

# **Longitudinal Effects of College Preparation Programs on College Retention**

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## **Abstract**

The effects of various college preparation programs, aptitude scores, and student background characteristics on college retention were studied. The data were obtained from the National Education Longitudinal Study: 1988-2000 and NELS:88/2000 Postsecondary Education Transcript Study. The effective sample contained 4,445 first-time freshmen students who were matriculated into four-year institutions between 1992 and 1994. Using survival analysis techniques, the focal point of the study was to examine longitudinal impact of high school programs on college retention. Participation in ACT/SAT preparation courses reduced the likelihood of departure by 42% or 55% in the second or third year in college, while receiving assistance in financial aid application increased the odds of departure by 89% in the second year.

## **Introduction**

Improving college readiness of high school students is a major concern for legislatures and educators in many states. Educational researchers suggest that the richness in secondary education is strongly associated with subsequent college enrollment and degree attainment (Adleman, 1999; Cabrera & La Nasa, 2001). College counseling and availability of related information were particularly important for the low-income high school students in their college attendance decisions (King, 1996). However, higher attrition rates of first-year college students raise questions on how much impact the quality of secondary education and the programs students received would have in terms of college retention (University System of Georgia, 1994). College students enhance their commitment to degree completion through continuing interactions with their institutional environments (Tinto, 1975). Would various college preparation programs in high school facilitate student's transformation into the college environment differently? If the quality of secondary education has a positive effect on college retention, how long does this effect prevent students from departing?

The purpose of the proposed study is to investigate the longitudinal effects of secondary educational characteristics of students on college retention. This study will particularly focus on various college preparation programs that may not be available to all high school students, and their impact on college retention. Additionally, using newly released NCES national data sets for the analysis makes this study unique. The findings of this study will illustrate the current national trend between college attrition and characteristics of postsecondary education.

## **Predisposition Toward College Enrollment**

Although going to college may be viewed as a rite of passage for future career advancement and social mobility, not all the students in our educational system decide to pursue further education after high school. Using a sample of 11,316 eighth graders included in the National Education Longitudinal Study:1988-2000 (NELS:88/2000), 6,687 of these eighth graders (59.1%) enrolled in some type of postsecondary institutions within two years after they graduated from high school. Among those who attend college, some of them begin formalizing their plans to attend college as early as eighth-grade (Hossler, Schmit, & Vesper, 1999).

Many studies have explored various factors that affect educational aspirations of attending college among high school students. The single most important factor that researchers agree on is parental support and encouragement (Stage & Hossler, 1989). The more encouragement students receive from their parents to attend college, the more likely they are to do so. Higher educational attainment of parents also has shown a strong effect on increasing the likelihood of college enrollment of students (Hossler & Stage, 1992). High school students with higher academic achievement were clearly more likely to matriculate to colleges (Jackson, 1978). While it is unclear that students are encouraged to go to college by their parents, peers, and teachers because of their higher grades, or students are already committed to going to college so that they need higher grades to attend postsecondary institutions of their choices, high school grades, as well as parental support and educational level, play a significant role to shape one's educational aspirations after high school (Hossler, Schmit, & Vesper, 1999).

In addition to educational aspirations, Hossler, Schmit, and Vesper (1999) describe the importance of gathering college-related information that enhances one's educational planning. They report that students mainly rely on their parents as sources for college-related information prior to the junior year in high school. During the junior year, information gathering activities significantly increases, and students utilize various sources, such as high school counselors to pick up information that help them with their decision-making process. Students also participated in various programs that assist them in the application process, such as admission test preparation courses through junior and senior years. Given that participation in various programs reflects students' stronger commitment to higher education, the research question for this study is to inquire if participation in these college preparation programs is associated with their retention behavior after matriculation to college? In the next section, how existing college attrition theories view student retention behaviors is briefly discussed.

