



## Factors Related to Persistence of Freshmen, Freshman Transfers, and Nonfreshman Transfer Students

Yelena Perkhounkova  
Research Associate  
ACT Inc.

Gerald W. McLaughlin  
Director of the Office of Institutional  
Planning and Research  
DePaul University

Julie P. Noble  
Principal Research Associate  
ACT Inc.

### Abstract

This study examined second-term and second-year retention of freshmen ( $n=6,054$ ) and nonfreshman transfer students ( $n=2,733$ ) from DePaul University, a large, urban, private institution. The predictor variables included both achievement and noncognitive measures collected at DePaul and on the ACT Assessment. Two questions formed the basis for this research: Do variables that predict retention for freshmen (transfer and first time) maintain their validity for predicting retention for nonfreshman transfer students? Do the noncognitive data collected on the ACT Assessment enhance the institution's ability to predict retention? To identify variables that predict second-term and second-year retention, logistic regression models were developed separately for freshmen and nonfreshman transfer students. The results supported the use of both institutional and ACT Assessment achievement and noncognitive measures to predict retention. Moreover, variables that predicted retention for freshmen generally predicted retention for transfer students.

### Introduction

While student enrollment in college continues to rise, as a nation we have also observed substantial numbers of students not completing their college education. According to the U.S. Department of Education (2005), 54% of students who entered college between September 1996 and August 1997 graduated within six years. Substantially fewer African American and Hispanic

students (38% and 45%, respectively) completed a bachelor's degree within this time period.

Extensive research exists on the factors related to college success and persistence of traditional-aged students. Much of the literature focuses on students' pre-college characteristics, in many cases to identify students early in their college careers who are at risk of dropping out. Academic achievement, typically measured by college admission tests (ACT or SAT) or high school GPA or rank, is one of these characteristics (ACT, 1998; Hezlett, Kuncel, Vey, Ahart, Ones, Campbell, and Camara, 2001; Noble and Sawyer, 2002). Other factors contributing to persistence of traditional freshmen include student intent in attending college, external support and demands, commitment to the particular institution, and student/institutional fit (Bean, 1989; Cabrera, Castaneda, Nora, and Hengstler, 1992; Tinto, 1993).

Research on transfer and nontraditional-aged students also emphasizes the importance of prior high school achievement and degree aspirations for college success and persistence (Adelman, 1999; Cabrera, La Nasa, and Burkum, 2001; Choy, 2002; Noble, 2000). However, research shows that there are unique factors that affect their likely success and persistence. These factors include failure to maintain continuous enrollment; withdrawing, dropping, or not completing courses; completing an AA degree before transferring; starting at a community college; and external demands such as employment and family (Adelman, 1999; Cabrera et al., 2001; Choy, 2002; Graham and Hughes, 1994; Piland, 1995; Tinto, 1993).

The work by Bradburn and Carroll (2002), and Terenzini, Cabrera, and Bernal (2001) have confirmed the relevance of both the risk of being a non-traditional student and the limitation of coming from less-advantaged economic circumstances.

This study extends our current knowledge by examining second-term and second-year retention of freshmen (transfer and non-transfer) and nonfreshman transfer students at DePaul University, a large, urban, private institution with more than 20,000 students who reflect a broad diversity of ethnic, religious, geographic and economic backgrounds. DePaul, which places the highest priority on teaching and learning, serves students who vary in age, ability, experience, and career interests. Slightly more than 20 percent of students are part-time; about 50 percent are 24 years of age or older. The student population includes a considerable proportion of undergraduate transfer students (one-third of entering undergraduates are transfers).

Previous research at DePaul University has suggested that transfer students might be at a higher risk of dropping out than are other students. The university was also concerned that higher-ability students might be transferring to other institutions at a higher rate than other students (Filkins, 2004). To explore these issues further, in order to improve retention of entering students, the institution elected to pursue its investigation with ACT research staff. A number of reasons lay behind this decision: The first reason was the availability of data. While DePaul maintains an archive of academic data, these data do not contain information on specific items available through the Student Profile Section, a noncognitive component of the ACT Assessment, which is usually completed at the time of ACT registration. Unpublished institution-specific research, as well as published studies by outside researchers (noted earlier), have linked persistence to some of the characteristics measured by these items, such as anticipated work hours, family situation, and high school experiences.

