Hispanic Student Success: Factors Influencing the Persistence and Transfer Decisions of Latino Community College Students Enrolled in Developmental Education

Gloria Crisp · Amaury Nora

Abstract This study examined the impact of a set of theoretically-derived predictor variables on the persistence and transfer of Hispanic community college students. Early models of student persistence have been validated primarily among 4-year college students. While the constructs have been well-established, the relationships of those relevant factors remain unexamined among community college transfer students, and specifically, among Hispanic students enrolled in developmental coursework and planning to transfer from a community college to a 4-year institution. Logistic regression analysis was used to test the hypothesized conceptual framework on an existing set of quantitative persistence data drawn from a national sample of Hispanic students.

Keywords Hispanic students · Persistence · Success · Developmental education · Community college

Recent estimates suggest that nearly 30% of the population in the United States will be Hispanic by the year 2050 (Aizenman 2008). Such large numbers of Hispanic individuals suggest the need to prepare for their higher education. Not surprisingly, the majority of these students will begin their postsecondary education in community colleges (Chronicle of Higher Education 2001; Fry 2004; Nora et al. 1999), as recent reports indicate that 58%

G. Crisp (✉) · A. Nora
Department of Educational Leadership and Policy Studies, College of Education and Human Development, The University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249, USA
e-mail: Gloria.crisp@utsa.edu

A. Nora
e-mail: Amaury.nora@utsa.edu

of Hispanic students are currently enrolled at 2-year colleges, compared to 42% of White students (Snyder et al. 2006). While 2-year institutions serve many functions, a very important one is the transfer of students seeking an undergraduate degree from a 4-year institution. Among the general population, 90% of students who enroll at a community college intend to obtain a degree or certificate or to transfer to a 4-year institution (Hoachlander et al. 2003). As for Latino/a students, findings from the National Center for Urban Partnerships database indicate that 85% of Hispanic students who attend community colleges view the community college as a first step to obtaining a baccalaureate degree (Rendon and Nora 1997). In other words, not only are the majority of Latino/a students attending community colleges, but their intended goal is to successfully transfer to a 4-year university and to earn an undergraduate degree or higher.

While the intent to transfer is evident among Hispanic students, less than a quarter of all Latino/a students who begin their educational experience at a community college actually transfer to a 4-year institution and/or earn a bachelor's degree (Fry 2004). In fact, Alexander et al. (2007) found that Hispanic community college students are "less likely than their White counterparts…to complete an associate's degree, transfer to a 4-year institution, and—among those who do transfer—obtain a bachelor's degree (Bailey and Weininger 2002; Fry 2004; Swail et al. 2005; Wilds and Wilson 1998; Woodlief and Chavez 2002, pp. 174–175)". Because so many Latino/a students are intensely concentrated in community colleges, the exceedingly low transfer rate for those whose original intent is to transfer makes the issue quite disturbing (Dougherty 2002).

Contributing to the issues of low transfer and high student attrition rates for Latino students is another disturbing figure—the number of Hispanics who enter higher education academically unprepared or underprepared to engage in college level coursework. An examination of postsecondary transcripts of students who were in 12th grade in 1992 and enrolled in postsecondary education between 1992 and 2000 indicated that 61% of students who first enrolled in a public 2-year institution completed at least one developmental course (Parsad et al. 2003). Moreover, Hoyt (1999) found that roughly 21% of all entering community college students required remedial education in two subject areas while 11% were required to enroll in developmental work in three subject areas.

Although numerous studies documenting the impact of enrolling in developmental coursework on community college student outcomes exist (e.g., Burley et al. 2001; Crews and Aragon 2007; Melguizo et al. 2008), the majority of studies have failed to control for important selection biases, such as high school curriculum or parental education (Attewell et al. 2006). Moreover, the longitudinal impact of enrolling in developmental coursework among Hispanic community college students has not been properly evaluated. As such, research is needed to track Hispanic students who enroll in developmental coursework and then persist and/or transfer to a 4-year institution (Higbee et al. 2005). According to Hurtado and Kamimura (2003), we must understand that a student's withdrawal decision is contingent on a variety of institutional support structures and college experiences in order to more fully realize why Hispanic students may not persist to graduation. Although many of these factors influencing the success of Hispanic students have been previously identified (e.g., encouragement and support, financial assistance), with the exception of Nora and Garcia (2001), the effects of developmental coursework within a comprehensive theoretical model of student success has not been previously examined. In turn, the purpose of this study was to examine the demographic, pre-college, socio-cultural, environmental, and academic experiences that impact the "success" (i.e., persisting, transferring, or earning a 2-year degree) of Hispanic students through the second and third years of college. The following research questions were examined:

1. For Hispanic community college students who intend to transfer to a 4-year institution, what factors are related to the probability of being successful in the second and third years of college?

