular belief holds that most students follow the same, straightforward path through college. Dubbed "the persistence track" by Carroll (1989), this path assumes

entrance into a 4-year institution the fall following high school graduation, enrolling full-time, and, then, after spending just four years in college, graduating with a 4-year degree.

Mounting research challenges this belief. Examining the college paths among members of the high school class of 1980, Carroll (1989) reported that one out of five students delayed entry into postsecondary education, entered less than 4-year institutions, and enrolled part-time. Using the same cohort of students, Hearn (1992) identified 13 college path patterns based on the combinations of three factors: delayed entrance, part- versus full-time enrollment, and first type of institution attended. Furthermore, he reported that the choice of one of these paths was highly conditioned by a student's socioeconomic background, degree aspirations, and academic preparation for college. In general, nontraditional college paths were chosen most by socioeconomic disadvantaged students, poorly prepared for collegiate work, and with low degree aspirations.

Adelman's (1999) analysis of the college path patterns followed by the High School Class of 1982 further proves students' trek through higher education for a rather large number of students is quite complex. Having examined college transcripts, Adelman found most college students do not graduate within four years. Moreover, a considerable proportion of high school students delay college entrance. Taking into account only those students who earned a minimum of 10 college credits, Adelman reported that 19 % of all high school graduates do not enroll in college immediately following high school graduation. Further examination by Adelman of the High School Class of 1982 showed that only 53% initially enroll at a 4-year institution, and only 46% remain solely within the 4-year sector.

While a variety of college paths to degree completion exist (Adelman, 1999; Carroll, 1989; Hearn, 1992), some are riskier. Challenging commonly held perceptions, Adelman (1999) did not find transfer *per se* to be a problematic college path behavior. He found many members of the high school class of 1982 either transferred or alternated enrollment among institutions, yet still managed to secure a college degree within 10 years of high school graduation. What matters, though, are part-time enrollment and the effort spent in earning college credits. Adelman demonstrated that failing to maintain continuous enrollment along with dropping, withdrawing from, and not completing college courses are the two riskiest college paths to a 4-year degree.

Our examination of the college paths followed by members of the 1982 High School Class shows Lowest-SES students are indeed more prone to follow at-risk paths. Only 30% of Lowest-SES students enter higher education at the 4-year sector, a trend in sharp contrast to the 67% participation rate exhibited by Highest-SES students (see Table 1). Slightly less than half of Lowest-SES students enroll on a continuous basis, while 71 % of Highest-SES do. Forty-one percent of Lowest-SES students dropped, withdrew from, or left incomplete college 10% or more of their college courses. This is in contrast to the 32% of Highest-SES students who engaged in this at-risk behavior (see Table 8).

Table 8. College paths of the 1982 High School Class across SES.

Variable	Lowest	Medium Low	Medium High	Highest	X^2	r
Continuous enrollment	51.6%	41.3%	40.5%	28.7%	44989.59 $p < .001$	0.147
Percentage of courses dropped, withdrew or left incomplete						
Less than 10%	58.9%	64.3%	62.0%	68.3%		
10% - 20%	14.7%	15.8%	14.8%	15.0%	17288.64	
More than 20%	26.4%	19.9%	23.2%	16.7%	$p < .001$	-.066

Financial Aid

Some researchers have examined persistence in college as the by-product of economic decisions (e.g. Manski & Wise, 1983; St. John, 1990; St. John, Andrieu, Oescher, & Starkey 1994; Stampen & Cabrera, 1986, 1988). Under this scenario, a student would persist to the extent social and economic benefits of attending college outweigh the costs and benefits associated with alternative activities (e.g. working full-time). Higher costs of attendance relative to students' perceptions of their ability to pay could influence their decision to drop out, particularly if the costs of attending college far exceed future benefits (Becker, 1964). Reduced tuition, direct grants, low interest loans, and subsidized work-study programs all seek to equalize (if not increase) the benefits of attending college relative to its costs (Bowen, 1977; Cabrera, Stampen, & Hansen, 1990; St. John, 1994).

Research into the effect financial aid plays on degree completion is contradictory. Nora (1990), Voorhees (1987), and St. John (1990) found all forms of federal support equally effective in preventing students from dropping out. In examining differences in the impact of financial aid across SES, Stampen and Cabrera (1986, 1988) found that student aid equalized educational opportunities between low-income students and students that are more affluent. However, they also reported that persistence rates were the highest when the student aid package included work-study programs. More recently, Adelman (1999) reported that grant-in-aid and loans had a small but positive contribution to the probability of securing a college degree among members of the High School Class of 1982. On the other hand, Astin (1975) found that grants and work-study programs had positive effects on persistence while loans had negative effects when directed to low-income students. St. John's (1991) comprehensive review of 25 years of research on the effect of financial aid led him to conclude reception of financial aid has a positive effect on persistence to graduation regardless of the type of financial aid. He also noted inconstancies could be attributed to methodological problems in terms of analytical models followed, the use of institutional databases versus national databases and levels of controls.

We find SES-differences in terms of financial aid received. Slightly more than half of the Lowest-SES students received grants-in-aid, whereas 36% of Highest-SES students

received this kind of aid (see Table 9). This finding is consistent with Stampen & Cabrera's (1988) study of the manner student aid was targeted in the early 1980s. SES-based differences in the reception of loans are also noted (r=.059); however, these differences are rather small, and a clear trend is not seen. While Lowest-SES students are as likely to rely on loans, as are students from the middle two SES groups, Highest-SES students receive loans to a lesser degree. Regarding satisfaction with cost of attending, the same mixed effect is seen: differences among SES groups are rather small, and no clear trend unfolds.

Table 9. Financial aid factors for the 1982 High School Class across SES.

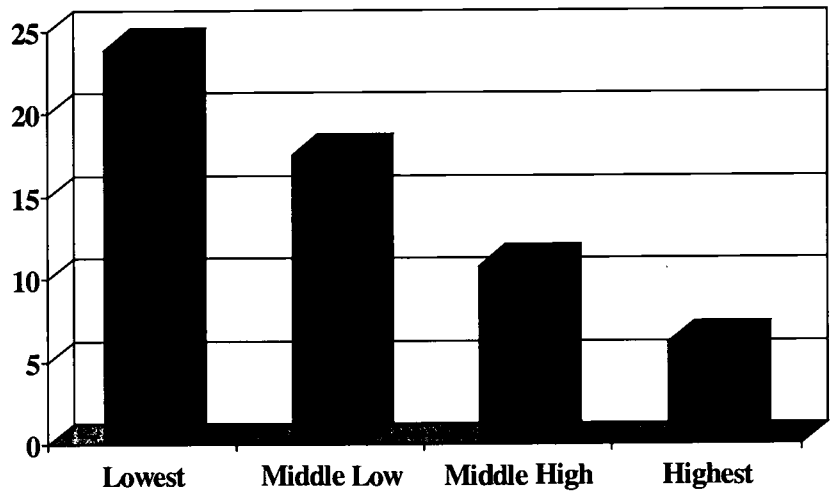
Variable	Lowest	Medium Low	Medium High	Highest	X^2	*r*
Satisfied with Cost of Attending	60.0%	63.7%	59.1%	57.0%	4475.84, p<.001	.023
Received Grants between 1982-86	53.5%	44.6%	41.3%	36.2%	34095.21, p<.001	-.118
Received Loans between 1982-86	38.9%	36.5%	40.7%	33.6%	8343.610, p<.001	.059

Parental Responsibilities

Having children while attending college has been singled out as another risk factor for persisting in college to degree completion. Nora, Cabrera, Hagedorn, and Pascarella (1996) reported that family responsibilities had the effect of competing with the academic and social components of the institution, thereby lessening a student's engagement in the college experience, intellectual development, and subsequent persistence. Adelman (1999) adds that having children while attending college lessens one's chances of completing a college degree within ten years upon high school graduation. While the above findings are true for all students, the extent to which this at-risk behavior is present among Lowest-SES students has not been examined.

For our student population, we find Lowest-SES are indeed more prone to having children while attending college. Twenty four percent of Lowest-SES students reported having at least one child by age 23 (see Figure 13). This number is 18%, 11%, and 5%, respectively, greater than the ones reported by Highest-SES, Middle-High SES, and Middle-Low SES students, respectively.

Figure 13. Percentage of 1982 high school graduates enrolled in college who had parental responsibilities by 1986 (by SES).