The second reason was political. If the studies were done locally, the results might have been perceived as the staff's perspective, who wanted the results to show the need and the ability to identify students who would benefit from intervention. It was thought that the results would be more compelling and persuasive if an external agent, such as ACT, were involved. ACT staff members' expertise in conducting statistical analyses and their willingness to cooperate with institutional researchers also played a role in the decision to combine efforts for this project's completion.

Two questions formed the basis for this research: Do variables that predict retention for freshmen (transfer and first time) maintain their validity for predicting retention for nonfreshman transfer students? Do the noncognitive data collected on the ACT Assessment enhance the

institution's ability to predict retention? Hence, the main objective of this research was to compare second-term and second-year retention for two groups of students: freshmen and nonfreshman transfer students. In addition, within the freshman group we contrasted retention of first-time freshmen with retention of students who transferred as freshmen. We used logistic regression analysis to model the relationship between retention and the predictor variables, which included both achievement and noncognitive measures collected at DePaul University and on the ACT Assessment.

### Data

Student records for new full-time freshmen from Fall 1999, 2001 and 2002, and new transfer students (freshmen and nonfreshmen) from Fall 1997 to Fall 2001 were matched against eight years of ACT data (1993-1994 to 2000-2001) for a combined sample of 8,787 students. These aggregated records included ACT Assessment results, self-reported student profile information, and DePaul University information such as placement tests results, college course grades, and enrollment data. Of these students, 593 did not re-enroll the second term and 1,004 did not re-enroll the following fall. Students who enrolled in Fall 2002 ( $n = 2,528$ ) were not included in the models for second-year retention because no information was available about their second-year enrollment at the time of data collection. Two non-overlapping student populations were analyzed separately: full-time freshmen (6,054 records, including students transferring with freshman status) and nonfreshman transfer students (2,733 records). Of full-time freshmen, 351 did not re-enroll in the second term and 676 did not re-enroll in the first fall term following their first enrollment term. Of nonfreshman transfer students, 242 and 328 did not re-enroll in the second term and the first fall term following their first enrollment term, respectively.

### Method

For both populations (freshmen (FS) and nonfreshman transfer students (TS)), separate regression models were developed for the two criterion variables of interest: second-term retention (enrollment in the second term) and second-year retention (enrollment in the first fall term following the first-term enrollment). The following potential predictors were examined:

1. ACT Composite score
2. ACT Mathematics score
3. High school GPA
4. Number of extracurricular activities in high school and number planned in college
5. Nine accomplishment scores
6. Sureness of college major
7. Highest level of education planned

8. Family income
9. First language at home (English or other)
10. Planned enrollment (full-time or part-time)
11. Intent to apply for financial aid
12. Planned work hours in college
13. Number of siblings at home
14. Preferred type of college (4-year private vs. other)
15. Residence plans (residence hall, with relatives, or other arrangement)
16. Planned major/campus
17. Local placement tests (Computation, Basic Algebra, Math1, Math2, Math3, and Writing)

These variables were selected based on previous research (e.g., Adelman, 1999; Choy, 2002; Hezlett, et al., 2001; and Tinto, 1993) and on local concerns, such as residence plans, that might bear on student persistence.

Information on items 3 through 16 was collected on the Student Profile Section of the ACT Assessment. For the freshman population, a variable indicating whether the student had transferred as a freshman was included in the analysis. Retention was coded 0 (did not enroll) and 1 (enrolled).

In the first stage of the analysis, Biserial correlation coefficients were computed between each predictor variable and the dichotomous criterion variables (second-term and second-year retention) for the two populations of students (FS and TS). Only variables that had a statistically significant correlation ( $p \leq .05$ ) with retention were considered for inclusion in the models.

Next, logistic regression models were developed to predict second-term and second-year retention for the FS and TS populations separately. Logistic regression is often used to model the statistical relationship between student characteristics and outcome criteria coded as 0 (failure) or 1 (success), such as retention. With these types of outcome criteria, linear regression is not appropriate.

