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Predictors of First-Year Student Retention in the Community College

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This study analyzed predictors of fall-to-spring and fall-to-fall retention for 9,200 first-time-in-college students who enrolled in a community college over a four-year period. Findings highlight the impact of developmental education programs and internet-based courses on student persistence. Additional predictors include financial aid, parents' education, the number of semester hours enrolled in and dropped during the first fall semester, and participation in the Student Support Services program.

Keywords: *student retention; persistence; community college; developmental education; first-time-in-college; remedial/developmental education; student services; student retention; online courses*

Though it costs more to recruit new students than it does to retain current students, institutions often focus on student recruitment rather than student retention (Astin, 1993; Pascarella & Terenzini, 1991; Tinto, 1993). Institutions budget for recruiters and associated expenses such as travel and recruiting materials. Recruiting is essential for getting students enrolled. But once they are enrolled, what are institutions doing to retain them? According to Tinto (1999), most institutions do not take student retention seriously. With an average attrition rate of approximately 41% from first to second year and a 34% persistence-to-degree rate, it is incumbent upon higher education institutions to focus on student success and determine predictors of student retention (ACT, 2007). According to Hossler (2005), most colleges and universities "do not conduct studies of the efficacies of retention intervention programs" (p. 7). Interventions should be tailored to each institution and then evaluated to make sure they are meeting the unique needs of the institution and its students. Using data

to predict student retention enables institutions to engage in interventions with students who bring particular characteristics and aspirations to the campus. Accordingly, this study empirically evaluated predictors of first-time-in-college (FTIC) student retention at a community college in West Texas.

Retention is important for a variety of reasons. From the institution's perspective, the retention of students is necessary for financial stability and to sustain academic programs. Public policy makers are advocating accountability, and one strong measure is student retention leading to graduation or transfer. Additionally, the federal Higher Education Act may use graduation rates as a measure of institutional effectiveness. And finally, if not most importantly, we want our students to have a positive college experience, complete their academic goals, and enter the workforce.

Understanding why students choose to leave or choose to stay is essential to those wanting to make a difference in students' lives. A number of theories exist regarding student retention. One is the student development theory (student integration model) attributed to Tinto (1993). This theory suggests that students progress through stages as they make the transition from being a FTIC student to being a mature student. These stages are influenced by academic and social integration; working together, both lead to the student's decision to remain in or to leave college. Another retention expert, John Bean (1990), is known for his psychological model of retention (student attrition model), which posits that background variables influence the way a student interacts with the college or university. Bean's theory adds environmental variables and student intention as factors that predict student retention.

In addition, Alexander Astin (1991) is well known for his input-environment-outcome model. According to Astin, outputs (degrees earned, number of graduates, etc.) must always be evaluated in terms of inputs (student ability, gender, age, major, etc). Even so, input and output data are of limited usefulness by themselves. The environment (courses, programs, facilities, faculty, peer groups, etc.) completes the model. Assessing student outcomes accurately requires input, output, and environmental data.

Each of these retention models attempts to describe the ways in which the student and the institution interact with one another. The theoretical principles convey the importance of having knowledge of student attributes that influence retention. Yet the foregoing theories are based on research regarding student retention in university settings: "Most of this research is based on traditional-age students in the residential settings of universities"

(Wild & Ebbers, 2002, p. 504). Though these retention theories may be relevant for all postsecondary students, it is important to recognize that the typical community college student possesses different characteristics than the traditional university student. For example, community college students are usually older than the average university student. "About 60 percent of adults (25 and older) who study at the undergraduate level are enrolled in two-year/community colleges" (Aslanian, 2001, p. 29). Community colleges are also more likely to enroll higher percentages of minority students than the university. According to Cohen and Brawer (1996), ease of access, low tuition, and the open-door policy have contributed to the increased numbers of minority students in community colleges. Students from ethnic minority backgrounds are more likely to enroll on a part-time basis and are more likely to be from low-income families. Community colleges encourage part-time attendance and have lower tuition than universities.

In addition, community colleges tend to enroll more underprepared students than the university. Most universities have selective admission standards that limit the enrollment of underprepared students. Because of the open-door policy, underprepared students are encouraged to enroll in a community college, where they can take advantage of developmental education, or remedial, courses:

> Ninety five percent of community colleges offer remedial education courses, most in multiple ability levels. Forty-one percent of entering community college students and 29 percent of all entering college students are underprepared in at least one of the basic skills (reading, writing, mathematics). (McCabe, 2000, p. 4)

Community college students are also more likely than university students to attend on a part-time basis:

> The rise in the number of part-time students can be attributed to many factors: a decline in eighteen-year-olds as a percentage of the total population, an increase in students combining work and study, and an increase in women attending college, to name but a few. (Cohen & Brawer, 1996, p. 43)

Finally, the education level of parents of community college students differs from that of university students: "First-generation students tend to be more concentrated in two-year colleges" (Thayer, 2000, p. 3). Thayer (2000) further notes that first-generation students tend to have lower retention rates than non-first-generation students.

Clearly, community college students have unique characteristics when compared to university students. The specific impact of these characteristics on community college retention needs to be further assessed. Consequently, the study reported in this article employs variables that differentiate community college students from university students. These variables include age, because community colleges enroll large numbers of adult and returning students; ethnicity, because the community college is the primary entry point to higher education for minorities; enrollment in developmental education, because a high proportion of students entering through the open door are not college ready; and the number of hours for which students enroll, because nearly two thirds of community college students attend on a part-time basis (Powers, 2007) and because students can enter a community college to take classes for the purpose of obtaining a 2-year transferable degree or a terminal certificate, enhancing general job skills, or for personal enrichment (Derby & Smith, 2004).