2. How do the variables that are related to success vary among developmental and non-developmental students?

Conceptual Framework

Research specific to Hispanic students attending community colleges has been described as being in its infancy stages, and there is no one comprehensive theory to explain the specific factors influencing the success of this unique group of students. As such, the conceptual model guiding the present study was framed using Tinto's (1993) Model of Student Integration, Nora's (2003) Student/Institution Engagement Model, and Bourdieu's (1973) Cultural Capital Theory, conceptual models specific to Latino students (e.g., Nora and Garcia 2001; Torres 2006), and empirical evidence around developmental students. The following paragraphs provide context to the variables used in the logistic models which posit that the persistence and transfer decisions of Hispanic students attending community colleges were related to demographic and pre-college variables, socio/cultural capital, environmental pull-factors, and academic experiences (including enrolling in developmental coursework). A graphical depiction of the conceptual framework is presented in Fig. 1.
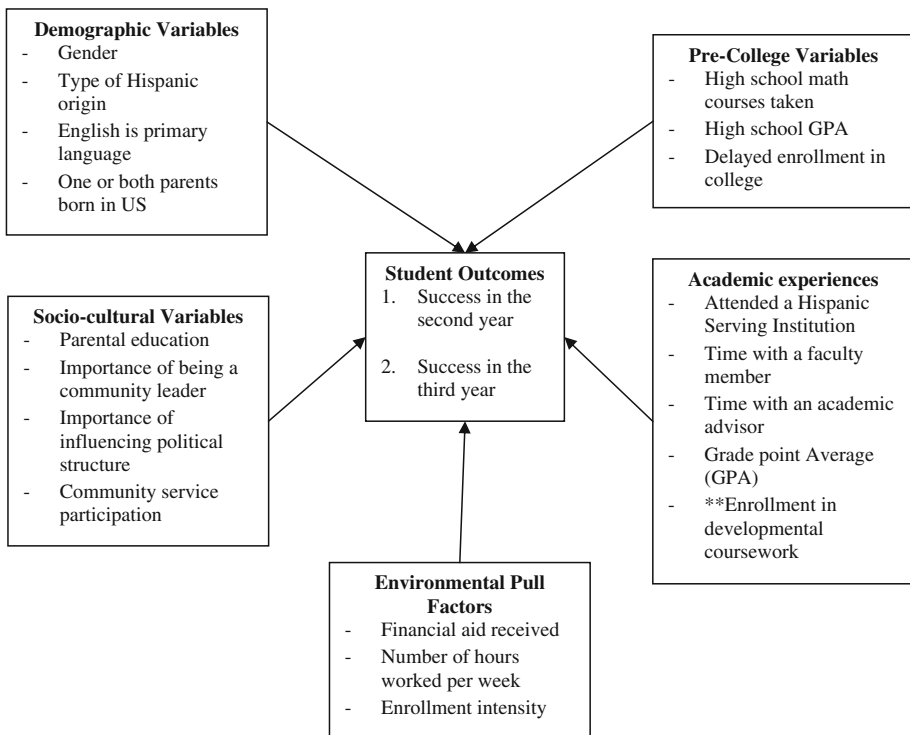

Fig. 1 A theoretical model of persistence and transfer among Hispanic community college students who intend to transfer to a 4-year institution

Pre-college Variables

Tinto's (1993) Model of Student Integration demonstrates that pre-college academic preparation, such as high school coursework and grades, influences persistence among traditional college students. The impact of pre-college academic preparation has also been found to be related to persistence and/or successful transfer among community college students (e.g., Wassmer et al. 2004) as well as for Hispanic students enrolled at the community college level (e.g., Arbona and Nora 2007; Suarez 2003). For instance, Arbona and Nora (2007) found that the academic preparation of Hispanic students in high school in the area of mathematics increased the likelihood of community college students transferring to a major institution or earning some form of credential. In addition, research findings indicated a relationship between college success among minority students and the type and quality of education that students received prior to college (Castellanos and Jones 2004). In addition, findings by Rendon and Hope (1996) tell us that cultural factors such as limited English proficiency or irregular attendance patterns may impinge on the retention of minority students. Similarly, research has consistently shown that not immediately enrolling in college after high school (i.e., delayed enrollment) is negatively related to community college students' decisions to persist in college or earn a degree (e.g., Adelman 1999, 2006).

Socio-cultural Capital

Tinto's (1993) framework also emphasizes the importance of social integration (i.e., participation in campus activities, interaction with peers) in solidifying students' commitment to the institution and to earning a college degree. However, Tinto's (1993) work has long been criticized for not being relevant for minority students (e.g., Rendon et al. 2001; Tierney 1992), as the majority of research on Latina/o students has failed to identify a direct relationship between social integration and persistence (e.g., Nora 1987; Nora and Cabrera 1996; Nora et al. 1996). As such, researchers focused on Latino/a success have also considered the impact of more culturally relevant social experiences, including participation or leadership in community service. For example, borrowing from Putnam's (2000) notion that participation in civic activities represents a form of social capital, recent findings by Nunez (2009) demonstrate a direct relationship between students' obligations to give back to the community and Latino/a students' sense of belonging. Similarly, Hurtado and Carter (1997) found that membership in a social-community organization was significantly related to Latino students' sense of belonging in the third year of college.

   Bourdieu's (1973) Cultural Capital Theory contributes to our understanding of how social class may impact Latino/a student success through parental education. More specifically, parental education is thought to be important to students' success in college as first generation students often lack the cultural capital needed to navigate the college environment (Berger 2000). Evidence to support this notion has been found for both Latino/a and community college populations (e.g., Logerbeam et al. 2004; Pascarella et al. 2003). Moreover, qualitative findings by Rendon and Valdez (1993) suggest that Hispanic community college students who have immigrant parents or families with limited understanding of college may face substantial barriers in transferring to a 4-year institution.