The models predicting students' conditional probability of retention are expressed with this formula:

$$\hat{p} = \frac{1}{1 + e^{-(\text{Index})}}$$

where  $\text{Index} = a_0 + a_1x_1 + \dots + a_nx_n$ , a weighted combination of predictor variables  $x_1, \dots, x_n$ , also called the odds of retention. The regression coefficients  $a_0, a_1, \dots, a_n$  are estimated from the data. Logistic regression can be used to identify the strength of the relationship between student characteristics and retention, and can provide information to evaluate specific criteria

(i.e., cutoffs) for identifying students for intervention (Noble & Sawyer, 1997). For more on logistic regression modeling see Hosmer and Lemeshow (1989).

DePaul University uses a progressive math placement testing program comprised of several tests (Computation, Basic Algebra, Math1, Math2, and Math3). Students with an ACT Mathematics score below 22 usually take lower-level tests (Computation and Basic Algebra) and are not always required to take higher-level tests (Math1 through Math3). In contrast, students with an ACT Mathematics score of at least 22 are not required to take the Computation test and in the past were not required to take the Basic Algebra test. In practice it means that adding Computation and Basic Algebra scores to the regression model effectively truncates the sample because more mathematically-adept students are less likely to take these tests. This is why it was decided to exclude local mathematics placement test scores from the logistic regression analysis in the first stage of model development. All other candidate predictors with statistically significant correlations were entered into a stepwise logistic regression analysis to predict second-term and second-year enrollment for freshman and transfer students separately. The predictors that were statistically significant at the .05 level were included in the final models.

Eleven of the initial variables were included in the development of the models: local mathematics placement test scores, ACT Composite score, high school GPA, planned residence, sureness of major, planned major/campus, the number of siblings at home, family income, and planned work hours. For the freshman model, a variable indicating transfer was also included. ACT Composite score and family income were included in all models. Table 1 (page 4) provides a description of the predictor variables included in the final models.

In the next stage, Computation and Basic Algebra scores and predictor variables selected for the final models in the first stage were entered jointly into a stepwise logistic regression analysis. The resulting models were determined by including predictors significant at the .05 level. Similarly, stepwise logistic regression analysis was performed by adding Math1 alone, and then adding Math1, Math2, and Math3 to the final models identified in the first stage. As a result, separate analyses were performed on samples differing somewhat in mathematics ability (as well as numbers of matched records).

## Results

Means and sample sizes for all students and second-year returning and non-returning students, provided in the Appendix, illustrate the effects of selection based on ACT Mathematics test score. As expected, for both freshmen (FS) and nonfreshman transfer students (TS), mean high school GPA, ACT Composite score, ACT

**Table 1**  
**Description of Predictor Variables Included in the Regression Models**

Variable	Description	Coding scheme
<b>ACT Assessment</b>		
1. ACT Composite	Average of ACT test scores (English, Mathematics, Reading, and Science).	1 to 36
2. High school GPA	Average of course grades in 30 core courses in English, mathematics, natural sciences, and social sciences (self-reported)	0.0 to 4.0
3. Family income	Estimated, pre-tax parental income range	0 to 9: \$18,000 or less = 0; incremental increasing to \$100,000 or more = 9
4. Planned work hours in college	Hours per week planned to work during first year of college	None = 1; 1-10 = 2; 11-20 = 3; 21-30 = 4; 31 or more = 5
5. Number of siblings at home	Number of brothers and sisters under 21 years of age	0 to 9 or more
6. Sureness of college major	How sure about choice of college major	Not sure = 1; Fairly sure = 2; Very sure = 3
7. Planned residence	Dummy variables indicating plans to live in a residence to live with relatives, or other arrangement (off-campus or fraternity/sorority)	1) With relatives = 1; residence hall or other arrangement = 0 2) Other arrangement = 1; residence hall or with relatives = 0
8. Planned major/campus	Dummy variables indicating plans for major/campus: Campus I (communications, education, sciences, human services, art, and philosophy) Campus II (commerce and computer science) Campus III (visual and performing arts)	1) Campus II = 1; Campus I or III = 0 2) Campus III = 1; Campus I or II = 0
<b>DePaul University</b>		
9. Basic Algebra	Local math placement test	1 to 15
10. Math1	Higher-level local math placement test	1 to 10
11. Freshman transfer indicator	A dummy variable indicating transfer status of freshmen	Nontransfer = 0; transfer = 1

Mathematics score, and local placement test scores were lower for students who took both the Computation and Basic Algebra placement tests than for students who took the Math1 placement test. The difference between the number of all students and the numbers of students returning and not-returning second year (FS and TS combined) is exactly the number of students for whom second-year enrollment information was not available at the time of data collection. Test score means and proportions for other variables are reported in Table 2 for each model. Correlations between criterion variables and predictor variables are shown in Table 3. Correlations among the predictor variables are available from the first author.