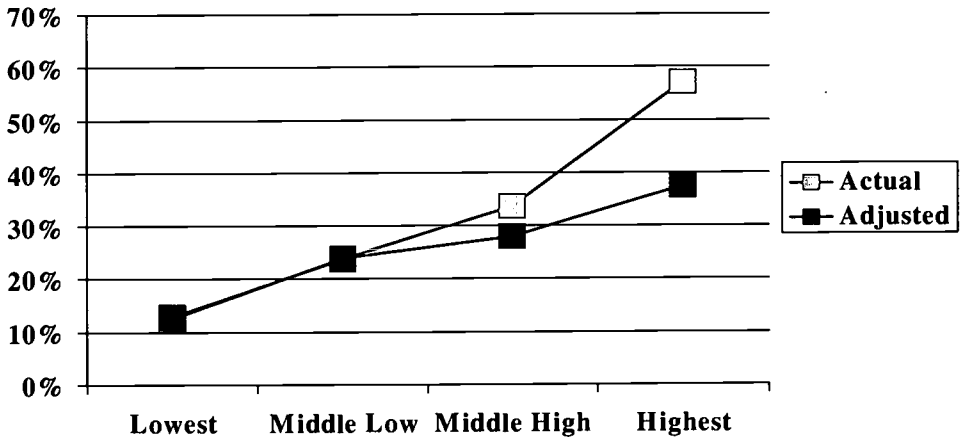
Note: Estimates are based on the High School and Beyond:80 (sophomore cohort). Panel weight (PSEWT1) (r=.191).

WHAT REALLY FACILITATES DEGREE COMPLETION?

SES

By 1992, 35% of the 1982 High School Class earned a college degree. Among Lowest-SES students, merely 13% managed to do so. In contrast, 57% of Highest-SES students completed their college degree. Descriptive statistics underscore other significant differences between Lowest-SES and Highest-SES students in factors known or presumed to be critical in securing a 4-year college degree. Once the effect of these degree-related factors is taken in a simultaneous manner, the 44% degree completion gap between Highest- and Lowest-SES students is reduced to 25% (see Table 10 and Figure 14).

Figure 14. Adjusted probabilities of degree completion by 1992 for the High School Class of 1982 (by SES).



Note: Estimates are based on the High School and Beyond:80 (sophomore cohort). Panel weight (PSEWT1) (r=.335)

Encouragement

Encouragement matters in a student's chances of getting a college degree. Irrespective of SES, students who received encouragement from parents and friends to pursue a college degree while in high school were more likely to complete this goal. Compared with students whose parents did not encourage them to pursue a college degree, those who did receive parental encouragement increased their chance of degree completion by 5%. The impact of high school peer encouragement is similar, increasing degree completion chances by 6% (see Table 10).

Academic Resources

Consistent with Adelman (1999), we find academic resources to have a substantial effect on degree completion across all SES groups. Compared to students poorly prepared academically, moderately and highly prepared students were 9% and 23% respectively more likely to complete a college degree within 10 years of graduating from high school (see Table 10). The effect of academic preparation amongst Lowest-SES students is even more pronounced. Being moderately prepared or highly prepared for college increased their chances to secure a degree by 9% and 29% respectively for this SES group (see Table 10).

College Aspirations

Aspiring for a college degree is a good predictor of eventual college degree completion. Across all SES quartiles, students with college degree aspirations while still in high school were 26% more likely to do so, as compared with students without such aspirations (see Table 10). SES moderates the effect of collegiate aspirations. While all students benefit from this factor, Middle Low-SES students benefit the most. Lowest-SES students holding degree aspirations while in high school increase their chances of completing a degree by 17%. Middle Low-SES, Middle High-SES, and Highest-SES students increase their degree completion chances by 38%, 20%, and 28%, respectively (see Table 10).

Curricular Choice, Academic Success, and Collegiate Experiences

While all collegiate experiences increase the rate of degree completion across all students, academic performance in college (GPA) is the most significant factor. Across all students, every increasing grade change in GPA increases the chances to complete a college degree by 32% (see Table 10). SES also moderates the effect of GPA. For example, among Lowest-SES students, changes in GPA increase degree completion rates by 28%, while among Middle Lowest-SES students the size of the effect is 46% (see Table 10).

Curricular choices are also important. Students who take three college math courses increase their degree completion chances by 22%. Those who take at least three college science courses increase their degree completion chances by 28%. The impact of taking science courses is particularly noteworthy. For all students, taking just one college science course increases degree completion rates by 19%. Additionally, the impact of taking science course amongst Lowest-SES students is striking. For this group, taking one, two, or three or more science course increases their chances of degree completion by 24%, 16%, and 50%, respectively (see Table 10).

Quality of instruction, out-of-classroom experiences, and working on campus have small, but significant effects on degree completion for all students. For all students, positive out-of-classroom activities increases degree completion chances by 8%, while exposure to good classroom instruction does so by 7% (see Table 10, column "All"). The quality of instruction is particularly relevant for Lowest-SES students whose probability to persist to graduation increases by 14% when taught effectively (see Table 10, column "Lowest"). Working on campus also helps. Every additional year of on-campus work increases his or her chances of completing a degree by 4% (see Table 10, column "All").

College Path

The first type of postsecondary institution attended, continuous enrollment in college, and maintaining enrollment in college courses are also important factors in degree completion. For all students, those who first enroll in a 2-year institution are 21% more likely to earn a college degree than those who enroll at a proprietary school. Those who enroll in a 4-year institution are 48% more likely to earn a college degree. The effect of the first type of institution attended is particularly strong for Lowest-SES

students. For this group, enrollment at a 2-year institution helps, but starting at a 4-year institution helps even more. Lowest-SES students who started in a 2-year institution increase their chances by 53%. Those Lowest-SES students who first enroll in a 4-year institution saw their chances to complete their 4-year degree by an astounding 79% (see Table 10, column "Lowest"). Students who do not maintain continuous college enrollment are 23% less likely to earn a bachelor's degree (see Table 10, column "All"). Those who drop, withdraw from, or fail to complete between 10%-20% of their coursework are 13% less likely to secure a baccalaureate degree. Dropping, withdrawing from, or failing to complete more than 20% of the coursework reduces a student's chances to complete a degree by 27% (see Table 10, column "All").

Financial Aid

For all students, receiving grants-in-aid and loans increases chances of completing a 4-year degree. Recipients of grants-in-aid are 7% more likely to earn a degree, while loan recipients are 12% (see Table 10, column "All"). SES also moderates the impact of financial aid, particularly for loan recipients. Lowest-SES and Middle Low-SES students receiving loans increase their degree completion chances by 16% and 26%, respectively (see Table 10, columns "Lowest" and "Medium Low").

Parental Responsibilities

Incurring parental responsibilities while pursuing a college degree hampers ones chances of degree completion by 32% (see Table 10, column "All"). This negative effect is felt most by Middle Low-SES students for whom having children by age 23 decreases their degree completion chances by 46% (See Table 10, column "Middle Low").

Table 10. Changes in the probability of degree completion due to background, encouragement, academic resources, performance in college, remediation, collegiate experiences, financial aid, and family responsibilities.

Factor	All	Socioeconomic Status			
		Lowest	Middle Low	Middle High	Highest
SES					
Middle Low	0.113*				
Middle High	0.155*				
Highest	0.249*				
Female	-	-0.091**	-0.094**	-0.073**	-0.020*
Ethnicity					
African American	-	-	-	-0.081**	0.116**
Hispanic	-	-0.034*	-	-0.107**	-
Asian American	0.230*	0.566**	-	0.180*	0.213**
High School Encouragement					
From Parents	0.050*	-	0.065*	0.087*	-
From High School Professionals	-	-	-	-	0.074*
From Friends	0.062*	-	0.117*	0.163*	-
Academic Resources					
Moderately Prepared	0.086*	0.092*	-	0.187*	-
Highly Prepared	0.226*	0.285*	-	0.419*	0.130*
Collegiate Aspirations	0.258*	0.172*	0.381*	0.199*	0.283*
Type of First Institution Attended					
2-year Institution	0.208*	0.525*	0.386*	-	0.239*
4-year Institution	0.483*	0.790*	0.553*	0.315*	0.387*
Continuous Enrollment	0.226*	0.228*	0.356*	0.157*	0.221*
DWI Index					
10-20% of courses	-0.129*	-	-0.088*	-0.144*	-0.217*
At least 20% of courses	-0.270*	-0.124*	-0.169*	-0.268*	-0.377*
Number of Math Courses					
One Course	-	-	-	0.083*	-
Two Courses	0.056*	0.048*	-	0.055*	-
Three or more Courses	0.223*	-	0.181*	0.297*	0.165*
Number of Science Courses					
One Course	0.185*	0.239*	0.245*	0.150*	0.099*
Two Courses	0.184*	0.163*	0.295*	0.130*	0.141*
Three or more Courses	0.277*	0.497*	0.423*	0.329*	0.144*
Collegiate Experiences					
Out-of-Classroom	0.081*	-	0.120*	0.126*	0.036*
Quality of Instruction	0.067*	0.135*	-	0.136*	0.022*
Counseling	0.006*	0.071*	-	0.019*	0.011*
Campus Facilities	-	-	0.046*	-	-
Institutional Prestige	0.022*	0.080*	0.049*	-	0.029*
Satisfaction with Costs	-	0.037*	-	-	-
Financial Aid					
Loans	0.117*	0.159*	0.257*	0.082*	0.047*
Grants/Scholarships	0.071*	0.055*	0.072*	0.089*	0.068*
Work Study Hours	0.040*	0.022*	0.037*	0.086*	0.013*
College GPA	0.318*	0.286*	0.463*	0.217*	0.318*
Having Children	-0.231*	-0.127*	-	-0.211*	-0.478*

Note: Only delta-ps associated with significant betas are reported. See Table 3 for significant betas.
*p<.01 **p<.001

Discussion

Pathways to a Four-Year Degree

A high school graduate faces nine pathways to a college degree. These pathways result from several degrees of academic preparation for college and the type of postsecondary institution first attended. Not all these paths are equally effective in leading to a 4-year degree. When students follow the pathway of having high academic resources and choosing a 4-year institution as their port of entry, their chances of eventually securing a 4-year degree are considerable (78%). No other pathway is nearly as effective. When a student enters postsecondary education at the 4-year sector and is only moderately academically prepared, his or her chances of earning a 4-year degree are only 35%. Even more difficult is the pathway for those students with poor academic preparation who enter at a 2-year institution. Their chance of earning a degree is only 10%.