Parental education and use of financial aid were also factored into the analysis. According to Thayer (2000), students from low-income families are far less likely to earn a bachelor's degree than those from higher income families. Because many students from lower socioeconomic backgrounds attend community college, financial aid is salient to this study and was selected as a variable for assessment. Additionally, Thayer notes that first-generation students, who are more concentrated in community colleges, are less likely to persist.

Finally, enrollment in online courses was also included. In a virtual environment, relationships between faculty members and students may be different than in a traditional setting where students and faculty members interact face to face. Furthermore, the online environment makes courses more readily available to students who live complicated lives. Given that students work and have family responsibilities, the flexibility afforded through online courses is an important option. The growth in availability of online courses in recent years led to the selection of enrollment in these classes as a variable that needed to be assessed.

"Data are collected from all primary providers of postsecondary education in the country in areas including enrollments, program completions, graduation rates, faculty, staff, finances, institutional prices, and student financial aid" (National Center for Education Statistics, 2008). Though institutions collect the majority of this demographic and institutional data, many do not use them fully to make informed decisions that might affect student retention: "On most campuses, enrollment management activities

do not include a robust set of retention programs based on an analysis of campus needs and what is most likely to work on individual institutions" (Hossler, 2005, p. 7). It is prudent for institutions to determine the characteristics for student success at their particular institution. Consistent with theory, data on selected student retention variables were compiled. This study evaluated attributes of FTIC students that can be considered predictors of student success resulting in retention.

Method

This quantitative, retrospective study assessed predictors of student retention for FTIC students in community college. Student data were collected from a Texas public urban community college with an academic student population of approximately 10,000 annually. The sample comprises 4 years of data for FTIC students ($N = 9{,}200$) who first enrolled in the Fall 2001, 2002, 2003, and 2004 semesters at the community college. Two dependent (response) variables for retention were included in the analysis. For this study, student retention was operationally defined as (a) first-year fall semester to first-year spring semester retention and (b) first-year fall semester to second-year fall semester retention. As discussed earlier, independent (predictor) variables representing existing retention theories included student gender, age, and ethnicity; student completion status for developmental mathematics, reading, and writing courses; participation in Student Support Services (a selective, federally funded TRIO program for special-needs students); receipt of financial aid; enrollment in Internet courses; semester hours enrolled in the first semester; semester hours dropped in the first semester; and the education level of parents.

The sample of student data was cleaned and analyzed using Statistical Package for the Social Sciences Release 15.0. Descriptive statistics, including means, standard deviations, and percentages, were developed for the sample. Chi-square analysis was used to assess the distribution of student retention rates by academic year. Bivariate correlation coefficients were calculated to determine the association of student retention with predictor variables. Point-biserial correlation coefficients were calculated to assess the relationship of dichotomous variables with continuous variables; phi correlation coefficients were calculated to assess the relationship of dichotomous variables with dichotomous variables. Multivariate logistic regression models were prepared to predict the odds of student retention

while controlling for relevant confounders such as student demographic variables (Gelman & Hill, 2007; Moore & McCabe, 2003). For all analyses, the level of significance was .05.

For the multivariate analyses, categorical data were dummy coded. The categorical data for student ethnicity were dummy coded with four exhaustive and mutually exclusive dichotomous variables (StudentEthnicHispa, StudentEthnicWhite, StudentEthnicOther, StudentEthnicUnknown) with each variable coded 1 for "yes" and 0 for "no"; for multivariate analyses, the excluded reference category was "White." Similarly, for multivariate analyses, the categorical data for developmental courses (mathematics, writing, and reading) were each dummy coded with three exhaustive and mutually exclusive dichotomous variables (e.g., NoDevMath, PassedDevMath, FailedDevMath); for example, a student either did not take developmental mathematics (NoDevMath), took developmental mathematics and passed (PassedDevMath), or took developmental mathematics and failed (FailedDevMath). For each of the developmental courses (mathematics, writing, and reading), the reference category excluded in the multivariate analyses was "failed." Thus, in Tables 4 and 5, the multivariate analyses identify variables such as NoDevMath and PassedDevMath while the reference category FailedDevMath is excluded. In Table 1, the variable TookDevMath was the union of PassedDevMath and FailedDevMath; participation in developmental reading and writing was similarly coded.

Correlations of independent variables were reviewed to assess multicollinearity; no problems were detected. Only 5,339 students reported the education level of their mother, and 5,224 students reported the education level of their father. If a parent's education level was missing, the parent's level of college experience was coded as not having attended college. After coding the missing values for parental education level, full data were available for 8,945 students (97.2% of the sample).