Environmental Pull Factors

Nora's (2003) Student/Institution Engagement Model posits that a set of environmental factors exert a "pulling away" or a "drawing in" of students into the academic and social

campus environments. Subsequently, these pulls are thought to impact a student's tenacity to continue a college education and center on variables external to university life such as having to work off-campus, family responsibilities, financial concerns, attending campus part-time, or having to commute to campus. Numerous studies have documented the negative influence of environmental pull factors on Hispanic success, including early research by Nora and Rendon (1990) who found Hispanic community college students were less likely to transfer to a 4-year institution due to a lack of financial resources and the need to work. However, Nora and Wedham (1991) found that working on-campus may exert a positive pull to college by providing the opportunity to interact with faculty and peers. As another pull factor, a lack of financial support has been shown to pull Hispanic students away from campus (Cabrera et al. 1993; Cabrera et al. 1990; Logerbeam et al. 2004; Stampen and Cabrera 1988). For instance, Nora (1990) found that Hispanic community college students who did not receive campus-based or off-campus-based financial aid (i.e., Pell grants) were significantly less likely to persist, earn more credit hours, or receive a certificate or degree.

Academic Experiences

Another variable that has been shown to contribute to student persistence for Latino/a students is college climate. Findings by Nora and associates (i.e., Cabrera and Nora 1994; Cabrera et al. 1993; Nora and Cabrera 1996) established the negative impact that discriminatory behavior, both in and outside of the classroom, has on the persistence decisions of Hispanic students. Moreover, Logerbeam et al. (2004) found that Latino/a students who perceived their campus as ethnically diverse (such as a Hispanic Serving Institution) were more likely to persist in college.

In addition, Tinto's (1993) Model of Student Integration further specifies that academic integration (i.e., interactions with faculty and staff, time spent on homework) positively influences students' persistence decisions. Academic experiences also have been shown to play an important role in Hispanic students' decisions to persist, transfer, or earn a degree. For instance, Hurtado et al. (1996) found that a large concentration of Hispanic students and positive interactions between students and faculty were two major reasons contributing to the persistence decisions of 4-year Hispanic students. Similarly, a causal model recently tested by Torres (2006) specific to Latino/a students identified a direct effect between academic integration, (defined as using the library and meeting with faculty outside of class) and students' commitment to the institution. Qualitative findings by Cejda and Rhodes (2004) revealed faculty interaction to be a key factor in facilitating Hispanic students' movement from a Hispanic Serving community college to a 4-year institution. In addition, research by Suarez (2003) suggested that support from staff members was important to the success of Hispanic community college students.

Furthermore, research has found that one of the most influential factors on Hispanic students' decisions to persist in college is the student's academic performance (e.g., Nora and Cabrera 1996; Nora et al. 1996; Hu and St. John 2001). Findings also demonstrate that Hispanic students are more likely to persist as college grade point average (GPA) increases. Nora et al. (1997) and Hu and St. John (2001) substantiated the importance of academic performance on the persistence decisions of Hispanic students, finding that the GPA of these students had a significant and positive direct influence on their decisions to remain in college. Moreover, Nora and Cabrera (1996) found that not only did the academic achievement of Hispanic students have a positive impact on persistence, but that

even the perceptions that they had made cognitive gains during their first year in college were influential in Hispanic students' decisions to remain enrolled in college.

Enrollment in Developmental Coursework

Many empirical studies have examined the impact of remediation on community college students. For instance, Hoyt (1999) concluded that as the number of areas needing remediation increased for students, dropout rates also consistently increased. The effect of developmental education was noted not only in terms of student persistence but in other student outcomes, such as the student's GPA during his or her first-term in college. In contrast, Bettinger and Long (2005) examined the impact of English and math remediation on student persistence. The sample consisted of first-time community college students from 1998 to 2003. The researchers found that students placed into developmental courses persisted just as well as similar individuals who were not enrolled in developmental courses, although math remediation appeared to improve some student outcomes.

Bettinger and Long's (2005) findings substantiated those of Jepsen (2006), who had analyzed the impact of taking developmental courses on persistence to the second year of college for a similar sample of community college students in the state of California. Jepsen also found that enrolling in developmental courses was associated with returning to college for the second year as well as completing transfer-level classes. However, Jepsen found differences in grouping the students by age. For the more traditional college-age students, developmental courses were negatively associated with transfer; for older students, the association was positive for returning and attaining a degree or certificate.

In other studies, the focus of the investigation has not been on the total developmental program but, rather, on individual remedial courses and the impact they may have on student outcomes. For example, Crews and Aragon (2004) examined the relationship between first semester enrollment in a developmental writing course at a community college and student persistence and goal attainment. Their analysis revealed that students who had been enrolled in a developmental writing course had completed more of the hours they had attempted compared to those students who were not required to enroll in a developmental writing course. At the end of a 3-year period, participants and non-participants were examined for differences in degree/certificate completion. Findings indicated similar completion rates among students enrolled and not enrolled in the writing course.

Although not specific to community colleges or Hispanic student populations, Kreysa's (2007) study advances the developmental literature by focusing on the explanatory predictors of student persistence among developmental and non-developmental students attending a large private 4-year institution. Factors that were found to most strongly predict whether non-developmental students would persist included declaring a major upon entering college (positive influence), changing majors (negative influence), and the students' cumulative GPAs (positive influence). Similarly, factors that influenced developmental students' decisions to re-enroll in college included students' SAT verbal scores (positive influence), changing majors after declaring one (negative influence), and cumulative GPA (positive influence).