Not all pathways are equally accessible to all students. Those traveling on the most successful pathways are most often Highest-SES students. Almost 60% of all Highest-SES seniors have secured the highest level of academic resources before college enrollment. Of those, 76% enroll in a 4-year institution. Overall, 45% of Highest-SES seniors followed the pathway defined by having high academic resources and enrolling at a 4-year institution. For them, the chances of degree completion are almost certain (81%). Lowest-SES students follow pathways opposite to those traveled by Highest-SES students. They are 35% less likely to be highly academically prepared for college. Of those with high academic resources, less than half enter a 4-year institution, and only 59% of these students earn a 4-year degree. In other words, compared to equally prepared Highest-SES students who followed the same path, the chances of Lowest-SES seniors are 22% less. However, Lowest-SES high school seniors are most likely to follow the pathway defined by medium academic resources and entrance at a 2-year institution; a pathway where the chance of securing a 4-year degree is only 3%.

Determinants of Transfer

In following members of the High School Class of 1982, we found that 2 out of 5 seniors selected a community college as their port of entry into higher education, regardless of SES. However, almost 50% of the Lowest-SES students from this group attended a community college first, and only 17% of these students transferred to a 4-year institution. The 20% transfer rate difference between Lowest-SES and Highest-SES students is reduced to just 8% once factors other than SES are considered simultaneously. What closes this SES-transfer gap is adequate preparation for college, degree aspirations, taking college math, science, and remedial reading courses, collegiate experiences, encouragement from peers, financial aid, and avoiding having children prior to transfer. While these factors define a Lowest-SES student's chances to transfer, of greater importance is the fact that their effect transcends SES boundaries.

It has been argued the community college can be an obstacle in eventually securing a 4-year degree (Karabel, 1972, 1986) since community college students

eventually transfer. Underlying this argument is the assumption that community college students enter with 4-year degree aspirations. Our findings suggest enrollment at a community college *per se* plays little role in determining whether the student would eventually secure a 4-year degree. First, only 42% of all community college students actually enter aspiring for a 4-yerar degree. Second, net of other factors, community college students are 21% more likely to secure a 4-year degree than are proprietary students (see Table 10).

We find two factors are determinants of transfer: pre-college factors and collegiate experiences. Regardless of a student's socioeconomic background, securing appropriate academic resources in high school coupled with degree aspirations provides a foundation upon which transfer is facilitated. The adjusted probability of transferring among highly prepared college degree seekers is 40%. What is striking is comparing this group of students against their exact opposites: those who are not academically prepared to perform college-level work and do not desire a bachelor's degree transfer at a rate of only11%. The community college as a potential funnel to a 4-year degree is facilitated to the extent to which the student is academically prepared and aspires for at least a baccalaureate degree. To hold community colleges accountable because students who do not want to transfer, do not want a bachelor's degree, and are not academically prepared for college-level coursework do not transfer to a 4-year institution seems disingenuous at best. However, the community college does play a role in facilitating transfer.

What occurs at the community college is the second factor that facilitates transfer, specifically curricular choices. We found that the type of coursework a student takes while in the community college is the greatest in-college predictor of transfer. Net of all other factors, all students who take college-level science courses increase their chances of transferring by 16-36%, depending on the number of sciences courses completed. Taking college math courses increases transfer chances by up to 19%. When the pre-college factors of degree aspirations and academic preparation are combined with taking two math and two science courses in the community college, the adjusted probability of transferring is 76%.

Merisotis and Phipps (2000) and Adelman (1999) have differing views of the role of remediation as a facilitator of transfer. Our findings support Adelman's contention when all students are considered in regards to remediation in reading. Indeed, remedial reading education does not play a significant role in facilitating transfer among all students. However, remediation in math is somewhat helpful for all students, increasing chances to transfer by 2% for each remediation course completed. Our findings also support Merisotis and Phipps' contention among Lowest-SES students: Lowest-SES students who take remedial reading see their chances to transfer increase by 24%.

Financial aid polices geared towards facilitating access to higher education seem to play a small, but significant role in transferring. In this respect, our results are consistent with Adelman's (1999). Of all types of financial aid, loans are most beneficial. All students who received educational loans while enrolled at the community college were 10% more likely to transfer. The effect of this type of financial aid on Lowest-SES students is even greater: receiving aid in the form loans increases their chances to transfer by 19%.

Determinants of Degree Completion

By 1992, 3 out of 10 members of the 1982 High School Class graduated from college with a baccalaureate degree. Out of 100 Lowest-SES students, merely 13 graduated with a 4-year degree by 1992. In the same period, 57 out of 100 Highest-SES students graduated. The 44% SES-based gap between Lowest- and Highest-SES students decreased to 25% once demographics, collegiate aspirations, academic resources, collegiate experiences, college path, and financial aid factors are taken into account along with SES. Despite mitigating high school and college based-factors, an SES-based effect persists. However, factors other than SES help equalize chances to earn a bachelor's degree between Lowest-SES students and their better off counterparts. As in transfer, these mitigating factors produce significant effects for degree completion, regardless of SES.

Pre-college factors, college path factors, and collegiate-related factors play significant roles in facilitating degree completion. Of pre-college factors, high school-based academic resources and degree aspirations play the defining role. The net added probability of securing a college degree by securing high school-based academic resources and aspiring for at least a bachelor's degree is 45%, irrespective of socioeconomic background.

Consistent with the literature (Carroll, 1989; Hearn, 1991, 1992; Adelman, 1999), paths followed in postsecondary education greatly affect a 1982 high school senior's chances of getting a 4-year degree. Opting for a 4-year institution as the port of entry to postsecondary education yields a net benefit of 48% chances of degree completion regardless of socioeconomic background (see Table 10). Among Lowest-SES students, the effect of attending a 4-year institution upon high school graduation is more pronounced, yielding a 79% increased in the likelihood of graduating with a bachelor's degree. The effort the student spends in maintaining continuous enrollment in both postsecondary institutions (23%) and in his/her program courses (27%) also enhance a student chances to graduate (see Table 10).

Of the collegiate experiences, academic performance and a curricular emphasis on math and science are the most important determinants of degree completion, regardless of SES and the type of institution first attended. A student who was academically prepared, aspired for college, maintained a 'C" average, and took one math and science course has a net probability of degree completion of 33%. Keeping all other factors constant, but increasing the number of math and science courses to two each, increases this probability by 5%. If that same student had maintained a "B" average, his/her chances of securing a degree increase to 70%. This is in stark contrast to a student who did not take any math or science courses while still maintaining a "B" average. His/her degree completion chances drop to only 46%. "C" average students with no math or science credits only have a 19% chance of graduating with a degree.

We also find that financial aid policies enhanced 1982 high school graduates' chances of securing a bachelor's degree by 1992. Net of the effect of SES, receiving loans increases the chances to complete a bachelor's degree by 12%, while grants had a net added benefit of 7% (see Table 10).

Positive experiences with the academic and social domains of the 4-year institutions contributed to the students' chances of getting a 4-year degree. Students satisfied with their out-of-classroom experiences and quality of instruction are 8% and 7% more likely to persist to graduation. Every year of working on campus yields a net benefit on this probability by 4% (see Table 10).

Limitations

The reader should bear in mind the following limitations when forming their own conclusions about the validity and usefulness of our findings.

- Our conclusions are based on just one generation of students, those who finished high school in 1982. During the last 20 years, school reform initiatives, changes in the composition of financial aid, and substantial technological and economic transformation may have produce new generations for which the determinants of transfer and degree completion may be qualitatively different. We can tell the story of one single generation; we cannot presume all their experiences and tribulations are applicable to subsequent cohorts.