Results

Student Attributes

Descriptive statistics for the sample are provided in Table 1. Students were predominately female (56%) and White (66%) with a median age of 19. The median number of semester hours enrolled was 12 for the first fall semester; 99.8% of the students enrolled in less than 20 semester hours. About two thirds of the students enrolled in developmental mathematics,

Table 1
Fall 2001-2004 First-Time-In-College Student Descriptive Statistics ($N = 9,200$)

Variable	Explanation	*N*	%	Median	*M*	*SD*
StudentSexM	Gender (male)	4,030	43.8			
StudentSexF	Gender (female)	5,163	56.1			
StudentSexUnknown	Gender (unknown)	7	0.1			
StudentStartAge	Age at college entrance			19	23.58	8.64
StudentEthnicHispa	Ethnicity (Hispanic)	2,155	23.4			
StudentEthnicWhite	Ethnicity (White)	6,113	66.4			
StudentEthnicOther	Ethnicity (Other)	681	7.4			
StudentEthnicUnknown	Ethnicity (unknown)	251	2.7			
TookDevMath	Took developmental mathematics class	6,009	65.3			
PassedDevMath	Passed developmental mathematics class	3,036	50.5			
TookDevWriting	Took developmental writing class	514	5.6			
PassedDevWriting	Passed developmental writing class	280	54.5			
TookDevReading	Took developmental reading class	2,042	22.2			
PassedDevReading	Passed developmental reading class	1,280	62.7			
EnrolledInSSS	Enrolled in TRIO Student Support Services	357	3.9			
RecvFinancialAid	Received financial aid	5,539	60.2			
EduMotherSomeCollege	Mother's educational attainment (some college)	2,569	27.9			
EduFatherSomeCollege	Father's educational attainment (some college)	2,264	24.6			
TookInternet	Took an Internet class	3,103	33.7			
HrsEnrolled1stFall	Hours enrolled during the first fall semester			12	9.97	3.92
HrsDropped1stFall	Hours dropped during the first fall semester			0	1.82	3.23
EnrolledNextTerm (Fall-Spring)	Enrolled in the subsequent spring term	6,324	68.7			
EnrolledNextYear (Fall-Fall)	Enrolled in the subsequent fall term	4,430	48.2			

and 22% enrolled in developmental reading. The majority of students (60%) received financial aid, and a third of the students enrolled in Internet classes. Only about a fourth of the students reported that their fathers or mothers had some college-level education.

Retention Rates

Fall-to-spring retention differed significantly by year, $\chi^2(3, N = 9{,}200) = 14.45$, $p = .002$, from a low of 65.7% to a high of 70.7%; about a third of the FTIC students who enrolled in the fall did not enroll at the same institution in the spring. Fall-to-fall retention did not differ by year in a statistically significant manner; retention rates varied from a low of 45.8% to a high of 49.4%. More than half of the FTIC students who enrolled in the fall did not enroll in the subsequent fall semester.

Correlations of Predictor Variables With Student Retention

Correlations (point-biserial and phi) of predictor and response variables are provided in Tables 2 and 3. Table 2 provides results by year, and Table 3 provides results for all years combined. The strongest positive correlate with retention was successful completion of a developmental reading course. Other positive correlates of retention included successful completion of a developmental mathematics course, receiving financial aid, taking an Internet course, semester hours enrolled in the first semester, and participation in student support services. Negative correlates included student age and semester hours dropped during the first semester. Student ethnicity and education level of parents were not consistently associated with student retention.

Multivariate Model Predicting First Fall to First Spring Semester Retention

To predict first fall to first spring semester retention (a binary variable), a logistic regression model was developed with all predictor variables included (Gelman & Hill, 2007). Student gender, ethnicity, enrollment in a developmental writing course, and completion of a developmental writing course were not statistically significant after controlling for covariates. A subsequent logistic regression model was developed excluding these variables; the results of the model are presented in Table 4. Age data were missing for 4 students; for this analysis, the sample size was 9,196. This model's effect size, Nagelkerke R^2, is .307; in other words, about 31% of the variance in the dependent variable is explained by the model.

The multivariate analysis depicted in Table 4 demonstrates that positive predictors of fall-to-spring retention (ordered from strongest to weakest) are passing a developmental reading course, taking Internet courses,

Table 2
Correlations (*r*) of Retention With Predictors of Retention for First-Time-In-College Students, Fall 2001-2004, by Year (*N* = 9,200)

	Fall 2001		Fall 2002		Fall 2003		Fall 2004	
	Next Term	Next Year	Next Term	Next Year	Next Term	Next Year	Next Term	Next Year
StudentSexM	–.054*	–.036	–.018	–.036	–.057**	–.084**	–.032	–.075**
StudentStartAge	–.116**	–.101**	–.075**	–.117**	–.083**	–.099**	–.033	–.101**
StudentEthnicHispanic	–.022	–.029	–.014	–.025	.026	–.017	–.022	.004
StudentEthnic White	.026	.041	.016	.040	–.017	.018	.029	.039
StudentEthnicOther	–.011	–.025	–.005	–.031	–.013	–.004	–.015	–.073**
PassedDevMath	.274**	.243**	.214**	.253**	.225**	.257**	.247**	.235**
PassedDevWriting	.259	.126	.183	.377**	.203**	.301**	.365**	.455**
PassedDevReading	.494**	.387**	.353**	.388**	.386**	.399**	.422**	.427**
EnrolledInSSS	.100**	.111**	.090**	.122**	.092**	.115**	.098**	.086**
RecvFinancialAid	.246**	.220**	.262**	.216**	.206**	.199**	.219**	.154**
EduMotherSomeCollege	.022	.031	–.018	.022	–.005	.016	–.011	–.005
EduFatherSomeCollege	.037	–.011	–.001	–.007	.071*	.083**	.066	.060
TookInternet	.242**	.299**	.243**	.325**	.239**	.330**	.224**	.297**
HrsEnrolled1stFall	.246**	.179**	.280**	.199**	.265**	.173**	.262**	.160**
HrsDropped1stFall	–.218**	–.155**	–.177**	–.142**	–.210**	–.166**	–.191**	–.133**

*$p < .05$ (two-tailed). **$p < .01$ (two-tailed).