Results for the final logistic regression models are shown in Table 4 (page 6). The models for predicting second-term and second-year retention for FS and TS were statistically significant ( $p < .0001$  for all but one model). The number of students is reported for each model in parentheses underneath the column heading.

Only students who had no missing data for any of the variables in the model were included. As seen from the table, there was a loss of data over time. In addition, a substantial loss of data after adding local placement variables resulted in a considerable decrease in the number of statistically significant predictors. For some models no predictor variable was statistically significant. For this reason, model results after adding local tests are reported only for second-term retention for the freshman population.

The table includes models for predicting second-term and second-year retention separately for FS and TS populations. The regression coefficients describe the strength and direction of the relationship between each predictor variable and the retention variables. Most regression coefficients in the table were statistically significant at the .05 level except for some of the dummy (design) variables that had to be included in the model as a set (e.g., planned residence), and for ACT Composite score or family income for some of the models.



**Table 2**  
Means and Proportions Based on Samples Used for Each Model

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Means and Proportions Based on Samples Used for Each Model

Variable	Second-term retention				Second-year retention	
	Freshmen (FS)			Nonfreshman transfer (TS)	Freshman (FS)	Nonfreshman transfer (TS)
	No local tests (n=4760)	Comp., Basic Algebra added (n=2290)	Math1 added (n=3144)	No local tests (n=2188)	No local tests (n=3190)	No local tests (n=1808)
<b>Mean</b>						
ACT Composite (1-36)	23.1	22.2	23	20.9	23.2	20.8
High school GPA	3.2	--	--	--	3.2	3
Family income (0-9)	5.3	5	5.2	4.9	5.2	4.9
Planned work hours in college (1-5)	--	--	--	--	2.5	--
Number of siblings at home (1-9)	--	--	--	--	1.3	1.3
Sureness of college major (1-3)	2.1	--	--	--	--	2.2
Basic Algebra	--	5.1	--	--	--	--
Math 1	--	--	4.8	--	--	--
<b>Proportion</b>						
Planned residence:						
Residence hall	0.62	--	--	0.55	--	--
At home with relatives	0.20	--	--	0.28	--	--
Other arrangement	0.18	--	--	0.17	--	--
Planned major/campus:						
Campus I, communications, education, etc.	0.54	--	--	--	0.55	--
Campus II, commerce & computer science	0.37	--	--	--	0.37	--
Campus III, visual & performing arts	0.08	--	--	--	0.08	--
Freshmen transfer indicator:						
Transfer as freshman	0.14	0.14	0.13	--	0.14	--
Nontransfer freshman	0.86	0.86	0.87	--	0.86	--

**Table 3**  
Correlations of Second-Term and Second-Year Retention with Predictor Variables

	Second-term retention				Second-year retention	
	Freshmen (FS)			Nonfreshman transfer (TS)	Freshman (FS)	Nonfreshman transfer (TS)
	No local tests (n=4760)	Comp., Basic Algebra added (n=2290)	Math1 added (n=3144)	No local tests (n=2188)	No local tests (n=3190)	No local tests (n=1808)
<b>ACT predictor variables</b>						
ACT Composite (1-36)	.03	.01	.02	-.00	-.00	-.07*
High school GPA	.06*	--	--	--	.09*	.04
Family income (0-9)	.03	.02	.01	.03	.02	-.02
Planned work hours in college (1-5)	--	--	--	--	-.06*	--
Number of siblings at home (1-9)	--	--	--	--	-.04*	-.05*
Sureness of college major (1-3)	-.03*	--	--	--	--	-.05*
Planned residence						
With relatives (1) vs. Residence hall (0)	-.00	--	--	.06*	--	--
Other (1) vs. Residence hall (0)	-.04*	--	--	-.02	--	--
Planned major/campus						
Campus II (1) vs. Campus I (0)	.03*	--	--	--	.04*	--
Campus III (1) vs. Campus I (0)	-.02	--	--	--	-.07*	--
<b>DePaul University predictor variables</b>						
Basic Algebra (1-15)	--	.07*	--	--	--	--
Math1 (1-10)	--	--	.06*	--	--	--
Freshman transfer indicator (1=transfer as freshman, 0=nontransfer freshman)	-.09*	-.07*	-.09*	--	-.07*	--