### **A Brief Overview of Student Departure Theory**

Based on Spady's work (1970, 1971) and Durkheim's Suicide Theory (1951), Tinto developed a model designed to explain the student departure process (1975, 1982, 1988). His theory, known as the Student Integration Model, "enjoys near paradigmatic stature in the study of college student departure" (Braxton, 2000, p.2). In his model various pre-college characteristics of students are thought to interact and directly influence a student's initial commitment to the institution and to their academic goals. A student's initial level of commitment is hypothesized to affect how integrated they become into the social and academic fabric of the institution. One's level of integration is

hypothesized to directly affect a student's decision to remain in college or depart. Higher degrees of integration into the social and academic environment contributes to a greater degree of institutional and goal commitment, and therefore to lower departure rates.

Bean's (1978, 1985) model, known as the Student Attrition Model, is based on causal models of organizational turnover by Price (1977), and Price and Mueller (1981). Believing that worker turnover is analogous to student dropout, Bean (1978) used this theory to study college student attrition. Bean's model emphasizes how a number of student and institutional factors affect student's satisfaction with college and intention to leave, the latter being a direct precursor to dropping out of college.

Many studies have tested Tinto's and Bean's frameworks. Cabrera and associates (1992), however, suggest that the two models are more complementary than previously thought. Cabrera and his colleagues (1993) offer an integrated model that yields a different understanding of the attrition process, where emphasis is placed on the structural specification of the psychological and sociological processes underlying dropout behavior. While these studies have proved to help us describe student attrition behavior, they lack a more practical application. For example, they often fail to incorporate the timing of dropout even though we know that student departure is a longitudinal process. Given the temporal nature of student departure, it is reasonable to suspect that the direction and magnitude of factors associated with departure may differ over time. Moreover, these studies have failed to elaborate effects of detailed characteristics of secondary education that students received.

## **Data and Methodology**

Data used in this study were derived from NELS:88/2000 and NELS:88/2000 Postsecondary Education Transcript Study (PETS:2000) sponsored by the National Center for Education Statistics (NCES). The NELS:88/2000 began its collection of various information on students, their parents, and schools when students were in the eighth-grade in 1988. Data were collected every two years till 1994. In 2000 NCES completed its fifth wave of data collection process for the data set. The PETS:2000 includes transcript information on students who participated in the NELS:88/2000.

The effective sample for this study includes 4,445 first-time freshmen students who were matriculated into four-year institutions between 1992 and 1994. Table 1 exhibits descriptive statistics of the sample. Forty-seven percent of the sample is male, and 73%, 9%, 8%, and 8% were Caucasian, Asian/Pacific Islander, Hispanic, and Black students. As for parents' highest educational attainment, 40% of the parents had high school diplomas or less (first-generation), while 34% of them were both college-educated parents. Annual family incomes of 39% of the sample were less than \$40,000. Over 90% of the students planned to graduate from college when they were in twelfth-grade.

High school ranking was included to control for academic aptitudes of the students. Approximately, 65% of the students were either in the top or second quartile. Five items with dichotomous values were included to assess the effects of high school programs on college retention. Three items were related to the types of assistance offered by schools. The three items asked if students took special courses to prepare for ACT/SAT, received assistance in financial aid, and preparation in writing college admission essays. Two items were related to behaviors of teachers to support college

decision-making process. These two items asked if teachers contacted parents for selecting colleges, and if teachers contacted colleges on behalf of their students. One item was included to address parent's involvement in the college decision-making process. This item asked if parents and their children frequently discussed educational opportunities beyond high school.

Three dichotomous variables were included to examine the effects of different types of financial aid on retention. Since aid recipient status was only available for the first year in the NELS: 88/2000, this study was not able to address how changes in recipient status would affect retention over time. About 53%, 36%, and 15% of the sample received grant, loan, and work-study for their first year in college.

Table 2 includes enrollment status of students in the sample over time. Attrition contains three types of departure, such as dropout, transfer, and graduation. Since these types of departure are different in nature (Metzner & Bean, 1987), they need to be examined separately. Dropout was defined as students who either left their initial institution and never returned, or left their initial institution but returned to the institution after a period of discontinuation in enrollment. Students left their initial enrolled institutions in average of 1.9 years. Transfer was interpreted as students who transferred to other institutions from their initial institutions and never returned to their initial institutions within eight years.