Table 3
Correlations of Retention and Predictors of Retention for FTIC Students, 2001-2004, With All Years Combined

	Enrolled Next Term (Fall to Spring)	Enrolled Next Year (Fall to Fall)
StudentSexM	$r = -.040$, $p < .001$, $n = 9{,}193$	$r = -.058$, $p < .001$, $n = 9{,}193$
StudentStartAge	$r = -.077$, $p < .001$, $n = 9{,}196$	$r = -.104$, $p < .001$, $n = 9{,}196$
StudentEthnicHispa	$r = -.007$, $p = .511$, $n = 8{,}949$	$r = -.017$, $p = .109$, $n = 8{,}949$
StudentEthnicWhite	$r = .013$, $p = .226$, $n = 8{,}949$	$r = .035$, $p = .001$, $n = 8{,}949$
StudentEthnicOther	$r = -.011$, $p = .287$, $n = 8{,}949$	$r = -.034$, $p = .001$, $n = 8{,}949$
PassedDevMath	$r = .241$, $p < .001$, $n = 6{,}009$	$r = .248$, $p < .001$, $n = 6{,}009$
PassedDevWriting	$r = .262$, $p < .001$, $n = 514$	$r = .358$, $p < .001$, $n = 514$
PassedDevReading	$r = .409$, $p < .001$, $n = 2{,}042$	$r = .403$, $p < .001$, $n = 2{,}042$
EnrolledInSSS	$r = .094$, $p < .001$, $n = 9{,}200$	$r = .108$, $p < .001$, $n = 9{,}200$
RecvFinancialAid	$r = .233$, $p < .001$, $n = 9{,}200$	$r = .197$, $p < .001$, $n = 9{,}200$
EduMotherSomeCollege	$r = .001$, $p = .956$, $n = 5{,}339$	$r = .024$, $p = .083$, $n = 5{,}339$
EduFatherSomeCollege	$r = .037$, $p = .008$, $n = 5{,}224$	$r = .025$, $p = .068$, $n = 5{,}224$
TookInternet	$r = .238$, $p < .001$, $n = 9{,}200$	$r = .312$, $p < .001$, $n = 9{,}200$
HrsEnrolled1stFall	$r = .264$, $p < .001$, $n = 9{,}200$	$r = .178$, $p < .001$, $n = 9{,}200$
HrsDropped1stFall	$r = -.199$, $p < .001$, $n = 9{,}200$	$r = -.149$, $p < .001$, $n = 9{,}200$

Table 4
Logistic Regression Model Predicting Retention: Fall to Spring ($N = 9{,}196$)

							95% CI for Exp(B)	
	B	*SE*	Wald	*df*	*p*	Exp(B)	Lower	Upper
StudentStartAge	0.011	.003	12.223	1	< .001	1.011	1.005	1.018
EnrolledInSSS	0.803	.198	16.439	1	< .001	2.232	1.514	3.291
RecvFinancialAid	0.473	.054	75.631	1	< .001	1.605	1.443	1.786
TookInternet	0.947	.062	233.816	1	< .001	2.577	2.282	2.909
HrsEnrolled1stFall	0.153	.008	408.455	1	< .001	1.165	1.148	1.182
HrsDropped1stFall	–0.156	.008	386.737	1	< .001	0.856	0.843	0.869
PassedDevMath	0.762	.073	110.121	1	< .001	2.143	1.858	2.470
NoDevMath	–0.245	.065	14.010	1	< .001	0.783	0.688	0.890
PassedDevReading	1.197	.118	103.647	1	< .001	3.310	2.629	4.168
NoDevReading	0.787	.089	78.179	1	< .001	2.197	1.845	2.616
EduMotherSomeCollege	–0.157	.070	5.077	1	.024	0.855	0.745	0.980
EduFatherSomeCollege	0.247	.073	11.433	1	.001	1.280	1.110	1.478
Constant	–2.064	.145	203.590	1	<.001	0.127		

Note: CI = Confidence Interval.

participating in the Student Support Services program, not taking a developmental reading course, passing a developmental mathematics course, receiving financial aid, father having some college education, semester hours enrolled in the first fall semester, and student age. Factors that reduce the odds of fall-to-spring retention include not taking a developmental mathematics course, mother having some college education, and semester hours dropped in the first fall semester.

Although the bivariate correlation of student age with retention was negative, in the multivariate model it was positive. However, the contribution of student age in the multivariate model was of small magnitude ($CI_{.95}$ = 1.005, 1.018); in other words, student age was a weak predictor of retention in this model. Similarly, mother's education level was not significantly associated with retention, yet the multivariate model suggests that if a student's mother had some college education, the student had lower odds of retention. This finding may be questionable, given the approach that was used to code missing data for this variable.

The findings related to developmental education are noteworthy. For the developmental education courses, the data were dummy coded. The reference group was students who enrolled but did not successfully complete the course. Table 4 demonstrates that students who successfully completed a developmental mathematics course had higher odds of retention than those who enrolled in developmental mathematics but did not successfully complete the course. Furthermore, students who did not enroll in developmental mathematics had lower odds of retention than those who enrolled in developmental mathematics but did not successfully complete the course. This finding suggests the significant role that developmental mathematics plays in student retention. Similarly, students who successfully completed a developmental reading course had higher odds of retention than those who enrolled in developmental reading but did not successfully complete the course. However, students who did not enroll in developmental reading also had higher odds of retention than those who enrolled in developmental reading but did not successfully complete the course. A possible explanation for this finding is that the students who did not enroll in developmental reading had sufficient reading skills and thus did not need to participate in a developmental reading course. These findings collectively emphasize the important contributions of developmental education to student outcomes.