Finally, as previously mentioned, Nora and Garcia (2001) is the only study to date that has examined the impact of Hispanic students enrolling in developmental coursework within a comprehensive theoretical model. In this study, the researchers examined the attitudes and perceptions held by students enrolled in developmental courses. Results indicated that seven factors were found to be related to remedial attitudes among Hispanic students including: (1) whether the students perceived themselves as needing remediation,

(2) the perceived value of developmental coursework, (3) pre-college academic preparation and curriculum, (4) personal attributes and skills, (5) feelings of discrimination related to being enrolled in remedial courses, (6) validation from faculty, staff, and peers, and (7) plans for degree attainment.

Method

Database and Sample

The Beginning Postsecondary Students Longitudinal Study tracks students longitudinally in an attempt to collect data specific to transfer patterns, co-enrollment, persistence, and degree attainment. Students sampled in the BPS Longitudinal Study ($n = 23,090$) were classified as first-time beginners (FTB's) during the base-year survey of the National Postsecondary Student Aid Study (NPSAS:04). FTB's were operationally defined as students who first enrolled at a post-secondary institution during the 2003–2004 academic year. Participants were initially interviewed in 2004 at the end of their first year in college, and then interviewed again several years later in the first follow-up study (BPS: 04/06).

Data sources included in the BPS:04/06 were derived from institutional records, federal and Pell grant records, federal financial aid applications, National Student Clearinghouse enrollment records, college admissions test agencies, and student interviews. Approximately 15,000 students completed an interview in 2006, resulting in a 77% weighted response rate. The sample utilized in the present study included Hispanic students who first enrolled at a 2-year public community college in 2003–2004 and who planned to transfer to a 4-year institution ($n = 570$).[1]

Outcome Variables

Community college researchers are increasingly seeking alternative outcome measures for community college students that are thought to be more valid and/or comprehensive measures of success such as enrolling at multiple institutions, earning an associates' degree, and transferring to a 4-year institution (e.g., Calcagno et al. 2008). As such, the present study examined two dichotomous outcomes considered to accurately represent a "successful" outcome for Hispanic students attending a community college: (a) successful, coded as 1 and defined as persisting, transferring to a different educational institution, or earning a degree at the end of their second year of college *versus* unsuccessful, coded as 0 and defined as not continuing to enroll at a 2- or 4-year institution or earning a degree or certificate, and (b) success in the third year, coded as 1 and defined as persisting, transferring to a different educational institution, or earning a degree *versus* unsuccessful, coded as 0 and defined as not continuously enrolled at a two or 4-year institution or earning some form of a college degree or certificate.

Predictor Variables

Five blocks of variables were hypothesized to predict the above mentioned outcomes from the BPS:04/06 data files. Four *demographic variables* were included in the first block of the model including students' gender, type of Hispanic origin, whether English was the

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[1] Unweighted sample sizes are rounded to the nearest ten, per IES Data Security guidelines.

students' primary language, and whether one or both of the students' parents were born in the United States. Next, several *pre-college variables* were added to the model. Pre-college variables were assessed using the rigor of high school math courses taken by students, high school grade point average, and whether or not the student had delayed his or her entry into college. Third, four items designed to measure *socio-cultural capital* were used including: parental education level, whether the student felt it was important to be a community leader or to influence the political structure, and whether or not the student participated in community service in the year preceding college. The fourth set of predictor variables centered on *environmental pull factors* including enrollment intensity through 2006, the number of hours worked per week, and the amount of financial aid that the student received. Several *academic experiences* were then added to the final block. This group of variables included whether the student attended a Hispanic Serving Institution (HSI), frequency of spending time with a faculty member outside of class, time spent with an academic advisor, GPA in the first year, and whether the student enrolled in a developmental course. Table 1 presents the model specifications.

Data Analysis

Descriptive statistics were computed to explore the relationship among the variables and to compare the demographic characteristics of participants. Next, chi-square and *t*-tests were computed for all relevant characteristics (such as gender, GPA) in order to identify significant differences/relationships. Using block sequential modeling, six logistic regression analyses were run to predict the likelihood of occurrence of the outcome variables based on the predictor variables (Garson 2008). Dichotomous logistic regression (DLR) was chosen over an ordinary least squares (OLS) analysis because the measurement of the outcome variables (i.e., successful or not successful). Moreover, data were not all normally distributed and the probability of the outcome variable could not be assumed to be linearly related to the predictor variables (Lottes et al. 1996).

All regression analyses were run using SPSS 17.0 with the exception of missing data, which were handled using multiple imputations (MI) with LISREL 8.80 (Enders 2008). All categorical predictors were recoded into dummy variables before they were entered into the logistic regression models. The variance inflation factor (VIF) was examined for each of the predictor variables, as a test of multicollinearity within the model. Variables with a VIF greater than 2.5 were not included in the final models. As recommended by Peng et al. (2002), the logistic regression models were evaluated through an examination and interpretation of the overall fit of the regression models and diagnostic statistics. Evaluation of the logistic regression models involved an examination of the chi square goodness of fit and predicted probabilities (PCP). Next, beta weights, standard errors, the Wald chi-square statistic, associated *p*-values, and odds ratios were examined and interpreted for significant relationships (Garson 2008).