Note: Correlation coefficients marked with an asterisk were statistically significant (p<.05).

**Table 4**  
**Logistic Regression Coefficients and Odds Ratios for Predicting Second-Term and Second-Year Retention**

	Second-term retention								Second-year retention			
	Freshmen (FS)				Nonfreshman transfer (TS)				Freshman (FS)		Nonfreshman transfer (TS)	
	No local tests (n=4760)		Comp., Basic Algebra added (n=2290)		Math1 added (n=3144)		No local tests (n=2188)		No local tests (n=3190)		No local tests (n=1808)	
	Regression coefficient	Odds ratio	Regression coefficient	Odds ratio	Regression coefficient	Odds ratio	Regression coefficient	Odds ratio	Regression coefficient	Odds ratio	Regression coefficient	Odds ratio
Intercept	2.42*		3.14*		3.02*		2.00*		1.36*		2.88*	
ACT predictor variables												
ACT Composite (1-36)	-.01	--	-.05	--	-.02	--	-.00	--	-.03*	.97	-.08*	.92
High school GPA	.33*	1.39	--	--	--	--	--	--	.50*	1.65	.43*	1.54
Family income (0-9)	.03	--	.03	--	.01	--	.06*	1.06	.02	--	.01	--
Planned work hours in college (1-5)	--	--	--	--	--	--	--	--	-.17*	.84	--	--
Number of siblings at home (1-9)	--	--	--	--	--	--	--	--	-.10*	.90	-.13*	.88
Sureness of college major (1-3)	-.20*	.82	--	--	--	--	--	--	--	--	-.24*	.79
Planned residence												
With relatives (1) vs. Residence hall (0)	-.11	--	--	--	--	--	.59*	1.80	--	--	--	--
Other (1) vs. Residence hall (0)	-.39*	.68	--	--	--	--	-.02	--	--	--	--	--
Planned major/campus												
Campus II (1) vs. Campus I (0)	.31*	1.36	--	--	--	--	--	--	.17	--	--	--
Campus III (1) vs. Campus I (0)	-.21	--	--	--	--	--	--	--	-.54*	.58	--	--
DePaul University predictor variables												
Basic Algebra (1-15)	--	--	.15*	1.16	--	--	--	--	--	--	--	--
Math1 (1-10)	--	--	--	--	.11*	1.17	--	--	--	--	--	--
Freshman transfer indicator (1=transfer as freshman, 0=nontransfer freshman)	-.82*	.44	-.75*	.47	-.87*	.42	--	--	-.34*	.71	--	--
Wald Chi-square	64.99 (<.0001)		25.89 (<.0001)		31.80 (<.0001)		11.33 (.0231)		75.87 (<.0001)		38.57 (<.0001)	
Goodman-Kruskal Gamma	.30		.26		.25		.16		.24		.25	
Maximum accuracy rate	--		--		--		--		.84		.86	

Note: Regression weights marked with an asterisk were statistically significant ( $p < .05$ ). No appropriate maximum accuracy rate could be computed for second-term retention models. Odds ratios are reported for statistically significant coefficients.

### Second-Term Retention

When local tests were excluded from the models, statistically significant predictors of second-term retention for FS included high school GPA, planned residence, sureness of college major, planned major/campus and whether the freshman was a transfer student. Students planning to live in residence halls had a higher probability of persisting in college than students choosing other arrangements, although the estimated coefficient for the "with relatives" vs. "residence hall" contrast was not statistically significant. Sureness in major was negatively related to retention. Non-transfer freshmen had a greater probability of reenrolling in the second term than students who transferred as freshmen, and Campus II students (commerce and computer science majors) had a higher probability of persisting than Campus I students (communications, education, sciences, human services, art, and philosophy majors).