Survival analysis was used to analyze the data. Unlike structural equation modeling that examines one arbitrary departure point, survival analysis is ideally suited to study temporal events like student attrition behavior. This particular methodology allows the analysts to define continuous time dimension (e.g., years in this study) and



assess effects of explanatory variables on attrition longitudinally. This is the significant advantage of survival analysis modeling over structural equation modeling, since values of explanatory variables, such as gender are constant, but *effects* of these variables may change over time. Moreover, survival analysis modeling permits the analyst to control different types of departure, such as dropout, transfer, and graduation. Hence, parameter estimations become more precise and tailored toward particular types of departure.

The study tested two types of survival models, exponential and period-specific models. The exponential model assumes that effects of explanatory variables on student departure exponentially increase or decrease. To examine if the directional assumption of the exponential model fits to explain attrition behavior, the period-specific model, which was designed to assess departure at discrete points in time, was also applied.

## **Empirical Results**

The results of the exponential model are shown in Table 3. Probability estimates were computed using  $\exp(\alpha) - 1$ , where  $\alpha$  represents a coefficient parameter. Positive parameters increase the odds of departure, while negative parameters increase retention rates.

As for effects of high school programs on college retention, students who took ACT/SAT preparation courses in high school were 33% less likely to drop out than those who did not. Students whose parents were contacted by teachers for selecting colleges were also 14% less likely to depart than students whose parents were not consulted by teachers. Students who often talked to their parents about attending college were 22% less likely to depart. Interestingly, students who received assistance in financial aid

application were 21% more likely to drop out than those who did not receive any assistance.

Other variables that showed positive effects on retention included being Asian American, grant, and work-study. Asian students were 32% less likely to drop out than Caucasian students. The likelihood of attrition was reduced by 15% or 36% when students received grant or work-study.

Negative effects of certain explanatory variables on retention were also observed in the exponential model. Late matriculation increased the odds of departure by 89%. Hispanic, Black, and Native American students were 32%, 32%, and 42% more likely to leave their institutions than their counterparts. Lower levels of parental educational attainment negatively impacted students' retention behavior. First-generation students and students with one college-educated parent were 82% and 40% more likely to drop out than students with both college-educated parents. Students from lower family income were exposed to greater chances of departure. For instance, students with family income less than \$19,999 were 1.27 times more likely to drop out than students with family income of \$50,000 or higher. Not surprisingly, students with lower academic abilities were more likely to depart. Students in the lowest high school ranking quartile were 2.8 times more likely to leave their institutions, while students in the 4<sup>th</sup> quartile were 2.5 times more likely to do so.

Table 4 displays the analysis results of departure behavior by year. As presented in the table, parameters of many variables did not change exponentially as assumed in the exponential model. In addition, unveiling how uniquely effects of these variables on attrition changed over time significantly contributed to improving the model fit. The

likelihood ratio for the exponential model was 711.29 ( $LR = 2 \times ((-2930.5976) - (-3286.2413))$ ), while the one for the period-specific model was 997.56. Clearly, the time-varying effects of variables must be included in the model to attain optimized results to understand college student departure behavior.

The effect of taking ACT/SAT preparation courses did not achieve statistical significance in the first-year. However, this particular high school program reduced the odds of attrition by 42% or 55% in the second or third years. Students whose parents were contacted by high school teachers were 30% less likely to drop out only in the fourth year. Receiving help with financial aid in high school increased the attrition rate of students by 89% for the second year. Although the results of the exponential model presented the significant negative effect of assistance in financial aid application on retention, the results of the period-specific model highlighted the period when the negative effect of this particular program was the strongest. In a similar vein, taking ACT/SAT preparation courses reduced the odds of attrition by 33% in Table 3. However, the positive effect of this program was actually much stronger in the years two and three. Frequent discussion between parents and students on college planning reduced the odds of departure during the first two years in college.