Logic of Regression Models

Four logistic regression equations were used in addressing the research questions. The first model tested the predictive nature of the set of variables underlying the five blocks in the conceptual framework (*demographic variables, pre-college variables, socio-cultural variables, environmental variables,* and *academic experiences*) for Hispanic students at the end of year two. The second equation tested the same set of variables in the conceptual framework for Hispanics students at the end of year three. Included in the fifth block—

Table 1 Logistic model specifications

Variables	Coding
Demographic variables	
Gender	*Male = 0, Female = 1
Type of Hispanic origin	*Mexican or Chicano descent = 0, Other or mixed Hispanic origin = 1
English is primary language	No = 0, *Yes = 1
One or both parents born in US	No = 0, *Yes = 1
Pre-college variables	
High school math courses taken	5 category variable representing highest level of math class taken: None of these = 1, Calculus = 5
High school grade point average	7 category variable representing GPA range:.5 to .9 = 1, 3.5 to 4.0 = 7
Delayed enrollment in college	Yes, delayed enrollment = 0, *No, entered college immediately following high school = 1
Socio-cultural variables	
Parental education	10 category variable representing highest level of parental education: Did not complete high school = 1, Doctoral degree or equivalent = 10
Importance of being a community leader	In 2004, whether the student indicated it was or was not important to be a community leader: No = 0, *Yes = 1
Importance of influencing political structure	In 2004, whether the student indicated it was or was not important to influence the political structure: No = 0, *Yes = 1
Community service participation	In 2004, whether or not the student participated in any community service: No = 0, *Yes = 1
Environmental pull factors	
Amount of financial aid received	5 category variable representing the total amount of financial aid received in 2003–2004: Did not receive financial aid = 0, 1 to 1000 dollars = 1, 1001–2000 = 2, 2001–3000 = 3, 3001–4000 = 4, 4001 to highest value = 5
Number of hours worked per week	Continuous variable representing the average number of hours worked per week (range 0 to 60)
Enrollment intensity	2 category variable representing the students enrollment intensity through 2006: *Part-time = 1, Mixed or Full-time = 2
Academic experiences	
Attended a Hispanic serving institution	Attended a HSI = 0, *Did not attend a HSI = 1
Time with a faculty member	3 category variable representing in 2004, the frequency of talking with faculty outside of class: Never = 1, Sometimes = 2, Often = 3
Time with academic advisor	3 category variable representing in 2004, the frequency of meeting with an academic advisor: Never = 1, Sometimes = 2, Often = 3
Grade point average (GPA)	Continuous variable representing students' grade point average in 2003–2004 (mean = 2.77, standard deviation = .822)
Developmental course enrollment	*Student took any remedial course in 2003–2004: Yes = 0, *No = 1
Outcome variables	
Student success in second year of college	Persistence, transfer or attainment anywhere 2004–2005: No = 0, *Yes = 1
Student success in third year of college	Persistence, transfer or attainment anywhere 2005–2006: No = 0, *Yes = 1

* Reference category

academic experiences—was the variable that indicated whether the student had enrolled in a developmental course or not in each academic year with the intent of establishing if enrollment in a remedial class played a role in student success.

Because enrollment in a developmental course was found to be significant in year 2 but not in year 3, it was decided to split the students into two groups, those categorized as developmental students and those categorized as non-developmental students to ascertain differences in the significance, magnitudes, and directions in the hypothesized sets of variables between the two groups for each academic year. The third and fourth regression equations were used to examine those differences.

Results

Descriptive Findings

Of the 570 Hispanic students who first attended a community college in 2003–2004 with the intention of transferring to a 4-year institution, 57% were female and nearly half were of Mexican or Chicano descent (48%). A little more than 10% (12%) of the sample was of Puerto Rican decent, 3% were Cuban, 6% indicated that they were of mixed decent and the remaining 31% classified themselves as "other" Hispanic origin. Nearly half (48%) of the students took Algebra 2 as the highest math course in high school, while 15% took trigonometry and only 12% completed calculus prior to attending college. Moreover, 54% of the sample completed high school with less than a "B" grade point average (i.e., less than 3.0). Nearly half (42%) of the students delayed entering college, 40% indicated that English was not their primary language, and less than half attended college full-time (47%). In addition, 52% of the sample took one or more developmental courses during their first year of college and 41% attended a community college classified as an HSI. Furthermore, half of the respondents indicated that their parents did not attend college. Slightly more than a third (35%) of the students were not successful in persisting or transferring to another institution in the second year of college and 41% did not persist or transfer in the third year.

Findings of chi-square and *t*-tests revealed several significant differences among developmental and non-developmental students. Delayed enrollment in college was found to be significantly related to taking developmental courses $\chi^2(1, n = 570) = 4.568, p < .05$, with a higher percentage of students who required remediation not delaying college enrollment. Similarly, student success in the second year was not found to be independent of enrolling in developmental coursework $\chi^2(1, n = 570) = 6.500, p < .05$, with developmental students more likely to be successful in the second year. Finally, non-developmental students were found to have a significantly higher GPA in the first year of college $t(570) = 2.563, p < .05$.