Adding Computation and Basic Algebra (local placement tests) to the initial model nearly halved the

sample size. For the remaining students, only Basic Algebra and the freshman transfer indicator were significant predictors. Adding Math1 alone resulted in the same model as adding Math1, Math2, and Math3. In either case, Math1 and the freshman transfer indicator were the only significant predictors. It is unclear whether this was the effect of truncating the sample based on students' ACT Mathematics score or the addition of the mathematics placement tests to the model.

Planned residence and family income were statistically significant predictors of second-term retention for TS. However, for this population, students planning to live with relatives had a higher probability of persisting in college than students planning to live in a residence hall. Family income was also positively related to retention. In contrast to FS, high school GPA was not a significant predictor of second-term retention for TS.

### Second-Year Retention

Statistically significant predictors of second-year

retention for FS included ACT Composite, high school GPA, number of hours planned to work while in college, number of siblings, planned major/campus, and transfer status. The more hours freshmen planned to work, the smaller their probability of reenrolling the following year, and freshmen at Campus I (communications, education, sciences, human services, art, and philosophy) had a greater chance of reenrolling than did students at Campus III (visual and performing arts). The ACT Composite, high school GPA, sureness of college major, and number of siblings were statistically significant predictors of second-year retention for nonfreshman transfer students.

Maximum accuracy rates for the models predicting second-year retention were .84 and .86 for FS and TS, respectively. Maximum accuracy rates correspond to a probability of retention of .5 and reflect the maximum proportion of correct classifications (enroll, not enroll) one might expect, using a given model. No appropriate maximum accuracy rates could be determined for models predicting second-term retention because the probability functions did not cross .5.

#### Interpretation of Logistic Regression Coefficients

In logistic regression, direct interpretation of an individual regression coefficient can be problematic. Regression coefficients in logistic regression represent the change in the logit transformation (log-odds) of the retention variable for a unit change in the predictor variable, given the other predictor variables in the model. For example, for second-term retention of TS, the coefficient for income was .06. For a unit change in income (e.g., 1 to 2), the logit transformation of the retention variable increased by .06. Coefficients can also be stated in terms of odds, or the exponent of the coefficient ( $e^{b(\text{income})}$ ), in this case 1.06. This indicates that a unit change in income increases the odds of retention by a factor of 1.06 (odds ratio), or a unit change in income increases the odds of retention by 6%. Similarly, planning to live with relatives rather than in a residence hall increased the odds of retention for TS by 1.8, or 80%.

An easier way to interpret logistic regression coefficients is to calculate probabilities of retention for various values of a predictor variable of interest, holding all other variables constant. For example, using the logistic regression model for second-term retention of FS (no local tests), a predicted probability could be calculated for specific values of high school GPA, holding all other variables constant at the mean or some other value. Figure 1 below shows the distributions of probabilities of second-term retention across different values of high school GPA for three different types of college residence (residence hall, with relatives, and other arrangement). The graph includes three curves, one for each type of college residence. The probability-of-retention curve for

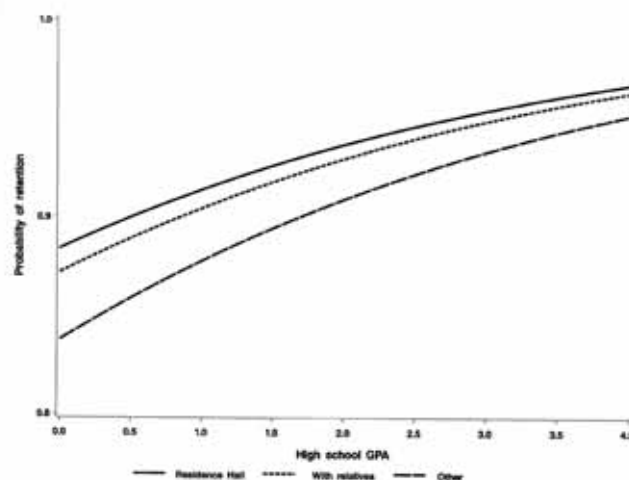
students planning to live in the residence hall is the highest among the three curves. It is significantly higher than the lowest curve that shows the probability of retention for students who planned to reside off-campus (in own or rental home) or in a fraternity/sorority.