The positive effect of grants to reduce the odds of departure was only significant in the first year. Grants were associated with lowering the attrition by 44% in the first year, rather than 15% in Table 3. Work-study students lowered their attrition rate by 47% in the second year. Interestingly, female students were 23% less likely to drop out in the first year of college than male students. However, they were 52% more likely to depart than their counterparts in year two.

The negative effect of later matriculation on retention was statistically significant in each year except for the second year. Late matriculation particularly increased the magnitude of its negative effect over time and exhibited its strongest impact in the fourth year. Asian students were the least likely to drop out in the first year. This is similar to previous research findings (DesJardins, Ahlburg, & McCall, 1999; Ishitani & DesJardins, 2002). Analysis results of the exponential model indicated that Hispanic and Black students were more likely to leave their institution than their counterparts. These minority students were actually most likely to depart in the year two. Hispanic students were 91% more likely to depart in the year two, while Black students were 63% more likely to drop out than Caucasian students in their second year in college.

Higher rates of attrition among first-generation students were statistically significant in each year except for year three. The highest risk period of dropout among first-generation students was the second year, followed by the fourth and first years. Students from family income less than \$19,999 were most likely to depart in the first year. They were more than five times more likely to drop out in the first year than students from family income of \$50,000 or higher. Although the magnitude of effect waned over time, the negative effect of family income between \$20,000 and \$34,999 was identified statistically significant over four years.

Students with unsure educational expectation were most vulnerable to attrition in the second year. They were 2.3 times more likely to drop out in the second year than those who had expectation of graduating from college. Students whose parents had uncertain educational expectation had the highest attrition rate in the second year.

Not surprisingly, high school ranking had significant effects on college student attrition behavior. Students from lower high school ranking quartiles were more likely to drop out of college. However, the highest risk periods of departure varied across different quartiles over time. For instance, students in the lowest or 3<sup>rd</sup> quartiles had the highest likelihood of departure in the third year, while students in the 4<sup>th</sup> quartile had the highest risk of dropout in the second year. Students in the lowest or 3<sup>rd</sup> quartiles were 8.4 and 3.5 times more likely to leave than students from the first quartile in the third year. As for attrition rates for the first and second years, students in lower high school ranking quartiles were more likely to depart than students in the first quartile.

In summary, after controlling for various student characteristics and high school ranking, a few of the high school programs measured in the study presented their effects on college attrition. The results of the exponential model identified that two positive factors, preparation courses for admission tests and teachers contacting parents for college selection, were effective to reduce attrition rates. Furthermore, the findings from the period-specific model indicated the time-varying nature of these factors. For instance, the positive influence of college preparation courses was most effective to reduce the dropout rate in the second and third years, while students whose parents were contacted by high school teachers were least likely to depart in the year four.

Receiving assistance in financial aid application indeed showed its negative effect on retention in the exponential model. This may imply that students needed assistance in financial aid application because of indecisiveness in their college decisions or their poor college planning. Even after matriculation, a lack of confidence in their decision to attend college might have impacted their retention behavior. However, the negative effect of this

particular program was only applicable to the second year retention. Thus, commitment to college education among students who received assistance in financial aid in high school may need to be enhanced early to reduce their odds of departure in the second year.

As attested earlier, the importance of parental involvement in the college decision-making process by Hossler, Schmit, and Vesper (1999), students who frequently discussed college planning with their parents were also more likely to persist in college. This factor presented its positive role particularly reducing the likelihood of departure in the years one and two. For years three and four, the effect of this factor to reduce attrition rates diminished.

## **Conclusion**

High school personnel strive to assist students in their college planning through various programs. Some of these programs are mainly designed to increase student's odds to matriculate postsecondary institutions. The study herein did not examine how the programs increased or decreased the likelihood of matriculation, but investigated if the programs might be associated with college retention behavior.