Logistic Regression Analyses

Predicting Success in the Second Year of College

The first analysis examined the influence of demographic, pre-college, socio-cultural capital, environmental pull factors, and academic experiences on whether Hispanic students persisted, transferred, and/or earned an associates' degree in the second year of college. Table 2 displays the parameter estimates, significance values, standard errors, odds ratios, and fit statistics for the final regression models. Results indicated each block

Table 2 Logistic regression models: parameter estimates and model evaluation—analysis split by year

	b	S.E.	Odds ratio[a]
Student success in year 2 (n = 570)			
Demographic variables			
Gender	−.332	.198	
Type of Hispanic origin	−.351	.206	
English is primary language	.052	.253	
One or both parents born in US	.349	.251	
Pre-college variables			
High school math courses taken	.224*	.096	1.252
High school grade point average	.004	.102	
Delayed enrollment in college	−.408*	.204	.665
Socio-cultural variables			
Parental education	.131**	.043	1.140
Importance of being a community leader	.012	.207	
Importance of influencing political structure	−.398	.230	
Community service participation	.292	.217	
Environmental pull factors			
Amount of financial aid received	.118*	.049	1.125
Number of hours worked per week	−.022***	.006	.978
Enrollment intensity	1.010***	.222	2.745
Academic experiences			
Attended a Hispanic serving institution	.391	.211	
Time with a faculty member	.014	.165	
Time with academic advisor	.080	.158	
Grade point average	.173	.122	
Developmental course enrollment	.475*	.197	1.608
Model evaluation			
−2 Log likelihood for final model	638.76		
χ^2	98.56***		
Cox and Snell R^2	.160		
Nagelkerke R^2	.219		
P.C.P	72.5%		
Student success in year 3 (n = 570)			
Demographic variables			
Gender	−.320	.188	
Type of Hispanic origin	−.197	.196	
English is primary language	−.024	.238	
One or both parents born in US	.315	.236	
Pre-college variables			
High school math courses taken	.209*	.089	1.232
High school grade point average	−.041	.097	
Delayed enrollment in college	−.408*	.194	.665
Socio-cultural variables			
Parental education	.140**	.041	1.151

Table 2 continued

	b	S.E.	Odds ratio[a]
Importance of being a community leader	.010	.196	
Importance of influencing political structure	−.182	.221	
Community service participation	.141	.206	
Environmental pull factors			
Amount of financial aid received	.049	.046	
Number of hours worked per week	−.022***	.006	.978
Enrollment intensity	.456*	.202	1.577
Academic experiences			
Attended a Hispanic serving institution	.406*	.201	1.500
Time with a faculty member	.068	.155	
Time with academic advisor	−.020	.149	
Grade point average	.267*	.116	1.306
Developmental course enrollment	.306	.187	
Model evaluation			
−2 log likelihood for final model	693.58		
χ^2	72.89***		
Cox and Snell R^2	.121		
Nagelkerke R^2	.163		
P.C.P	66.1%		

[a] Odds ratios only reported for statistically significant coefficients

* $p < .05$; ** $p < .01$; *** $p < .001$

significantly improved the fit of the model. Moreover, the overall model was found to be significant $\chi^2(19, n = 570) = 98.555$, $p < .001$ and yielded correct predictions for 73% of the sample. A review of the parameter estimates and associated probabilities identified that the likelihood of being successful in the second year of college was uniquely influenced by the level of math courses taken in high school, delaying enrollment in college, parental education levels, the amount of financial aid received, enrollment intensity, the number of hours students worked per week, and enrolling in developmental courses.

An examination of the direction of the odds ratios indicated that enrolling in higher math courses during high school, having parents with higher levels of education, and receiving more financial aid increased the odds of being successful. Conversely, delaying enrollment in college and working more hours were both found to decrease the odds that a student would persist, transfer or earn an associate's degree in 2 years. In addition, the odds of being successful were found to be 2.75 times as large for students who enrolled in college full time and 1.61 times as large for students who enrolled in developmental courses.

Predicting Success in the Third Year of College

The second regression examined the influence of the above mentioned variables on whether a student was still enrolled, transferred to another institution, and/or earned an associate's degree in the third year of college. Results indicated pre-college variables, socio-cultural capital, environmental pull factors, and academic experiences significantly improved the fit

of the model, which was found to be significant $\chi^2(19, n = 570) = 72.888, p < .001$ and yielded correct predictions for 66% of the sample. Similar to the second year, high school math courses, delaying enrollment in college, parental education, the number of hours worked, and enrollment intensity uniquely influenced success in the third year of college. In addition, attending a HSI and students' GPAs in the first year of college were found to be significantly related to success in the third year of college. More specifically, odds of being successful were found to be 1.50 times as large for students who chose to attend an HSI and a one-unit increase in GPA increased the odds of success in the third year by a factor of 1.31.

Predicting Success among Non-Developmental Students

The third and fourth regressions examined the influence of the variables that were found to be significantly related to second and third year success for Hispanic students who were not required to take developmental courses. The models were found to be significant for both the second $\chi^2(8, n = 280) = 51.607, p < .001$ and third $\chi^2(8, n = 280) = 53.328, p < .001$ years. The model for the second year correctly predicted 71% of the sample while the third year model correctly predicted 68% of the sample. The likelihood of being successful in the second year of college for non-developmental students was found to be uniquely influenced by the level of math courses taken in high school and environmental pull factors (i.e., number of hours worked, financial aid, enrollment intensity). It is notable that the odds of being successful were 3.69 times as large for non-developmental students who enrolled in college full-time. Similarly, success in the third year of college was found to be significantly related to high school math courses, the number of hours worked per week, and enrollment intensity. Parental education, as a form of social-cultural capital, was also found to uniquely predict student success among non-developmental students in the third year (see Table 3).