- Our study does not take into account some factors that affect the adjustment of the student with the institution. Some include the frequency and quality of the interactions with faculty and peers, exposure to different teaching practices, out-of-classroom experiences, and the nature of the curriculum (Astin, 1993; Chickering & Reisser, 1993; Tinto, 1993, 1997; Pascarella & Terenzini, 1991; Hurtado, Milem, Clayton-Pedersen, & Allen, 1999; Kuh, Douglas, Lund, & Ramin-Gyurnek, 1994). The lack of measures on these factors may lead to an underestimation of the effect of collegiate experiences on transfer and degree completion.

- During the last 20 years, a number of valid measures of collegiate experiences have emerged. Those capture academic and intellectual development, commitments to the institution, engagement with different elements of the campus life, student effort, campus and classroom climates, and classroom experiences (Pace, 1980; Kuh, 2000; Pascarella & Terenzini, 1980; Cabrera & Nora, 1994; Nora & Cabrera, 1993; Kuh, Pace, & Vesper, 1997; Cabrera, Colbeck, & Terenzini, in press). Though most of those measures were not available at the time the database was designed, future designers of national databases should consider their incorporation.

- Our analyses highlight some characteristics of students who transfer and graduate; and at most, they offer just a glimpse as to why. Future research should include qualitative components to paint a more thorough understanding of these phenomena.

Strengths

The strengths of this study derive primarily from its theoretical framework and research design. These strengths are as follows.

- All factors included in the study were selected after a careful review of the literature (see Appendix C). This literature review lead us to conclude that studies seeking to bring a comprehensive perspective in examining decisions to transfer from the 2-year sector to the 4-year sector and persisting to degree completion ought to consider the following factors: a) demographic characteristics of the high school student (e.g. gender, ethnicity), b) encouragement and support provided in high school, b) a high school student's early degree aspirations, c) acquisition of high school-based academic resources, d) performance in college, e) collegiate experiences, f) remediation courses taken, g) satisfaction with cost of attendance and type of financial aid received, and f) acquiring family responsibilities before completing a college degree.

- Our study uses degree completion as the measure of collegiate success. As shown by Adelman (1999) persistence to degree completion is a more valid and reliable measure of student's success in college than is year-to-year persistence rates. The economic benefit a student receives due to his or her collegiate experience is predicated on their completing a degree, not persisting from the first to second year of college.

- Our use a national database allowed us to track students from their sophomore year in high school to ten years post-high school graduation. The HS&B/So database contains a sufficiently large number of student cases allowing for generalization of results on a national level.

- Our measures of academic resources, enrollment patterns, curricular choices, financial aid, and academic performance are based on verifiable student records, such as high school and college transcripts and financial aid records (Adelman, 1999). This feature increases the internal validity of our study. It ensures the reliability of the relationships observed between these performance measures and transfer and degree completion.

- Our conclusions regarding the nexus between SES and transfer and degree completion rest on sophisticated statistical analyses, rather than on simple descriptive statistics. Descriptive statistics tend to overestimate the connection between variables and fail to take into account the simultaneous effects of those factors also known to affect transfer and persistence to graduation.

- Data regarding satisfaction and student engagement with postsecondary education institutions were secured while the student was enrolled. We included statistical controls to make certain that this was the case.

Conclusions and Implications

Our study suggests that factors other than socioeconomic status play a larger role in successfully navigating the pathway to a college degree. As with countless generations, the path to a 4-year degree for members of the 1982 High School Class began as early as the 8th grade (Cabrera & La Nasa, 2001; Wallace, Abel, & Ropers-Huilman, 2000). At this time, aspirations for college triggered the need to secure the academic preparation necessary to succeed in college. Those who met this task had ample choices in their quest for a college degree, regardless of their socioeconomic status. In view of the fact that preparation for college and degree aspirations are so intertwined (Cabrera & La Nasa, 2001), it stands to reason that strategies addressing these two critical factors simultaneously are more likely to enable the students and their families to navigate the right path to a college degree. Programs that recognize that academic readiness and degree aspirations are the by-product of the connections between a student's family with peers, the K-16 school system, and the larger community, such as TRIO and GEAR-UP, seem most appropriate (Cabrera & La Nasa, 2001; Gladieux & Swail, 2000).

Curriculum is at the heart of academic preparation for college (Adelman, 1999). Policies geared at securing academic resources for college during the last few years of high school are inadequate. Rather, academic preparation for college should begin as early as the 8th grade. Our results suggest curriculum should be articulated to foster the development of those critical competencies, values, and skills known to prepare the student to successfully undertake collegiate work. The competencies acquired through math and science courses made a difference. The current emphasis on using testing to hold both elementary and secondary institutions accountable would only be successful to the extent to which the tests themselves are valid measures of academic resources (National Research Council, 1999). Without this orientation, the testing regimen will produce countless children able to answer test questions, but unable to perform successfully in college.

Accountability of public higher education needs revising on two-fronts. First, policies aimed at holding community colleges accountable for low transfer rates need to be revisited. Not all students entering a community college aspired for a 4-year degree, nor are all of them academically prepared for college coursework. In our study, only 47% of those members of the 1982 High School Class who entered community college students aspired for a college degree. Of all community college students, only 38% were highly academically prepared. Holding community colleges responsible for creating academic resources, which evolve throughout middle and high school, is unrealistic. Instead, we propose community colleges be held accountable to identify students aspiring for a bachelor's degree and then provide them with strong college curriculum in math and sciences, positive classroom and out-of-classroom experiences, financial support and assistance with the details of the transfer process. This policy should also recognize the fact remediation has at most a modest impact in facilitating transfer. However, our findings suggest remediation targeted to Lowest-SES students seems to help, particularly when this effort is aimed at increasing reading skills and competencies.

Second, policies that stress year-to-year persistence within one institution should be revised to emphasize persistence to degree completion across the entire higher education system. We join Adelman (1999) in this recommendation. After all, the benefits of a college degree are universal; regardless of where the degree was ultimately obtained (Pascarella & Terenzini, 1991). This change in policy would also recognize the increasingly transient nature of today's college student population. As Adelman (1999) noted, only 43% of all college students remained at the first institution attended; however, 63% of the same students persisted to degree completion in the entire higher education system.

The use of the of the year-to-year persistence rate as a criterion of success leads institutions to enact intervention strategies with short-term gains which miss the real causes of disengagement with the postsecondary system. Counting all students who failed to return for their sophomore year as dropouts ignores the multidimensional nature of college withdrawal behavior (Tinto, 1987, 1993). Mallette and Cabrera (1991) estimate that about two-thirds of all students counted as dropouts actually transferred to another institution. Counting non-returnees as dropouts also ignores the fact that factors influencing withdrawal, transfer, and stop-out decisions are different (Mallette and Cabrera, 1991). Emphasis on freshman persistence has another drawback: it detracts attention from the realization that degree completion is the result of a longitudinal process. For many students, the roots of the freshman dropout rate go back as far as the 8th grade (Adelman, 1999; Cabrera & La Nasa, 2001).

Enrollment management should begin at the grade school. Interventions can be designed with two groups in mind: students, their families, and the K-12 school personnel. Community colleges and 4-year institutions can help educate students and their parents about the benefits associated with college degree completion. They can advise students and parents about K-12 curricular choices that position a student to be academically prepared for college. College personnel can best provide information about the college application process, including financial aid. Colleges and universities are best equipped to tell parents and children what college is all about. Summer camps, summer bridge programs, and targeted visits are some strategies already in place for 11th and 12th graders. Making these opportunities available as early as the 8th grade is one mechanism to bring early awareness for college, particularly among Lowest-SES students and their families.

Intervention strategies aimed at K-12 can touch several key domains. To begin, colleges and universities can work with elementary and secondary schools in aligning curriculum with competencies, experiences, values, and skills deemed essential for future collegial work. Universities can also assist impoverished school districts with faculty and resources to teach higher level math as well as foundations in sciences (Adelman, 1999). K-12 personnel can also profit from the research and technical assistance colleges and universities can provide regarding effective instructional techniques and parental support mechanisms. These and other collaborative efforts are nowadays greatly facilitated by initiatives such as GEAR-UP, a federal program that supports multiple partnership initiatives geared to low-income 7th graders.

Learning and academic performance in college leads to degree completion. These outcomes are best fostered when university personnel create contexts and environments that enhance student engagement with the academic and social components of the institution (Astin, 1993: Kuh, Douglas, Lund, Ramin-Gyurnek, 1994; Tinto, 1987, 1993). Learning communities are one of the promising intervention strategies. They seek to maximize student engagement in academically purposeful ways by increasing academic and social involvement through collaborative learning (Gablenick, MacGregor, Matthews, & Smith, 1990; Lenning & Ebbers, 1999; Tinto, 1987, 1993). Our study shows that taking college level math and science courses significantly influence degree completion. What better way to foster a student's involvement with math and sciences than incorporating these two disciplines as part of the block scheduling underlying the use of the learning communities?