#### Discussion

The answer to both research questions was “yes.” Generally, the variables that predicted retention for freshmen maintained their validity for predicting retention for transfer students. Moreover, the noncognitive variables collected on the ACT Assessment were statistically significant predictors of retention.

The results supported the importance of academic achievement for both freshmen and nonfreshman transfer students, with high school GPA being positively related to retention for all but nonfreshman transfer students for the second term. Family income was positively related to second-term retention of nonfreshman transfer students. The traditional risk factors of coming from large families and planning to work more hours were negatively related to retention. However, the intent to seek financial aid was not significant at the bivariate level, perhaps because a large proportion of students at DePaul seek financial aid. Scores on local mathematics placement tests were positively related to retention.

**Figure 1**  
Probability of Second-Term Retention for Nontransfer Freshmen at Campus I for Different Types of College Residence (Fixed Values of ACT Composite Score, Sureness of College Major, and Income)



However, because these tests are taken based on prior course work and ACT test scores, using them resulted in restriction of range, thereby inhibiting our ability to predict retention.

One of the most negative components of the freshman

model was being a transfer freshman. This outcome was consistent with earlier findings regarding the higher rate of dropping out for transfer students at DePaul. ACT scores were negatively related to second-year retention. This outcome, coupled with the negative effect of sureness of major, supports a local belief that very capable students at DePaul tend to transfer to other institutions after the first year. The results have encouraged an extension of this inquiry into other risk factors and the role of on-campus employment.

Two variables were included in all models without consideration for statistical significance: ACT Composite score and family income. Because ACT scores are routinely collected and could have valuable interactions with other measures, they were kept in the models despite their collinearity with high school GPA, which reduced their unique statistical contribution. Moreover, a substantial proportion of students enrolled at DePaul University come from lower socioeconomic backgrounds. As a private institution, DePaul can intervene financially with students who are at risk of dropping out for financial reasons. In addition, prior research (e.g. Cabrera et al., 2001) shows socioeconomic status (SES) to be an important factor in student persistence. We statistically controlled for SES by including family income in all models.

This study advanced our understanding of factors related to student success in college. It justified considering both academic and demographic characteristics in order to understand better the factors that place students at risk of leaving college prematurely. It also reinforced the value of sharing research and other professional activities between organizations that have similar concerns about the success of students.

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**Appendix**  
**Means and Sample Sizes for All Students, Second-Year Returning and Non-Returning Students**

Variable	All Students							
	Freshmen				Nonfreshman transfer			
	All	Have Comp., Basic Algebra scores	Have Math 1 scores	Have Math 1-Math 3 scores	All	Have Comp., Basic Algebra scores	Have Math 1 scores	Have Math 1-Math 3 scores
High School GPA	3.2 (5559)	3.0 (1454)	3.2 (3100)	3.3 (2309)	3.0 (2583)	2.9 (1392)	2.9 (1514)	3.0 (1142)
ACT Composite	23.0 (6050)	20.4 (1620)	22.9 (3699)	24.0 (2472)	20.9 (2731)	20.6 (1471)	20.9 (1595)	21.2 (1202)
ACT Mathematics	22.5 (6052)	18.9 (1620)	22.5 (3700)	24.2 (2473)	20.6 (2731)	20.1 (1471)	20.6 (1595)	21.1 (1202)
Computation	8.6 (1642)	8.6 (1621)	8.8 (1447)	9.8 (412)	10.2 (1493)	10.2 (1471)	10.3 (1361)	10.6 (1001)
Basic Algebra	6.0 (2760)	5.0 (1621)	6.2 (2532)	7.2 (1392)	6.6 (1479)	6.6 (1471)	6.7 (1350)	6.9 (999)
Math 1	4.7 (3701)	3.3 (1434)	4.7 (3701)	5.5 (2473)	4.6 (1596)	4.6 (1344)	4.6 (1596)	5.1 (1203)
Math 2	6.0 (3362)	4.0 (1056)	6.2 (3196)	6.9 (2473)	5.3 (1594)	5.1 (1338)	5.4 (1513)	6.0 (1203)
Math 3	3.5 (2540)	2.7 (432)	3.5 (2488)	3.5 (2473)	2.9 (1273)	2.9 (1056)	3.0 (1228)	3.0 (1203)