Predicting Success Among Developmental Students

The last two regressions examined the influence of the variables that were found to be related to second and third year success for students who enrolled in developmental courses. Once again, both models were found to be significant for both the second $\chi^2(8, n = 300) = 34.599, p < .001$ and third $\chi^2(8, n = 300) = 16.622, p < .05$ years. The model for the second year correctly predicted 72% of the sample while the third year model correctly predicted only 65% of the sample. Similar to non-developmental students, all three environmental pull variables (number of hours worked, financial aid, enrollment intensity) were found to uniquely influence the success of developmental students in the second year of college. In addition, parental education levels were found to be significantly related to success in the second year for developmental students. In contrast, none of the variables found to be related to the overall sample were found to be significantly related to student success for developmental students in the third year (see Table 4).

Limitations

The results should be considered in light of several data limitations. First, the BPS 04:06 does not include additional variables that previously have been found to impact the success

Table 3 Logistic regression models: parameter estimates and model evaluation—analysis split by developmental status (year 2)

	Developmental students ($n = 300$)			Non-developmental students ($n = 280$)		
	b	S.E.	Odds ratio[a]	b	S.E.	Odds ratio[a]
Student success in year 2						
Pre-college variables						
High school math courses taken	−.001	.135		.420**	.132	1.523
Delayed enrollment in college	−.486	.280		−.289	.276	
Socio-cultural variable						
Parental education	.164**	.059	1.178	.067	.058	
Environmental pull factors						
Number of hours worked per week	−.018*	.009	.983	−.029**	.009	.971
Amount of financial aid received	.153*	.069	1.165	.131*	.065	1.141
Enrollment intensity	.698*	.295	2.009	1.306***	.325	3.692
College variables						
Attended a Hispanic Serving Institution	.402	.285		.147	.290	
Grade point average	.297	.169		.012	.166	
Model evaluation						
−2 Log likelihood for final model	324.49			320.11		
χ^2	34.60***			51.61***		
Cox and Snell R^2	.112			.171		
Nagelkerke R^2	.158			.231		
P.C.P	71.9%			70.5%		

[a] Odds ratios only reported for statistically significant coefficients

* $p < .05$; ** $p < .01$; *** $p < .001$

of Latino students such as educational hopes and aspirations (Cabrera et al. 1993; Nora et al. 1992; Zurita 2004), perceiving prejudice or discrimination on campus (Cabrera and Nora 1994; Nora et al. 1992; Nora and Cabrera 1996), or support from *la familia* (Castellanos and Jones 2004; Hurtado et al. 1996). As such, these variables could not be considered in the conceptual model. Second, the dataset limited our ability to consider students' perceptions of developmental coursework or institutional policies or programs that may have been related to student success. Although a more longitudinal measure of student success was desired, the BPS: 04/06 data currently has data available for students through the third year of college. Finally, the operational definition of student "success" did not allow for an examination how the predictor variables may have a different impact on student outcomes that are more narrowly defined (e.g., students who persisted but did not transfer, students who persisted and earned a 2-year degree).

Discussion

Four major comparisons are the focus of this section, each comparison centered on the similarities and differences in student success among the groups being compared. The first

Table 4 Logistic regression models: parameter estimates and model evaluation—analysis split by developmental status (year 3)

	Developmental students (n = 300)			Non-developmental students (n = 280)		
	b	S.E.	Odds ratio[a]	b	S.E.	Odds ratio[a]
Student success in year 3						
Pre-college variables						
High school math courses taken	.024	.124		.340**	.128	1.405
Delayed enrollment in college	−.333	.259		−.460	.273	
Socio-cultural variable						
Parental education	.101	.052		.170**	.059	1.185
Environmental pull factors						
Number of hours worked per week	−.014	.008		−.035***	.009	.965
Amount of financial aid received	.059	.063		.073	.065	
Enrollment intensity	.257	.264		.694*	.305	2.002
Academic experiences						
Attended a Hispanic Serving Institution	.395	.262		.268	.286	
Grade point average	.233	.157		.276	.168	
Model evaluation						
−2 Log likelihood for final model	369.22			324.40		
χ^2	16.62*			53.33***		
Cox and Snell R^2	.055			.176		
Nagelkerke R^2	.075			.236		
P.C.P	65.1%			67.6%		

[a] Odds ratios only reported for statistically significant coefficients

* $p < .05$; ** $p < .01$; *** $p < .001$

comparison considers factors that were found to significantly impact a more global definition of student success for years 2 and 3. Consistent with previous research on Hispanic community college students (e.g., Arbona and Nora 2007), the academic preparation of students in high school mathematics courses was found to be associated with student success in both years 2 and 3. Similarly, results from the present study parallel previous research (e.g., Adelman 2006, 1999) that indicates delaying enrollment into a postsecondary institution immediately after graduating from high school negatively impacts the likelihood of transferring or earning a credential.

Parental education levels, as a form of social capital, were also found to be positively related to success for Hispanic community college students. Moreover, community college students who are financially fortunate enough to enroll full-time were significantly more likely to be successful at the end of years 2 and 3. Related to the inability to enroll full-time is the need to work at the same time that the student is attending college. Unfortunately, this circumstance was found to negatively impact the likelihood of student success.

Some Hispanic students enter community colleges with the social and cultural capital to keep them enrolled in college and influence their educational aspirations to transfer, earn a college credential, or both. However, consistent with early research on Hispanic students (e.g., Nora and Rendon 1990; Nora and Wedham 1991), findings of this study indicate that even stronger socioeconomic conditions and financial circumstances may delay the

student's entrance into higher education, forcing the student to work a substantial number of hours, and to engage the academic and social environment of the college which they are attending merely as part-time students. In turn, these environmental factors collectively were found to "pull" Hispanic students away from successfully transferring or persisting.