Providing grants and loans on a need basis eases the pursuit of a 4-year degree. Because involvement in academic and social areas matter, institutions should develop finance mechanisms to help pay for college which also increase opportunities for student involvement (St. John, Cabrera, Nora, & Akser, 2000). Our results indicate that well-crafted forms of working on campus can be a viable way for students to pay for college while simultaneously being involved in academically purposeful activities.

Appendix A

The Database, Weights, and Variables

Database

The sample for this study was drawn from the National Longitudinal High School and Beyond 1980 Sophomore Cohort (HS&B/So). Created under the auspices of NCES, the database (CD#: 2000-194) follows almost 15,000 high school sophomores over an eleven-year span. In 1980, data were collected from high school sophomore students attending 1,015 schools. Their parents were also surveyed. In the first follow-up (1982), high school seniors' data were complemented with high school transcripts. The third and fourth follow-ups took place in 1986 and 1992. In 1993, NCES collected college transcripts from all institutions student reported attendance between 1982 and 1992 (Zahs, Pedlow, Morrissey, Marnell, & Nichols, 1995).

Weight Employed in the Analyses

The NCES followed a stratified sample strategy in creating the HS&B/so whereby the original sample of 10th graders was adjusted to represent the 1980 census of all high school seniors (about 3.7 million). Subsequent weights reflect the number of individuals attending postsecondary institutions. In this study, we used the Postsecondary Education Participation Panel Weight (PSEWT1), which adjusts the HS&B/So data to reflect the number of 1982 high school graduates who enrolled in postsecondary education (See Table A1).

Table A1. Weighted and unweighted sample sizes and proportions.

SES	Postsecondary Education Participation Panel Weight (PSEWT1)		UNWEIGHTED	
	N	%	N	%
Lowest	407,772	17.3	3967	27.9
Middle-Lowest	526,214	22.3	3347	23.5
Middle-High	661,478	28.0	3443	24.2
Highest	764,332	32.4	3464	24.4
Total	2,359,796	100%	14,914	100%

Dependent Variables

Transfer. Using INSTCOMB (Adelman, 1999), we identified those students who transferred from a 2-year institution to a 4-year institution. Our baseline was formed by those students who enrolled at a community college between fall of 1982 and 1984 to ensure that the college experiences they reported corresponded with their enrollment in the 2-year sector. Determination of enrollment statues was done using college transcripts (see Adelman, 1999).

Degree Completion. Students who secured at least a bachelor's degree by 1993 were considered degree completers for this study. This variable was derived from NHDEG, which included a record of students' highest confirmed degree received by 1993 as indicated on college transcripts (Adelman, 1999).

Independent Variables

Socioeconomic Status. Quartile coding of base year SES (SESQ). This variable was built upon respondent's socioeconomic status at the time he/she was a 10th grader in 1980. Socioeconomic status, as defined by variables within NCES datasets, includes the following measures: parental education, parental occupation, items in the home (i.e., dishwasher, books, etc.), and family income. This variable ranged from 1 (Lowest-SES) to 4 (Highest-SES). As shown in Table A1, estimates of subjects across SES categories vary as a function of the weight under consideration.

Background. Gender (PSEX) coded as 0 (Male) and 1 (Female) and ethnicity (RACE). Ethnic categories included White (1), African American (2), Hispanic (3), and Asian American (4). Native Americans, due to their small number, were excluded from the logistic regression analyses.

High School Encouragement. Three dummy coded indicators of whether the students felt were encouraged to go on college from parents (PARENTE), high school teachers or counselors (HSPROF) and friends (FRIENDE) were used for this construct. PARENTE was derived from two items indexing whether respondents felt the father (FY63a) or the mother (FY63b) expected them to go on college after high school graduation. Similar to parental encouragement, HSPROF was created from two items indicating whether the respondent felt teachers or counselors expected him/her to go on to college (FY63c and FY63d). FRIENDE was derived from highest expectations respondents' high school friends had for them in their education (FY63e). The selection of these variables is consistent with recent literature highlighting the role of family, high school teachers, high school counselors, and friends on a student's college-choice decisions (e.g. King, 1996; Cabrera and La Nasa, 2001; Perna, 2000).

Academic Resources Index. Created by Adelman (1999), the academic resources index (ACRES) is a composite of multiple indicators of a student's high school academic performance and curriculum. It brings together a reduced but enhanced version of the SAT test students took in the e 12th grade along with high school rank, academic GPA, as well as measures of the intensity and quality of the high school academic curriculum. This index avoids problems associated with using "preparatory track" by capturing measures that are more valid of a student's effort and success in academic related areas. Furthermore, this measure is based on transcripts avoiding biases associated to self-reported data. Adelman (1999) found ACRES ranking second among the predictors of degree completion for members of the High School Class of 1982. Originally conceived in quintiles, we collapsed the two categories of both extremes in the variables creating academic resources in thirds: (1) low academic resources, (2) medium, and (3) high academic resources.

Degree Aspirations. ASP82 is a dummy variable reflecting whether the high school senior aspired for a 4-year degree (1) or not (0).

College Paths. College paths were indexed using three separate variables: first type of institution attended, continuous enrollment (NONSTOP), and the ration of courses dropped, withdrawn from or left incomplete in relation to those attempted (DWI#3). First type of institution attended was derived from TRIFA by forming three categories: (1) Less than 2-year, (2) 2-year, and (3) 4-year. Used for the degree completion section, these variables were created from college transcripts (see Adelman, 1999).

Collegiate Experiences. Five indicators were used to measure the experiences of the student with the institution. Out-of-classroom experience scale is a composite of three likert items assessing the extent to which the student was satisfied with: the college's social life (TY28b), cultural activities (TY28g), and sports and recreation facilities (TY28k). The alpha reliability for this scale is 0.64. Instructional quality scale is a composite of five likert items indexing satisfaction with: curriculum (TY28i), acquisition of work skills (TY28c), quality of instruction (TY28j), quality of faculty (TY28a), and intellectual development (TY28h). The alpha reliability for this scale is 0.82. The Satisfaction with Campus Faculties (TY28f), Satisfaction with Counseling (TY28e), and Satisfaction with the Prestige of the Institution (TY28m) were each measured via a single likert-item. Using the High School Cohort of 1980, Cabrera (1987) found these items to show moderate correlations with Pascarella and Terenzini's (1980) scales of academic and social integration.

Table A2. Concurrent Validity Matrix of Student Integration Model.

Variables	Academic Integration			Social Integration	Institutional Commitment
	Academic & Intellectual Development	Faculty Concern	Interactions with Faculty	Peer-Group interactions	
Ability, Knowledge, and Professional Quality of Teachers	.389**	.452**	.274**	.075	
Development of Work Skills	.418**	.398**	.367**	.091	
Intellectual Growth	.489**	.319**	.221**	.194**	
Counseling or Job Placement	.094	.193**	.151*	.132*	
Cultural Activities	.143*	.159*	.116	.175	
School Intellectual Life	.416**	.319**	.218**	.182**	
Course Curriculum	.345**	.297**	.237**	-.027	
Quality of Instruction	.470**	.478**	.334**	.148*	
School Social Life	.218**	.134*	.149*	.551**	
Sports & Recreational Facilities	.010	.099	-.002	.052**	
Buildings & Library Equipment	.156*	.225**	.132*	.052	
School Prestige	.162*	.162*	.106*	.107	.234**
Financial Cost of Attending	.219**	.140*	-.065	.262**	.187**

Source: Cabrera, A. F. (1987). *Ability to pay and college persistence.* Unpublished doctoral dissertation. University of Wisconsin – Madison, Madison, WI.

College Grade Point Average. Two measures of college GPA were used. For the transfer analysis component, the variable reflecting GPA earned in the first year of postsecondary education (GPA1) was used. Analyses on degree completion employed overall undergraduate GPA (GPA). Both GPA measures were derived from college transcripts (see Adelman, 1999).

Earned Credits Hours. College transcripts were examined to ascertain the student's level of effort in earning credits. This variable measures the percent of credits earned in relation to credits attempted. This variable was collapsed into three categories: (1) earned less than ¾ of courses attempted, (2) earned ¾ or more, and (3) earned all credits attempted. This measured attempted to capture the Astin's (1993) quantitative component of his theory of academic effort.

Remediation. Two measures were employed signifying the number of remedial courses in math (REMMTH) and reading (REMREAD) the community college student took. These variables were derived from college transcripts (see Adelman, 1999).