Table 5
Logistic Regression Model Predicting Retention: First Fall to Second Fall (*N* = 9,200)

							95% CI for Exp(B)	
	B	*SE*	Wald	*df*	*p*	Exp(B)	Lower	Upper
EnrolledInSSS	0.756	.138	30.109	1	< .001	2.129	1.625	2.789
RecvFinancialAid	0.342	.051	44.642	1	< .001	1.408	1.274	1.557
TookInternet	1.151	.052	499.569	1	< .001	3.163	2.859	3.499
HrsEnrolled1stFall	0.067	.007	104.403	1	< .001	1.069	1.056	1.083
HrsDropped1stFall	–0.111	.008	185.373	1	< .001	0.895	0.881	0.909
PassedDevMath	0.698	.061	132.515	1	< .001	2.011	1.785	2.264
NoDevMath	–0.412	.061	45.994	1	< .001	0.662	0.588	0.746
PassedDevWriting	0.704	.214	10.866	1	.001	2.023	1.331	3.075
NoDevWriting	0.090	.158	0.327	1	.567	1.095	0.803	1.492
PassedDevReading	1.184	.116	104.846	1	< .001	3.267	2.605	4.098
NoDevReading	0.978	.100	95.436	1	< .001	2.660	2.186	3.236
EduMotherSomeCollege	0.137	.063	4.771	1	.029	1.147	1.014	1.297
EduFatherSomeCollege	0.184	.065	7.910	1	.005	1.202	1.057	1.366
Constant	–2.384	.186	164.435	1	< .001	0.092		

Note: CI = Confidence Interval.

Multivariate Model Predicting First Fall to Second Fall Semester Retention

A logistic regression model to predict first fall to second fall semester retention was developed with all predictors. Student age, gender, and ethnicity were not statistically significant after controlling for covariates. A subsequent logistic regression model was developed excluding these variables; the results of the model are presented in Table 5. This model's effect size, Nagelkerke R^2, is .285; about 29% of the variance in the dependent variable is explained by the model. Though there was no significant difference between those who had not enrolled in developmental writing (NoDevWriting) and those in the reference group (enrolled in developmental writing but did not successfully complete), it would be inappropriate to exclude this variable (NoDevWriting) from the model because it was one variable within a block of dummy variables representing a categorical variable, developmental writing participation (Bland, 2000).

The multivariate analysis depicted in Table 5 demonstrates that positive predictors of fall-to-fall student retention (ordered from strongest to weakest) are passing a developmental reading course, taking Internet courses, not

taking a developmental reading course, participating in the Student Support Services program, passing a developmental writing course, passing a developmental mathematics course, receiving financial aid, father having some college education, mother having some college education, and the number of semester hours enrolled in the first fall semester. Factors that reduce the odds of fall-to-fall retention include not taking a developmental mathematics course and semester hours dropped in the first fall semester. These findings are similar to those of the model described in Table 4 with the exception that successfully completing a developmental writing course and having a mother with some college education were positive predictors of fall-to-fall student retention. Additionally, student age was not a significant predictor of retention after controlling for covariates.

Discussion

The findings from this study reveal significant predictors of retention. A key finding is the importance of developmental education to college success as measured by retention. "Students who lack the basic and fundamental skills, especially in mathematics and writing, are finding it difficult to cope with the normal course workload" (Lau, 2003, p. 2). Yet McCabe's (2000) research points to successful academic performance of those students who complete their remedial program of study, with more than one third of the developmental students earning an associate's degree or certificate. Higbee, Arendale, and Lundell (2005) cite estimates that two million students would drop out of college annually in the absence of developmental education. Thus, prior research suggests that developmental education is associated with academic success contingent on persistence.

According to the regression models in this study, the strongest predictor for retention is passing a developmental reading course. College-level reading comprehension and reading strategies are essential for students to be able to read and understand their college-level textbooks. The finding of "not taking a developmental reading course" as being a predictor of success indicates that the student scored at college level in reading on an assessment or placement test such as Accuplacer or the Texas Higher Education Assessment and, therefore, a developmental reading course was not necessary. In that case, the student already possessed college-level reading skills. Collectively, these findings indicate the significant impact of reading skills on student success and retention, consistent with prior research findings (Dixon, 1993; Fleischauer, 1996).

Passing developmental mathematics courses is an indicator of fall-to-spring and fall-to-fall student retention. Not taking a developmental mathematics course lowered the odds of retention compared to students who took developmental mathematics even if they did not successfully complete it. Although we do not know the reason for this finding, it highlights the importance of developmental mathematics and warrants further study. Even though this study indicates that passing a developmental reading course is the greatest predictor of retention, Hall and Ponton (2005) note that mathematics is the subject most essential to determining students' success in degree attainment. Furthermore, Waycaster (2001) found in a study of five community colleges that developmental mathematics was positively associated with student retention, suggesting that "extra attention that developmental students receive in counseling, advising, teaching and monitoring progress, as well as smaller classes, contribute greatly to this higher level of retention for developmental mathematics students" (p. 412).