In past studies, the receipt of financial support has been consistently shown to have a positive effect on student persistence (e.g., Cabrera et al. 1993; Cabrera et al. 1990; Logerbeam et al. 2004), and was substantiated by success in the second year in the present study. There are many plausible reasons why financial assistance was not found to be significant in the third year. One such speculation, for example, is that students come to rely on financial packages upon entering college. However, those grants that are available to students oftentimes do not come close to covering college costs. In those cases, students may be forced to apply for loans that can add up rather quickly (leading to debt aversion) and forcing students to seek employment off-campus. Students come to depend more on work if those costs cannot be met more effectively through financial aid. The sad fact is that as students work more and more hours to meet their educational expenses, the increase in the number of hours that they work pulls them away from accomplishing their educational goals.

Another factor that exerted its influence in only the second year was enrollment in developmental coursework. Adding to the literature on developmental education, the current study establishes enrollment in at least one developmental course as having a positive impact on student success. Students who required remediation in at least one area and were placed in a developmental course were found to benefit from that experience up until the end of their second year in college. In addition, the likelihood of transferring or earning a credential was increased for those that needed some form of remediation.

For the third year, Latino community college students were positively affected by two factors that did not make a difference in prior years, including attending an HSI and their academic performance in college (i.e., GPA). It could be speculated that attending a more culturally-sensitive institution where the campus climate fosters a sense of belonging (Hurtado and Ponjuan 2005) directly or indirectly impacted Latina/o student success. Previous research tells us that when students feel that they are welcomed and that they belong on a campus, their academic achievement is evident in the form of their GPA's (Nora and Cabrera 1996; Nora et al. 1996).

These findings are not particularly startling and serve to further substantiate previous findings in the literature that have primarily utilized students attending public 4-year institutions. What is more interesting in the current study are the findings related specifically to Hispanic students attending 2-year institutions and enrolled in developmental education. Currently, there is very little that is known regarding the academic performance, student adjustment, and persistence of Latino students who are required to take developmental courses upon entering college.

In an effort to tease out the differences between developmental and non-developmental students, the analysis was conducted separately for each group by each year. Similar to the analysis for the entire sample, environmental pull-factors (i.e., working too many hours, not receiving enough financial aid to pay for college, and enrolling part-time in college) negatively affected the success of both developmental and non-developmental students, thereby affirming the importance of including this construct in theoretical models for different groups of traditionally underserved students. The differences were found for two other factors—previous high school preparation in mathematics and parental education (a proxy for social capital). For development students, the lack of impact from high school math courses may represent a lack of access to advanced math courses in high school or a

lack of encouragement and support to engage in a stronger academic curriculum while in high school.

The second factor, parental education, is a different story. This variable was found to be significant for developmental students but not for non-developmental students. If one considers the educational attainment of parents as a proxy for social capital, the finding makes sense. For those students requiring developmental coursework, if their parents reported higher levels of educational attainment, that form of social capital may have influenced developmental students in the form of support and encouragement to succeed (in spite of the challenges associated with enrolling in developmental coursework).

It is also important to examine the differences between years 2 and 3 for Hispanic developmental students, as variables in the model were useful in predicting the likelihood of success only for the second year. The amount of time spent at work, the amount of financial assistance received, full-time enrollment status, and the level of social capital with regard to parental education were all found to impact the persistence, transfer, or degree attainment of Hispanic community college students during their second year of college. However, none of those influences carried over to the following year. As such, additional research is needed to investigate the factors influencing the success of Hispanic community college students enrolled in developmental coursework beyond the second year in college (e.g., family support, mentoring).

Turning to non-developmental Hispanic students, the positive influences exerted by academic preparation in high school, the ability to enroll as a full-time student, and non-dependence on a job to meet the costs of an education were felt during both the second and third years. The only differences among non-developmental students in years 2 and 3 was the educational attainment of parents (significant only in year three) and the amount of financial aid received (significant only in year two). It is believed that a higher level of educational attainment on the part of the parents exerts positive pressure on non-developmental students to remain committed to the goal of degree attainment, be it through transferring to a baccalaureate degree-granting institution or through the attainment of an associate's degree. These commitments to that goal may be so strong that even when financial assistance may not be available, the desire to earn a college degree or credential overcomes the negative influence of financial circumstances.

Concluding Remarks

The present study is intended to inform policy and intervention efforts aimed at achieving equity in higher education among Hispanic students by providing empirically and theoretically-based evidence regarding the academic preparation, experiences, and success of Latina/o community college students. More specifically, the findings reveal three major conclusions regarding Latina/o success. The first centers on the variables represented in the theoretical framework. There are a common set of factors that previously have been found to impact different measures of success for students enrolled at 4-year institutions that are substantiated for Hispanic developmental and non-developmental community college students. As such, the findings contribute to the existing theory on Latino students.

Second, the findings support the influence of environmental pull-factors as important for both developmental and non-developmental students, substantiating the need for additional financial support for Latino students entering higher education. Finally, while there were a common set of variables that impacted student success for developmental and non-developmental students, factors included in the present study were more influential early

on for developmental students. This third conclusion implies some identified set of variables might be impacting developmental students' success beyond the first 2 years, such as institutional policy surrounding developmental students.

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