Number of college math and science course. In the case of the transfer component of the study, college transcripts were examined to determine the number of courses in math and sciences taken only at the community college. In the case of the degree completion section, all math and science courses were considered regardless of the granting institution. For both sections, only college math and science courses where student received credit were selected. The type of math and science courses included were those most likely to be taken by all students regardless of their major.

Financial Aid. Three financial measures were used: receipt of educational loans (loan8286), grant-in-aid (schl8286), and satisfaction with cost. The first two measures were developed by Adelman (1999) from student aid record and signify whether the student received loans and grants within the 1982-86 periods. Satisfaction with cost was derived from an item indexing a student's satisfaction with the cost of attending (TY28l). This variable was dichotomized to indicate satisfaction (1) or dissatisfaction (0). This was done according to practices outlined in Cabrera, Stampen, and Hansen (1990) and Nora, Cabrera, Hagedorn, & Pascarella (1996).

Working On Campus. This variables indexes the number of years the student reported working on campus on such activities as work-study, co-opt placements, and/or teaching-research assistantships (see Adelman, 1999).

Children. This variable signifies weather the student had children by 1986, four years after high school graduation (CHILD86).

Tables A3 and A4 display descriptive statistics employed in the two logistic regression analyses.

Table A3. Descriptive statistics for the variables employed in the transfer logistic regression model.

Variable	N	% Cell	Mean	S.D.
Transferred				
Yes	146,949	29.0%		
No	359,860	71.0%		
SES				
Lowest	81,467	16.1%		
Middle Low	121,340	24.0%		
Middle High	155,240	30.7%		
Highest	147,026	29.1%		
Gender				
Male	221,464	43.2%		
Female	291,494	56.8%		
Ethnicity				
White	403,14952	79.9%		
African American	,782338,4	10.5%		
Hispanic	34	7.6%		
Asian American	10,285	2.0%		
High School Encouragement				
From parents	373,275	82.9%		
From high school professionals	293,135	65.5%		
From friends	276,576	61.8%		
Academic Resources				
Low	55,867	12.6%		
Medium	218,617	49.4%		
High	168,103	38.0%		
Degree Aspirations				
Aspired for a college degree	214,372	42.3%		
First Year College GPA	503,838		2.39	0.878
Credit Hours Earned vs. Attempted				
Less than 75%	86,131	16.8%		
75%-99%	91,790	17.9%		
100%	335,036	65.3%		
Number of Remediation Courses				
In Math	512,958		0.85	1.162
In Reading	512,958		0.23	0.573
Number of math courses				
None or missing	228,099	44.5%		
One	104,867	20.4%		
Two	84,279	16.4%		
Three or more	95,712	18.7%		
Number of science courses				
None or missing	296,290	57.8%		
One	73,607	14.3%		
Two	57,965	11.3%		
Three or more	85,096	16.6%		
Collegiate experiences				
Out-of-classroom experiences	411,243		3.64	0.755
Instruction quality	409,193		4.00	0.718
Counseling or job placing	414,752		3.38	1.035
Campus facilities	416,154		4.08	0.887
Institutional prestige	415,999		3.76	0.926
Satisfied with cost	279,503	67.1%		
Financial aid				
Loans 1982-86	139,175	27.1%		
Grant-in-aid 1982-86	195,527	38.1%		
Had Children in 1986	43,085	8.8%		

Note: Cases were weighted by the NCES panel weight PSEWT1.

Table A4. Descriptive statistics for the variables employed in the degree completion logistic regression model.

Variable	N	% Cell	Mean	S.D.
Degree completers				
Yes	842,493	35%		
No	1,566,633	65%		
SES				
Lowest	407,772	17.3%		
Middle Low	526,214	22.3%		
Middle High	661,478	28.0%		
Highest	764,332	32.4%		
Gender				
Male	1,104,772	45.9%		
Female	1,304,354	54.1%		
Ethnicity				
Hispanic	148,991	6.3%		
African American	284,054	12.0%		
Asian American	43,241	1.8%		
White	1,893,474	79.9%		
High School Encouragement				
From parents	1,732,304	81.3%		
From high school professionals	1,462,415	68.9%		
From friends	1,340,736	63.1%		
Academic resources				
Low	264,253	12.6%		
Medium	821,194	39.2%		
High	1,010,646	48.2%		
Degree aspirations				
Aspired for a college degree	1,245,822	52.4%		
Type of first institution attended				
Less than 2-year	267,170	12.2%		
2-year	894,437	40.8%		
4-year	1,030,255	47.0%		
Continuous enrollment	1,309,733	61.8%		
DWI Index				
Less than 10%	1,421,202	64.1%		
10%-20%	331,286	14.9%		
More than 20%	465,666	21.0%		
Number of math courses				
None or missing	1,295,554	53.8%		
One	386,987	16.1%		
Two	289,534	12.0%		
Three or more	437,051	18.1%		
Number of science courses				
None or missing	1,416,027	58.8%		
One	267,874	11.1%		
Two	241,731	10.0%		
Three or more	483,496	20.1%		
Collegiate experiences				
Out-of-classroom experiences	1,797,614		3.70	0.778
Instruction quality	1,790,114		4.08	0.699
Counseling or job placing	1,808,262		3.39	1.078
Campus facilities	1,808,653		4.00	0.971
Institutional prestige	1,811,500		3.85	0.988
Satisfied with cost	1,074,637	59.3%		
Financial aid				
Loans 1982-86	887,943	36.9%		
Grant-in-aid 1982-86	1,011,355	42.0%		
Working on campus	1,397,574		1.31	1.261
Overall College GPA	2,261,439		2.52	0.895
Had Children in 1986	301,067	13.1%		

Note: Cases were weighted by the NCES panel weight PSEWT1.

Appendix B

Methodological Notes

Adjustment of Standard Error

As noted by Adelman (1999), standardized statistical packages such as SPSS significantly underestimate the sampling error when handling stratified samples. To correct for this problem we used the average design effect of 1.5 for adjusting the standard deviations of parameters used in logistic regression models. This value was chosen based on the recommendations contained in the High School and Beyond Fourth Follow-Up Methodology Report (Zahs, Pedlow, Morrissey, Marnell, & Nichols, 1995). To further minimize type I error due to large sample sizes, all parameter estimates were tested using a *p*-value of 0.01.

Logistic Regression

We relied on a series of logistic regression models to assess the effect of demographic, school-based, aspirations, collegiate experiences, college paths, and family responsibilities on the probabilities of securing a baccalaureate degree and to transfer from the 2-year sector to the 4-year sector within 11 years. Logistic regression is an ideal method to model the effect of independent variables when the dependent variable under consideration is dichotomous. Logistic regression not only captures the probabilistic distribution embedded in dichotomized measures, but it avoids violations to the assumption of homogeneity of variance and functional specification the direct application of Ordinary Least Squares (OLS) regression models are likely to produce (Aldrich & Nelson, 1986; Cabrera, 1994; Menard, 1995). Moreover, Press and Wilson (1979) proved the superiority of logistic regression for classification and prediction purposes in relation to discriminant analyses.

Interpretation of Logistic Regression Results

Baseline p - observed probability of the dependent variable. For instance, the observed probability that 1982 high school seniors would eventually secure a 4-year degree by 1993 is 0.354, meaning that 35% of them graduated. Observed probabilities are also referred as "unadjusted probabilities." Baseline *p* serves as a benchmark to assist in assessing how much each independent variable contributes to the probability of the dependent variable.

Beta weights. In contrast to OLS, interpretation of logistic parameter estimates is not straightforward. Unlike OLS, the metric of individual coefficients is expressed in terms of logits rather than in terms of the original scale of measurement. This problem is particularly accentuated for categorical variables; the corresponding beta weights represent contrasts among categories summarized in terms of differences of logits. For instance, the SES effect of 1.018 displayed in table B2 indicates that Highest-SES originated students, on the average, are 1.018 logit units more likely to obtain a bachelor's degree than are Lowest-SES students. To overcome this problem, logistic

regression results are usually presented in terms of changes in probabilities and adjusted probabilities.

Delta-p. Developed by Peterson (1985), delta-*p* reflects the incremental change in the dependent variable (e.g., completing a 4-year degree) due to a unit change in the independent variable (e.g. college academic performance). In Table 10, for instance, the delta-p value of .318 associated with College GPA means that for every unit increase in GPA, the probability of degree completion increases by 32% percent. When the independent variable is a dichotomy (e.g. gender), delta-*p*s are interpreted as differences between the two categories. In Table 10, for instance, the delta-*p* of 0.246 associated with Highest SES, means that Highest SES students are 25 percent points more likely to graduate by 1993 than their Lowest-SES counterparts.