After controlling for student background characteristics, some program indeed presented period-specific effects on college retention. However, the compelling question is if participation in certain high school programs improves the odds of students to persist in college, or students with stronger commitment to persist in college are more likely to participate in certain programs in high school. For instance, students who took ACT/SAT preparation courses were more likely to persist in the second and third years in Table 4.

Students took the preparation courses, because they already had strong commitment to college education and hoped to raise their test scores so that they would be able to attend more desirable postsecondary institutions of their choices. Since it is difficult to assess varying strength of commitment to higher education among students with the same educational expectation of graduating from college, participation status in certain high school programs becomes valuable information to examine students' college retention behavior in depth.

Using the parameter estimates from this study, the analyst is able to compute longitudinal attrition risks based on various student characteristics. Let us assume Students A and B, who are both male, Hispanic first-generation students, from families with annual income of \$32,000, have the same educational expectation of graduating from college and graduated from high school in the 2<sup>nd</sup> high school ranking quartile. However, Student B and his parents often talked about going to college, and he participated in college admission preparation courses and received assistance in college admission essay, while Student A and his parents did not discuss about going to college, and he did not participated in any programs that Student B participated in. Figure 1 illustrates their college retention behaviors over time. Although a pattern of risk curves is similar between Students A and B, clearly Student B is less likely to depart than Student A over time.

As for application of the findings of this study, personnel in high school can compute overall risks of college attrition behaviors of their students using parameters presented in Table 3. High school guidance counselors may be able to advise their students more effectively if they are aware of predicted future risks of departure from

college for their students. This may be particularly beneficial to first-generation students, since their parents are not able to share their own experiences of hardship entailed in graduating from college with their children. College admission counselors can also recommend intensity of institutional interventions for individual in-coming freshman students based on departure risks estimated from Table 3. Using parameters from Table 4, academic advisors can assess period-specific departure risks of their students and adjust their intervention intensity accordingly.



**Table 1: Descriptive Statistics of the Study Sample**

Sample Size: n = 4,445		
Variable	Label	Percent.
Cohort	1992	96.2% *
	1993/1994	3.8%
Gender	Male	46.5% *
	Female	53.5%
Race	Asian	9.4%
	Hispanic	7.7%
	Black	8.0%
	Caucasian	72.9% *
	Native American	2.0%
Parent's Education	First-generation	40.2%
	One parent with BA	26.2%
	Both college-educated parents	33.6% *
Income	0 - \$19,999	14.1%
	\$20,000-\$34,999	24.7%
	\$35,000-\$49,999	23.1%
	\$50,000 or higher	38.2% *
Educational Expectation	Unsure	4.6%
	Won't graduate from college	4.2%
	Graduate from college	39.7% *
	Finish graduate school	51.5%
Parent's Highest Educational Expectation	Unsure	6.5%
	Won't graduate from college	3.4%
	Graduate from college	41.2% *
	Finish graduate school	48.9%
High School Ranking	1st quartile	38.7% *
	2nd quartile	26.1%
	3rd quartile	18.1%
	4th quartile	10.9%
	Lowest quartile	6.2%
High School Programs	Received special ACT/SAT prep. course	21.1%
	Received assistance in financial aid application	41.8%
	Received assistance in writing college admission essays	37.3%
	Parents are contacted for college selection	42.2%
	Teachers contacted colleges for students	66.2%
Parental Involvement	Often talked about college education	52.1%
First-Yr. Financial Aid	Grant	52.9%
	Loan	36.2%
	Work-study	15.4%

**Table 2: Enrollment Status of the Study Sample**

Departure Type	Count	Percent.	Average Time to Event
Dropout	862	19.4%	1.9 yrs.
Transfer	1,109	24.9%	1.5 yrs.
Graduate	2,251	50.6%	4.2 yrs.
(Still Enrolled after Stopout)	223	5.1%	