Variable	Students Returning Second-Year							
	Freshmen				Nonfreshman transfer			
	All	Have Comp., Basic Algebra scores	Have Math 1 scores	Have Math 1-Math 3 scores	All	Have Comp., Basic Algebra scores	Have Math 1 scores	Have Math 1-Math 3 scores
High School GPA	3.2 (3044)	3.0 (676)	3.2 (1492)	3.3 (1011)	3.0 (1874)	3.0 (1076)	3.0 (1132)	3.0 (839)
ACT Composite	23.0 (3283)	20.2 (759)	22.7 (1616)	23.9 (1068)	20.8 (1969)	20.6 (1127)	20.9 (1183)	21.1 (877)
ACT Mathematics	22.6 (3284)	18.7 (759)	22.3 (1616)	24.2 (1068)	20.5 (1969)	20.2 (1127)	20.6 (1183)	21.1 (877)
Computation	8.7 (771)	8.7 (760)	8.8 (658)	10.5 (176)	10.3 (1147)	10.4 (1127)	10.4 (1049)	10.8 (758)
Basic Algebra	5.1 (795)	5.0 (760)	5.2 (684)	6.7 (203)	6.9 (1135)	6.9 (1127)	6.9 (1039)	7.3 (756)
Math 1	4.7 (1617)	3.3 (651)	4.7 (1617)	5.6 (1068)	4.9 (1184)	4.7 (1033)	4.8 (1184)	5.3 (878)
Math 2	6.4 (1273)	4.1 (305)	6.6 (1213)	7.1 (1068)	5.4 (1165)	5.3 (1012)	5.6 (1114)	6.3 (878)
Math 3	3.7 (1099)	2.8 (188)	3.8 (1077)	3.8 (1068)	3.1 (929)	3.0 (797)	3.1 (897)	3.2 (878)

Variable	Students Not-Returning Second Year							
	Freshmen				Nonfreshman transfer			
	All	Have Comp., Basic Algebra scores	Have Math 1 scores	Have Math 1-Math 3 scores	All	Have Comp., Basic Algebra scores	Have Math 1 scores	Have Math 1-Math 3 scores
High School GPA	3.1 (608)	2.9 (136)	3.1 (282)	3.2 (188)	2.9 (305)	2.8 (144)	2.9 (143)	3.0 (101)
ACT Composite	23.1 (674)	20.8 (157)	23.0 (310)	24.5 (193)	21.4 (327)	20.9 (155)	21.7 (150)	22.5 (103)
ACT Mathematics	22.1 (675)	19.3 (157)	22.4 (311)	24.3 (194)	20.6 (327)	20.1 (155)	21.0 (150)	21.8 (103)
Computation	8.8 (158)	8.8 (157)	8.9 (141)	10.8 (37)	9.6 (155)	9.6 (155)	9.9 (129)	10.0 (87)
Basic Algebra	5.0 (163)	4.9 (157)	5.1 (147)	6.5 (43)	5.8 (155)	5.8 (155)	6.1 (129)	6.5 (87)
Math 1	4.3 (311)	3.4 (141)	4.3 (311)	5.2 (194)	4.7 (150)	4.6 (129)	4.7 (150)	5.1 (103)
Math 2	5.7 (247)	4.2 (75)	6.0 (234)	6.6 (194)	4.8 (159)	4.6 (139)	5.3 (139)	6.1 (103)
Math 3	3.2 (198)	3.2 (39)	3.3 (194)	3.3 (194)	2.7 (114)	2.6 (97)	2.8 (108)	2.9 (103)



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DePaul University  
1 East Jackson, Suite 1501  
Chicago, IL 60604-2216  
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Fax: 312/362-5918  
gmclaugh@depaul.edu

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Associate Director of Planning and  
Institutional Research  
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Fax: 202/687-3935  
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Association for Institutional Research  
222 Stone Building  
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