Adjusted probabilities. Used to estimate corrected probabilities by holding constant the dependent variables at their mean value (Cabrera, 1994; Menard, 1995), adjusted probabilities, then, control for factors that systematically affect a group in a consistent manner. Take the case of transfer rates among Lowest-SES students. At the aggregate, Lowest-SES student transfer to a four-institution at considerably lower rates than Highest-SES students (17.0% vs. 36.7%), signifying a strong SES effect. This 20% SES-based effect is significantly reduced to 8% once other factors are held constant for both groups (see Table 5 and Figure 8). In other words, the observed differences in probabilities of transferring are more a product of factors facilitating transfer that are systematically more present among Highest-SES students than Lowest-SES students. For transfer and degree completion, we calculated the adjusted probabilities using the mean values and the logistic parameter estimates depicted in Tables B1 and B2, respectively, using the following formula (see Cabrera, 1994, p. 228).

$$P(Y) = \frac{\text{Exp}\,(B_0 + B_1X_1)}{1 + \text{Exp}(B_0 + B_1X_1)}$$

X2 for the model. Assesses whether the independent variables as a group are significantly associated with the dependent variable (Aldrich & Nelson, 1987).

Proportion of Correctly Predicted cases (PCP). Provides an overall indicator of fit of the logistic regression model paralleling the OLS proportion of variance explained with R^2. This measure involves a comparison between the number of cases that the model predicted as being either 0 (graduated) or 1 (did not graduate) against the total sample size. PCP values greater than 55% signify a good fit of the model (see Cabrera, 1994).

Tables B1 and B2 report the logistic regression results for determinants of transfer and degree completion, respectively. Each case was weighted by the NCES panel weight PSEWT1. To minimize the effect of large sample sizes standard errors were corrected using the design effect of 1.5. PCP represents the percent of cases correctly predicted by the model. PCPs higher than 55% signify a good fit for the model.

Table B1. Effects of background, encouragement, academic resources, performance in college, remediation, collegiate experiences, financial aid, and family responsibilities on the probability of transferring to a 4-year institution.

Factor	All	Socioeconomic Status			
		Lowest	Middle Low	Middle High	Highest
SES[1]					
Middle Low	0.091				
Middle High	0.427*				
Highest	0.359*				
Female	-0.421	-1.180**	-0.565**	-0.026	-0.722**
Ethnicity					
African American	-0.035	-1.019**	0.033	-0.770**	1.221**
Hispanic	-0.440**	-0.625*	-0.366*	-1.603**	-0.134
Asian American	0.239*	-0.552	2.112**	-0.558*	0.565*
High School Encouragement[1]					
From Parents	-0.096	-1.930	0.448*	0.579*	0.174
From High School Professionals	0.189*	-0.915	-0.018	-0.237	0.893*
From Friends	0.305*	1.156*	0.178*	0.660*	-0.285
Academic Resources[1]					
Moderately Prepared	0.376*	-0.334	-0.389	0.376*	0.773*
Highly Prepared	0.977*	1.605*	0.546*	0.176	1.754*
Collegiate Aspirations[1]	0.719*	0.707*	1.339*	0.890*	1.142*
Grade Point Average[1]	0.416*	-0.235	0.128*	0.476*	1.364*
Earned Hours[1]					
¾ and more of attempted	-0.510	-1.677	-0.293	0.312*	-1.248
Earned all hours attempted	-0.601	-1.344	-0.530	-0.521	-1.238
Remediation Courses[1]					
In Mathematics	0.086*	0.071	-0.010	-0.117	0.389*
In Reading	-0.192	1.221*	-1.250	-0.233	-0.858
Number of Math Courses[1]					
One Course	0.195*	0.266*	-0.399	0.476*	0.476*
Two Courses	0.807*	0.211	0.874*	0.673*	1.648*
Three or more Courses	0.619*	-0.311	1.292*	1.734*	0.240*
Number of Science Courses[1]					
One Course	0.689*	2.242*	0.861*	0.769*	0.766*
Two Courses	1.495*	-1.541	1.926*	1.585*	1.478*
Three or more Courses	1.172*	1.744*	1.301*	1.255*	0.954*
Collegiate Experiences[1]					
Out-of-Classroom	0.279*	0.187*	-0.055	0.506*	0.160*
Quality of Instruction	0.301*	0.461*	0.973*	0.265*	0.062
Counseling	0.101*	-0.312	0.589*	0.153*	-0.104
Campus Facilities	-0.147	0.193*	-0.136	-0.280	-0.117
Institutional Prestige	-0.002	0.282*	-0.445	-0.254	0.599*
Satisfaction with Costs[1]	-0.634	-0.800	-0.616	-1.200	-0.456
Financial Aid					
Loans	0.461**	1.012**	0.891**	0.506**	-0.278*
Grants/Scholarships	0.284**	0.028	0.413**	-0.266*	1.279**
Having Children[1]	-1.287*	-1.925*	-0.182	-2.982*	-1.733*
Intercept	-5.260	-2.535	-6.289	-4.440	-8.452
Number of cases	499,116	77,689	121,049	154,033	146,345
Baseline p	0.294	0.170	0.229	0.339	0.367
Model X^2, df	98,017,33**	11,852,30**	33,291,30**	37,061,30**	49,519,30**
PCP	77.5%	83.0%	83.4%	76.3%	80.4%

*p<.01 **p<.001

1. Effects of the variable were directionally tested.

Table B2. Effects of background, encouragement, academic resources, performance in college, remediation, collegiate experiences, financial aid, and family responsibilities on the probability of degree completion.

Factor	All	Socioeconomic Status			
		Lowest	Middle Low	Middle High	Highest
SES[1]					
Middle Low	0.469*				
Middle High	0.637*				
Highest	1.018*				
Female	-0.302	-1.326**	-0.624**	-0.351**	-0.081*
Ethnicity					
African American	0.005	-0.104	0.085	-0.393**	0.502**
Hispanic	-0.198	-0.343*	0.215	-0.535**	0.080
Asian American	0.940*	2.735**	-0.070	0.746*	1.001**
High School Encouragement[1]					
From Parents	0.211*	-0.458	0.330*	0.372*	-0.078
From High School Professionals	0.001	-0.297	-0.429	0.014	0.310*
From Friends	0.264*	-0.192	0.567*	0.679*	-0.295
Academic Resources[1]					
Moderately Prepared	0.359*	0.650*	-0.217	0.773*	0.224
Highly Prepared	0.926*	1.562*	-0.272	1.807*	0.564*
Collegiate Aspirations[1]	1.057*	1.067*	1.650*	0.822*	1.477*
Type of First Institution Attended[1]					
2-year Institution	0.852*	2.548*	1.672*	0.028	1.164*
4-year Institution	2.237*	4.334*	2.493*	1.303*	2.825*
Continuous Enrollment[1]	0.922*	1.320*	1.547*	0.653*	1.049*
DWI Index[1]					
10-20% of courses	-0.636*	0.542	-0.576*	-0.753*	-0.887*
At least 20% of courses	-1.793*	-3.373*	-1.457*	-1.935*	-1.712*
Number of Math Courses[1]					
One Course	0.012	-0.050	-0.702	0.356*	-0.139
Two Courses	0.239*	0.372*	0.008	0.236*	-0.098
Three or more Courses	0.910*	-0.021	0.841*	1.228*	0.736*
Number of Science Courses[1]					
One Course	0.757*	1.371*	1.100*	0.623*	0.423*
Two Courses	0.752*	1.025*	1.299*	0.544*	0.617*
Three or more Courses	1.136*	2.426*	1.832*	1.368*	0.632*
Collegiate Experiences[1]					
Out-of-Classroom	0.340*	-0.128	0.581*	0.529*	0.149*
Quality of Instruction	0.284*	0.883*	-0.039	0.568*	0.092*
Counseling	0.025*	0.525*	-0.337	0.085*	0.045*
Campus Facilities	-0.127	-0.373	0.238*	-0.210	-0.165
Institutional Prestige	0.093*	0.581*	0.255*	-0.063	0.121*
Satisfaction with Costs[1]	-0.283	0.298*	-0.047	-0.601	-0.356
Financial Aid					
Loans	0.485*	1.006*	1.149*	0.350*	0.193*
Grants/Scholarships	0.300*	0.421*	0.365*	0.378*	0.285*
Worked on Campus[1]	0.170*	0.185*	0.197*	0.367*	0.052*
College GPA[1]	1.319*	1.566*	2.019*	0.894*	1.788*
Having Children[1]	-1.367*	-4.289*	0.381	-1.262*	-2.577*
Intercept	-11.207	-17.274	-13.994	-10.701	-9.480
Number of cases	2,359,795	407,772	526,213	661,478	764,332
Baseline p	0.354	0.129	0.236	0.336	0.570
Model X^2, df	647,115,35**	73,256,32**	145,226,32**	197,475,32**	202,394,32**
PCP	86.4%	90.9%	88.8%	84.6%	87.4%