**Table 3: Parameters Estimates of the Exponential Model**

Variable	Label	Coeff.	p	Prob.
Constant		-3.96	**	
Cohort	1993/1994	0.63	**	0.89
Gender	Female	-0.07		-0.07
Race	Asian	-0.39	*	-0.32
	Hispanic	0.28	*	0.32
	Black	0.28	**	0.32
	Native American	0.35	*	0.42
Parent's Education	First-generation	0.60	**	0.82
	One parent with BA	0.34	**	0.40
Income	0 - \$19,999	0.82	**	1.27
	\$20,000-\$34,999	0.75	**	1.11
	\$35,000-\$49,999	0.31	**	0.36
Educational Expectation	Unsure	0.26		0.29
	Won't graduate from college	0.81	**	1.25
	Finish graduate school	-0.09		-0.09
Parent's Highest Educational Expectation	Unsure	0.12		0.13
	Won't graduate from college	0.28		0.32
	Finish graduate school	0.05		0.06
High School Ranking	2nd quartile	0.55	**	0.73
	3rd quartile	1.05	**	1.85
	4th quartile	1.25	**	2.51
	Lowest quartile	1.32	**	2.75
High School Programs	Special ACT/SAT prep. course	-0.41	**	-0.33
	Assistance in financial aid application	0.19	**	0.21
	Assistance in writing college admission essays	-0.11		-0.10
	Parents are contacted for college selection	-0.15	*	-0.14
	Contact college for students	-0.03		-0.03
Parental Involvement	Often talked about college education	-0.25	**	-0.22
First-Yr. Financial Aid	Grant	-0.17	*	-0.15
	Loan	-0.05		-0.05
	Work-study	-0.45	**	-0.36

\*\* =  $p < 0.01$ , \* =  $p < 0.05$

Log likelihood (starting values): -3286.2413

Log likelihood (final estimates): -2930.5976

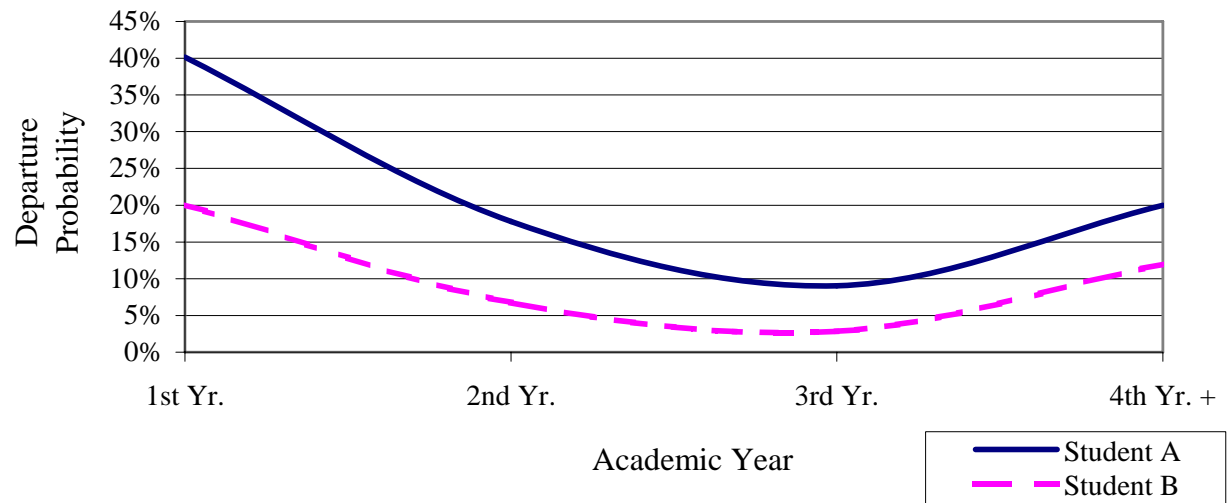
**Table 4: Parameter Estimates of the Period-Specific Model**