Passing developmental writing is a predictor of fall-to-fall student retention, though not a statistically significant predictor of fall-to-spring retention. The findings for fall-to-fall retention are in general agreement with those of other community college research studies with respect to the positive association of passing developmental writing with student persistence (Crews & Aragon, 2007; Southard & Clay, 2004), though it is unknown why passing developmental writing was not associated with fall-to-spring retention in this study. All basic academic skills (reading, writing, and mathematics) are essential for college-level success. Large numbers of students enter their first year of college with below college-level competencies; it is imperative to give these students a chance to improve their skills (Fike & Fike, 2007). "We want to ensure that students receive an opportunity to succeed by having their needs met through developmental education courses" (Frost & Braun, 2006, p. 27).

Taking Internet courses is a strong predictor of student retention in this study. Allen and Seaman (2007) note that the growth in online enrollments in higher education is greatest for nontraditional students at community colleges and that demand for the availability of online courses is expected to continue to grow. According to Aslanian (2001), if students cannot find the courses they need at convenient times and locations, they will turn to distance options. Although availability and demand for Internet courses may contribute to student persistence, other factors such as quality

and design of online courses (Dietz-Uhler, Fisher, & Han, 2007) and student attributes, such as computer skills and prior experiences (Dupin-Bryant, 2004), may also have a bearing. The specific reasons why taking Internet courses is a predictor of student retention in this study are unknown. Regardless of whether one is a proponent of learning at a distance, this study suggests that having online courses is important to student retention. Further research should examine the association of Internet course taking and student persistence.

Student Support Services is a federally funded TRIO program that is charged with increasing the rate of retention for students from disadvantaged backgrounds, including students from first-generation and low-income backgrounds and those with physical or learning disabilities. For the students composing the sample, only 397 (3.9%) special needs students qualified and participated in Student Support Services. Even though a small percentage of the sample participated in Student Support Services, the findings indicate that the program encourages student retention. Involvement in Student Support Services requires students to meet regularly with their advisors, complete midsemester grade checks, and complete a long-term plan of study.

Consistent with prior research, receiving financial aid is a predictor of student retention in this study. According to Wessel, Bell, McPherson, Costello, and Jones (2006), students with greater financial need persist to graduation at lower rates. Zhai and Monzon (2001) note that community college students claim that financial difficulties are a key reason for their failure to persist. Based on a review of the literature, Lichtenstein (2002) concludes that financial aid is associated with persistence but models have not been developed that sufficiently explain how financial aid affects persistence. Given the diverse types and levels of financial aid available to students, more research is needed to better explain how financial aid affects student persistence.

A review of nationally representative samples of postsecondary students has shown that first-generation students have lower persistence rates than their counterparts (Nunez & Cuccaro-Alamin, 1998). More recent studies that focus specifically on community college student retention have suggested that parental education level is positively associated with student persistence (Hoyt, 1999; Summers, 2003; Wild & Ebbers, 2002). Consistent with prior findings, this study found that for fall-to-fall retention, parents having some college education is a predictor of student retention. Similarly, for

fall-to-spring retention, the father having some college is a positive predictor; however, the mother having some college is a negative predictor. Although the specific reasons why parental education level is associated with student retention in this study are unknown, Lee, Sax, Kim, and Hagedorn (2004) note that parents who have enrolled in college classes may be more apt to counsel their children regarding college success. Parents with postsecondary experience understand the commitment necessary for college success, such as the amount of time required to study, the expenses associated with college and textbooks, and the sacrifices, in general, that their child must make to complete college. "Students who frequently talk with their parents and follow their advice participate more frequently in educationally purposeful activities and are more satisfied with the college experience" (Kinzie, 2007, p. 1). The reason why "mother having some college" is a negative predictor of fall-to-spring retention in this particular study is unknown; this inconsistency with prior research may be a consequence of the way missing "parent education level" data were coded. Further research regarding this finding is warranted.

The number of semester hours for which a student enrolls in the first fall semester is a positive predictor of retention in this study. Conversely, the number of semester hours dropped during the first fall semester decreases the odds of retention. These findings are consistent with Mohammadi's (1994) research at a community college, which demonstrated a significant positive association between hours enrolled and persistence, as well as a significant positive association between hours completed and persistence. Though undergraduates at universities are predominantly full-time, degree-seeking students, the majority of community college students attend on a part-time basis (Powers, 2007). Given this difference between community college and university student enrollment patterns, additional research exploring the underlying reasons for the association of persistence and the number of hours enrolled for or dropped in the community college should be pursued.

Gender and ethnicity are not significant predictors of retention after controlling for covariates. Student age is not a predictor for fall-to-fall retention but is a statistically significant predictor for fall-to-spring retention. Though age is statistically significant for fall-to-spring retention, it appears to be of limited practical significance; it has a very small effect size ($CI_{.95}$ = 1.005, 1.018).

Implications for Future Practice and Research

> If developmental education is to be successful, it must be an institutional priority supported by the institutional community. It must be coordinated, and it must be part of institutional planning efforts. If these conditions are not met, then whatever activities are undertaken in support of developmental education will not reach their full potential. (Boylan, 2002, p. 7)

Some institutions of higher education do not particularly value developmental education or developmental students. Some institutions do not even have developmental education programs. "Increasingly, state and local policy seeks to constrict—if not eliminate—the amount of remedial work that takes place in 4-year colleges" (Adelman, 1999, p. ix). The practice of universities outsourcing remedial education to community colleges "is more widespread than people realize" (Redden, 2007, p. 1). Knowing that completing developmental education courses is one of the stronger predictors of student retention indicates that institutions should place developmental education as a high priority. Research-based best practices in developmental education should be implemented, including mandatory assessment and placement, systematic program evaluation, and emphasis on professional development, just to name a few (Boylan, 2002). Further research to assess the impact of developmental education on student retention is warranted.