*p<.01 **p<.001

1. Effects of the variable were directionally tested.

Appendix C

Literature Review Summary

Author(s)	Citation	Methodology	Variables[1]	Results	Notes
Merisotis, J. & Phipps, R.	Remedial Education In Colleges and Universities: What's Really Going On? *The Review of Higher Education, 24(1).* ASHE. 2000.	Review of remedial issues. Listed descriptive stats.		See article for descriptive stats on # of courses taken, type, institutions and remedial work, remedial success, and cost	
Voorhees, Richard	Toward Building Models of Community College Persistence: A Logit Analysis. *Research In Higher Education 26(2).* AIR. 1987.	Population: 369 suburban cc students in Fall 1984. Test: ACT's Student Opinion Survey and an additional 26-question survey. Analysis: logit modeling	gender, **enrollment status(part/full time)**, ethnicity, purpose of enrolling, satisfaction with college, intent to return, GPA[2], informal faculty interaction, **weekly study hours**	Found main effects for: sex, purpose of enrolling, intent to return.	See page 121 for variables.
Kinnick, M. & Kempner, K.	Beyond "Front Door" Access: Attaining the Bachelor's Degree. *Research In Higher Education 29(4).* AIR. 1988.	Population: 2100 Oregon HS[3] Seniors in Fall 1974, 1400 (67%) in follow-up. Quantitative Tests: 1. survey in 1974 collecting demographic, HS program and GPA, and PS[4] ed[5]. asp[6]. 2. follow-up survey in 1985 collecting PS education, PS employment Qualitative Test: interviewed 22 people in 1987 who: had HS GPA > 3.0, asp. to BD[7], attend Oregon cc[8] by 1975.	BD by 1985, gender, parents' income (self-reported in 1985), SES[9], father's ed., mother's ed., HS GPA, ed. asp., true first institution type, **geographical area of HS (rural/nonrural), HS program**	1. Characteristics of cc students: low SES, low parental ed. level, low HS GPA, low ed. asp., not in college prep program 2. BD attainment of students with BD asp. associated with: HS GPA, SES, parents' ed., college type (4-yr), ed. asp., HS program 3. BD attainment and first institution type; 51% w/<3.0GPA and 4-yr get BD, 37% w>3.5GPA and 2-yr get BD;	
Lee, V. & Frank, K.	Students' Characteristics that Facilitate the Transfer from two-year to four-year Colleges. *Sociology of Education 63(3).* 1990.	From HS&B80, 2500 students who entered cc by 1982. Analysis: OLS then LISREL	Social class, ethnicity, **HS academic track, Catholic HS attendance, homework hours/week**, # of HS math courses, ed. asp. in 1980, **parental interest in students' academics**, HS GPA, **applied to college while in HS, HS academic achievement**, # of cc sem[10]. hours, **# of full-time cc sem.**, cc GPA, **# of cc math courses, # of cc science courses, % working in Feb. 82, % of science majors, age at which plan to work full-time, job satisfaction**	1. Direct effects: cc academic behavior had strongest direct effect on transfer followed by academic track in HS, 3 HS math courses, HS academic achievement, HS GPA, cc credits in math, cc credits in science, age planned to work full-time, job satisfaction, % of science majors 2. Net effects: class, academic track, 3 HS math courses, HS GPA, 3 cc sem. of math, 3 cc sem. of science courses, age planning to work full-time, job satisfaction	See page 182 for path model See page 190, Table 6 for effects of model predicting transfer

1. bolded variables were not included in the current 2000 AIR analysis
2. GPA: grade point average
3. HS: high school
4. PS: post secondary
5. ed.: education(al)
6. asp.: aspire/aspiration(s)
7. BD: bachelor's degree
8. cc: community college
9. SES: socioeconomic status
10. sem.: semester

Author(s)	Citation	Methodology	Variables	Results	Notes
Dougherty, K.	Community College and Baccalaureate Attainment. *Journal of Higher Education 63(2).* 1992.	Summary of 11 studies.		1. an 11-19% BD attainment gap between 2/4-year colleges exists 2. cc students are 10-18% more likely to drop out 3. cc students have difficulty with logistics of transferring 4. cc students have difficulty graduating after transfer	
Nora, A., & Rendon, L.	Determinants of Predisposition to transfer Among Community College Students: A Structural Model. *Research in Higher Education 31(3).* 1990.	Population: 569 students (422 Hispanic, 147 white) from English, math, history, and business classes in 6 cc in TX, AZ, & CA Test: survey given in spring 1987 Analysis: LISREL and ULS	HS GPA, parents ed., ethnicity, encouragement from sig. others, **importance of meeting ed. goals, importance of attending particular institution**, faculty contact outside class, **reading college newspaper, orientation participation, looking at college bulletin boards**, acad. experiences, **career prep. experiences, transfer opportunities, info on transfer options, faculty encouragement to transfer, institutional priority to transfer, giving more reading assignments to prospective transfer students, study groups, honors participation, library use, making appts. w/faculty, asking faculty for advice, taking notes, taking notes on readings, attending lectures, asking faculty for additional references, asking for writing skills help, # of institutions planned to apply to for transfer, discussing transfer w/friends, faculty, counselors, & transfer school people, looking at college catalogs, importance to transfer, feelings about not transferring, feelings about getting a job vs. transferring, transfer after AD[10], worrying about future transfer**	encouragement, acad. integration, & social integration increase ed. goal and institutional commitment predisposition to transfer: high parental ed., high academic integration, high social integration, high ed. and institutional goals	See page 249 for model with effect coefficients. See page 250 for table.

1. bolded variables were not included in the current 2000 AIR analysis
2. GPA: grade point average
3. HS: high school
4. PS: post secondary
5. ed.: education(al)
6. asp.: aspire/aspiration(s)
7. BD: bachelor's degree
8. cc: community college
9. SES: socioeconomic status
10. sem.: semester

r(s)	Citation	Methodology	Variables	Results	Notes
Kraemer, B.	Factors Affecting Hispanic Student Transfer Behavior. *Research in Higher Education 36(3).* 1995.	Population: 277 students who graduated between 1990-92 from a private bilingual junior college in Illinois. Test: survey given while at junior college, some info from transcripts and "transfer center"	Age, gender, **place of birth, marital status,** children, family income, parent's ed., **type of HS diploma, # of years between HS and college, math placement test, care for family, house work, family problems,** encouragement from students, encouragement from counselors, **class participation,** GPA, **satisfied with English communication skills, student feels 'at home' at college because of other Hispanic faculty, students, staff, & Hispanic activities,** ed. goals, **importance of particular college, willingness to chose same college if started now**	Transfer was most influenced by: transfer intent, achievement, & math ability	See page 309 for model. See page 313, Table 2 for LISREL estimates and R2
Janice Cox Jones, & Lee, B.	Moving On: A Cooperative Study of Student Transfer. *Research in Higher Education 33(1).* 1992.	Population: 165 UC-Davis and 1621 CSU-Sacramento students whom had transferred in from a Los Rios cc district school. Transfer occurred by 1983. All students were "credited" to Los Rios by sr. institution, or had completed >56 transferable units at Los Rios prior to transfer Test: data was collected from college records	pretransfer GPA, gender, ethnicity, age, remedial classes, # credits earned, **# of terms, AD attainment,** actual time elapsed in process, sr. school GPA, BD attainment	1. pretransfer GPA higher for women, Asians, whites, older, non-remedial. 2. AD attainment higher for women, African Americans, Native Americans, Hispanics, older. 3. sr.(4-year) school GPA higher for women, Asians, Native Americans, older 4. remedial students took longer at sr.(4-year) school	
Bers, T. & Smith, K.	Persistence of Community College Students: The Influence of Student Intent and Academic and Social Integration. *Research in Higher Education 32(5).* 1991.	Population: 1142 suburban cc students in Midwest. Test: Current Student Survey in Fall 1988. Survey included Pascarella and Terenzini 30-item scale to test integration. 420 students gave Social Security Numbers and student records were examined for additional data Analysis: setwise discriminant analysis and classification analysis	objective in attending cc, **# of additional terms intended to remain at cc,** gender, age, employment status, ethnicity, **cc program (transfer, vocational), intent to reenroll,** ed. objectives, academic integration, social integration (institutional/goal commitment), dependant variable was persistence between fall and spring semesters (not between academic years)	Student ed. objectives was most powerful predictor followed by academic and social integration and employment status	See page 550, Table 4 for standardized discriminant function coefficients. See page 551, Table 5 for summary of setwise discriminant analysis on the calibration sample data.

1. bolded variables were not included in the current 2000 AIR analysis
2. GPA: grade point average
3. HS: high school
4. PS: post secondary
5. ed.: education(al)
6. asp.: aspire/aspiration(s)
7. BD: bachelor's degree
8. cc: community college
9. SES: socioeconomic status
10. sem.: semester

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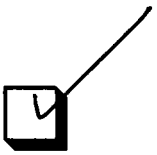

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