Variable	Label	First Year			Second Year			Third Year			Fourth Year +		
		Coeff.	p	Prob.	Coeff.	p	Prob.	Coeff.	p	Prob.	Coeff.	p	Prob.
Constant		-3.98 **			-5.18 **			-4.46 **			-3.14 **		
Cohort	1993/1994	0.42 *	0.52		0.43	0.54		0.82 **	1.28		1.28 **	2.61	
Gender	Female	-0.26 *	-0.23		0.42 **	0.52		-0.05	-0.05		-0.28 *	-0.25	
Race	Asian	-0.96 *	-0.62		-0.02	-0.02		-0.28	-0.24		-0.33	-0.28	
	Hispanic	0.40 *	0.50		0.65 **	0.91		-0.19	-0.17		-0.23	-0.20	
	Black	-0.04	-0.04		0.49 *	0.63		0.32	0.38		0.27	0.32	
	Native American	-0.17	-0.15		0.74 *	1.10		0.23	0.26		0.75 *	1.12	
Parent's Education	First-generation	0.48 *	0.62		0.95 **	1.58		0.40	0.50		0.56 **	0.74	
	One parent with BA	0.37	0.45		0.33	0.39		0.32	0.38		0.35	0.42	
Income	0 - \$19,999	1.83 **	5.21		0.37	0.44		0.38	0.47		0.48 *	0.62	
	\$20,000-\$34,999	1.32 **	2.76		0.67 **	0.96		0.64 *	0.89		0.40 *	0.49	
	\$35,000-\$49,999	0.70 **	1.02		0.30	0.35		0.59 *	0.80		-0.14	-0.13	
Educational Expectation	Unsure	0.20	0.22		1.18 **	2.25		-0.73	-0.52		-0.55	-0.42	
	Won't graduate from college	0.84 **	1.32		0.78 **	1.18		0.96 **	1.62		0.75 **	1.12	
	Finish graduate school	0.00	0.00		-0.20	-0.18		-0.08	-0.07		-0.18	-0.17	
Parent's Highest Educational Expectation	Unsure	-0.03	-0.03		0.83 **	1.30		-0.79	-0.55		-0.15	-0.14	
	Won't graduate from college	-0.19	-0.17		0.74 **	1.10		0.77 *	1.15		0.04	0.04	
	Finish graduate school	-0.20	-0.18		0.06	0.06		0.01	0.01		0.42 *	0.52	
High School Ranking	2nd quartile	0.72 **	1.04		0.82 **	1.28		0.82 *	1.28		0.07	0.07	
	3rd quartile	1.23 **	2.44		1.17 **	2.23		1.50 **	3.48		0.63 **	0.87	
	4th quartile	1.37 **	2.95		1.38 **	2.99		1.30 **	2.66		1.03 **	1.80	
	Lowest quartile	1.70 **	4.45		1.57 **	3.79		2.24 **	8.36		0.29	0.33	
High School Programs	Special ACT/SAT prep. course	-0.31	-0.27		-0.55 **	-0.42		-0.79 **	-0.55		-0.16	-0.15	
	Assistance in financial aid application	0.01	0.01		0.64 **	0.89		0.05	0.05		0.09	0.10	
	Assistance in writing college admission essays	-0.22	-0.19		-0.11	-0.11		-0.36	-0.30		0.05	0.05	
	Parents are contacted for college selection	-0.13	-0.12		-0.01	-0.01		-0.06	-0.05		-0.35 *	-0.30	
	Contact college for students	-0.18	-0.17		0.10	0.10		0.28	0.32		-0.10	-0.09	
Parental Involvement	Often talked about college education	-0.32 *	-0.28		-0.42 **	-0.34		0.00	0.00		-0.14	-0.13	
First-Yr. Financial Aid	Grant	-0.57 **	-0.44		0.28	0.32		-0.05	-0.05		-0.16	-0.15	
	Loan	-0.12	-0.11		-0.13	-0.12		-0.20	-0.18		0.12	0.13	
	Work-study	-0.40	-0.33		-0.63 **	-0.47		-0.44	-0.36		-0.28	-0.24	

\*\* = p &lt; 0.01, \* = p &lt; 0.05

Log likelihood (starting values): -3286.2413

Log likelihood (final estimates): -2787.4592

**Figure 1: Predicted Departure Risks for Students A and B**

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