The pervasive growth of online courses cannot be disputed, even though their effectiveness often is. Faculty members and students alike debate the quality and efficacy of online instruction. Whether one supports distance education or not, taking online courses is shown to be a predictor of student persistence in this study. Perhaps the flexibility provided by online courses is important to students. One study found that "inflexible scheduling of courses posed an intolerable burden on their personal and professional lives" and led to students leaving college (Wlodkowski, Mauldin, & Campbell, 2002, p. 7). These findings provide a basis for institutions to offer flexible schedules, including quality online courses, to meet the needs of their students. Research to explore the association of online courses with student retention is needed.

"Financial aid enhances adult student persistence" (Wlodkowski et al., 2002, p. 2). However, research is needed to better explain how financial aid affects students, particularly with respect to the broad array of financial aid opportunities available to the diverse community college student population (Lichtenstein, 2002). Additionally, making more financial aid available

and helping community college students know how to access this aid may yield gains in student persistence (Zhai & Monzon, 2001).

Limitations

There are several limitations to this study that merit attention. First, there was a large percentage of missing data values for parents' level of education. Although this is a potential weakness, removing these variables from the analysis did not substantively change the contribution of other variables in the logistic regression models. Regardless, the validity of the findings regarding parents' level of education may be limited. Additionally, some of the data analyzed in this study were self-reported (e.g., parent's education level, student ethnicity, student age, student gender); these data were not verified. Lastly, this study did not employ an experimental design; a causal relationship between predictor variables and student retention could not be formally determined (Moore & McCabe, 2003). Replication with similar findings for other populations will serve to strengthen the external validity of this study.

Conclusion

"Student retention has become a challenging problem for the academic community; therefore, effective measures for student retention must be implemented in order to increase the retention of qualified students at institutions of higher learning" (Lau, 2003, p. 1). As educators, we need to be concerned about students leaving college. For every student lost, an educational dream goes unfulfilled. And for every unfulfilled dream, there is a long-term impact. As of 2000, U.S. households headed by a high school graduate had an annual income of $44,068 compared to $80,327 for a bachelor's degree and $104,294 for a graduate or professional degree (Murdock, 2004). Cumulative differences in earnings are outstanding. Clearly, student attrition represents huge potential losses to the individuals, their families, and society as a whole. We as educators must be reminded that it is education, not retention itself, that is the principal goal of retention programs (Tinto, n.d.).

It is essential to use data to guide institutional decisions that are supportive of retention goals. The purpose of retention data is to provide greater insight into the factors influencing student retention. Student data

can be used to develop an understandable and workable plan to guide efforts toward effective interventions that increase student persistence.

This study of 9,200 FTIC students who first enrolled in a community college over a 4-year period found that passing development courses, taking Internet courses, participating in the Student Support Services program, receiving financial aid, parents' education level, the number of hours for which the student enrolls in the first fall semester, and the number of hours dropped in the first fall semester served as predictors of student persistence.

References

ACT. (2007). *Institutional data file for 2007*. Iowa City, IA: Author. Retrieved November 26, 2007, from http://www.act.org/path/policy/reports/retain.html

Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment*. Washington, DC: U.S. Department of Education.

Allen, I. E., & Seaman, J. (2007). *Online nation: Five years of growth in online learning*. Needham, MA: Sloan Consortium. Retrieved April 25, 2008, from http://www.sloan-c.org/publications/survey/pdf/online_nation.pdf

Aslanian, C. B. (2001). *Adult students today*. New York: The College Board.

Astin, A. W. (1991). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education*. New York: Macmillan.

Astin, A. W. (1993). *What matters in college*? San Francisco: Jossey-Bass.

Bean, J. P. (1990). Why students leave: Insights from research. In D. Hossler, J. P. Bean, & Associates (Eds.), *The strategic management of college enrollments* (pp. 170-185). San Francisco: Jossey-Bass.

Bland, M. (2000). *An introduction to medical statistics*. New York: Oxford University Press.

Boylan, H. R. (2002). *What works: Research-based best practices in developmental education*. Boone, NC: National Center for Developmental Education.

Cohen, A. M., & Brawer, F. B. (1996). *The American community college* (3rd ed.). San Francisco: Jossey-Bass.

Crews, D. M., & Aragon, S. R. (2007). Developmental education writing: Persistence and goal attainment among community college students. *Community College Journal of Research and Practice*, *31*, 637-652.

Derby, D. C., & Smith, T. (2004). An orientation course and community college retention. *Community College Journal of Research and Practice*, *28*, 763-773.

Dietz-Uhler, B., Fisher, A., & Han, A. (2007). Designing online courses to promote student retention. *Journal of Educational Technology Systems*, *36*, 105-112.

Dixon, R. A. (1993, March). *Improved reading comprehension: A key to university retention?* Paper presented at the Sixth Annual Midwest Regional Reading and Study Skills Conference, Kansas City, MO.

Dupin-Bryant, P. A. (2004). Pre-entry variables related to retention in online distance education. *The American Journal of Distance Education*, *18*, 199-206.

Fike, D. S., & Fike, R. (2007). Does faculty employment status impact developmental mathematics outcomes? *Journal of Developmental Education*, *31*, 2-11.

Fleischauer, J. P. (1996). Assessing developmental reading courses: Do they have an impact? *Research and Teaching in Developmental Education*, *12*(2), 17-24.

Frost, L. H., & Braun, G. K. (2006). Go figure! Using quantitative measures to enhance program and student success. *NADE Digest*, *2*(2), 27-34.

Gelman, A., & Hill, J. (2007). *Data analysis using regression and multilevel/hierarchical models*. New York: Cambridge University Press.

Hall, J. M., & Ponton, M. K. (2005). Mathematics self-efficacy of college freshmen. *Journal of Developmental Education*, *28*, 26-30.

Higbee, J. L., Arendale, D. R., & Lundell, D. B. (2005). Using theory and research to improve access and retention in developmental education. *New Directions for Community Colleges*, *Spring*(129), 5-15.

Hossler, D. (2005, November). *Managing student retention: Is the glass half full, half empty, or simply empty?* Paper presented at the Strategic Enrollment Management Conference of the American Association of Collegiate Registrars and Admissions Officers, Chicago.

Hoyt, J. E. (1999). Remedial education and student attrition. *Community College Review*, *27*(2), 51-72.

Kinzie, J. (2007). *High-impact practices boost learning, involved parents no problem*. Bloomington: Indiana University Center for Postsecondary Research. Available at http://nsse.iub.edu/NSSE_2007_Annual_Report/docs/withhold/PressRelease2007.pdf

Lau, L. K. (2003). Institutional factors affecting student retention. *Education*, *124*(1), 126-136.

Lee, J. J., Sax, L. J., Kim, K. A., & Hagedorn, L. S. (2004). Understanding students' parental education beyond first-generation status. *Community College Review*, *32*(1), 1-20.

Lichtenstein, M. (2002, June). *The role of financial aid in Hispanic first-time freshman persistence*. Paper presented at the Annual Forum for the Association for Institutional Research, Toronto, Ontario, Canada.

McCabe, R. H. (2000). *No one to waste: A report to public decision-makers and community college leaders*. Washington, DC: Community College Press.

Mohammadi, J. (1994). *Exploring retention and attrition in a two-year public community college*. Martinsville, VA: Patrick Henry Community College. (ERIC Document No. ED382257)

Moore, D. S., & McCabe, G. P. (2003). *Introduction to the practice of statistics*. New York: W. H. Freeman and Company.

Murdock, S. H. (2004). *Population change in Texas: Implications for human, socioeconomic and natural resources in the 21st century*. San Antonio, TX: Institute for Demographic and Socioeconomic Research. Retrieved December 1, 2007, from http://recenter.tamu.edu/speeches/land04Murdock.pdf

National Center for Education Statistics. (2008). *The Integrated Postsecondary Education Data System (IPEDS), statistical data and information on postsecondary institutions*. Washington, DC: Author. Retrieved February 20, 2008, from http://www.nces.ed.gov/IPEDS/about/

Nunez, A. M., & Cuccaro-Alamin, S. (1998). *First generation students: Undergraduates whose parents never enrolled in postsecondary education* (NCES 98-082). Washington, DC: National Center for Education Statistics.

Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students: Findings and insights from twenty years of research*. San Francisco: Jossey-Bass.

Powers, E. (2007, November 12). Rules of (community college) engagement. *Inside Higher Ed*. Retrieved February 20, 2008, from http://www.insidehighered.com/news/2007/11/12/ccsse

Redden, E. (2007, December 20). Outsourcing remedial ed. *Inside Higher Ed.* Retrieved February 20, 2008, from http://www.insidehighered.com/news/2007/12/20/remedial

Southard, A. H., & Clay, J. K. (2004). Measuring the effectiveness of developmental writing courses. *Community College Review*, *32*(2), 39-50.

Summers, M. D. (2003). Attrition research at community colleges. *Community College Review*, *30*(4), 64-84.

Thayer, P. (2000). Retention of students from first generation and low income backgrounds. *Opportunity Outlook Journal*, *3*(1), 2-8.

Tinto, V. (1993). *Leaving college: Rethinking the causes of student attrition* (2nd ed.). Chicago: University of Chicago Press.

Tinto, V. (1999). Taking retention seriously: Rethinking the first year of college. *NACADA Journal*, *19*(2), 5-9.

Tinto, V. (n.d.). *The assessment of student retention programs*. Syracuse, NY: Syracuse University, School of Education. Retrieved December 7, 2007, from http://soeweb.syr.edu/academics/grad/higher_education/vtinto.cfm

Waycaster, P. (2001). Factors impacting success in community college developmental mathematics courses and subsequent courses. *Community College Journal of Research and Practice*, *25*, 403-416.

Wessel, R. D., Bell, C. L., McPherson, J. D., Costello, M. T., & Jones, J. A. (2006). Academic disqualification and persistence to graduation by financial aid category and academic ability. *Journal of College Student Retention: Research, Theory & Practice*, *8*, 185-198.

Wild, L., & Ebbers, L. (2002). Rethinking student retention in community colleges. *Community College Journal of Research and Practice*, *26*, 503-519.

Wlodkowski, R. J., Mauldin, J. E., & Campbell, S. (2002). *Early exit: Understanding adult attrition in accelerated and traditional postsecondary programs*. Indianapolis, IN: Lumina Foundation for Education.

Zhai, L., & Monzon, R. (2001, November). *Community college student retention: Student characteristics and withdrawal reasons*. Paper presented at the 2001 California Association of Institutional Research Annual Conference, Sacramento, CA.

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