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Factors Predicting the Educational Outcomes of Baccalaureate
Aspirants Beginning at Community Colleges

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Abstract

Utilizing the National Education Longitudinal Study of 1988, this study tested logistic regression models to predict transfer, baccalaureate attainment, and persistence among bachelor's degree-seeking community college entrants. A multiple regression model predicting academic achievement at four-year institutions was also estimated. Results indicate that SES, perceived value of education, enrollment intensity, and community college GPA significantly predict transfer. Baccalaureate attainment is significantly associated with gender, race, high school curriculum, perceived value of education, community college GPA, and math remediation. Perceived locus of control, remediation in reading, and community college GPA are significant predictors of persistence. Academic achievement is influenced by gender, race, high school test score, self-concept, perceived value of education, community college GPA, enrollment intensity, social involvement, and co-enrollment.

Factors Predicting the Educational Outcomes of Baccalaureate Aspirants Beginning at Community Colleges

Throughout the twentieth century, access to postsecondary education in the United States was drastically increased. The availability of community colleges contributed to this expansion of educational opportunities significantly. Currently, community colleges enroll over ten million students every year, nearly half of all credit-earning undergraduate students (Bailey & Morest, 2006). For a large number of these students, access to community colleges represents an alternative route to the bachelor's degree or higher, by means of transferring to a baccalaureate institution (Bailey & Morest, 2006; Hoachlander, Sikora, Horn, & Carroll, 2003). On the other hand, in many four-year colleges and universities, community college transfer students form a substantial student subpopulation. Characteristics associated with the educational success of these students, therefore, are important factors to be taken into account when considering the missions and functions of two-year and four-year institutions.

Research literature focusing on community college enrollees has largely pointed to the negative effect of attending community colleges on bachelor's degree attainment (e.g. Christie, 1999; Crook & Lavin, 1989; Dougherty, 1987, 1994; Ganderton & Santos, 1995; Rouse, 1995; Whitaker & Pascarella, 1994; see Adelman, 1999; Lee, Mackie-Lewis, & Marks, 1993, for exceptions). Based on their review of research evidence over three decades, Pascarella and Terenzini (2005) concluded that "students seeking a bachelor's degree who begin their college careers in a two-year public institution continue to be at a disadvantage in reaching their education goals compared with similar students entering a four-year college or university" (p. 381). Prior research has also indicated that community college students who transfer to four-year institutions are disadvantaged in terms of academic achievement and degree attainment in

comparison to their counterparts who entered as freshmen (e.g. Best & Gehring, 1993; Cejda, 1994, 1997; Glass & Harrington, 2002; Hills, 1965; Zhai & Newcomb, 2000).

This obvious disadvantage associated with community college attendance represents an obligation among higher education researchers to look within the community college student group in identifying the factors that affect these students' educational attainment. There has been abundant empirical evidence to confirm repeatedly that community college beginners fare less satisfactorily than four-year beginners. Not as much empirical focus, however, has been placed on studying community college students in their own right to examine what exactly influences their attainment. Focusing on baccalaureate aspirants beginning at community colleges, this study explores factors associated with their transfer, attainment, persistence, and GPA at four-year institutions. Educational attainment is generally defined as the number of years of schooling completed or degrees earned (Pascarella & Terenzini, 2005). In this particular study, educational attainment refers to eventual bachelor's degree attainment. Transfer, persistence, and GPA at four-year institutions are included as outcome variables because they are close correlates to degree attainment. Restricting the sample to baccalaureate aspirants, rather than using degree aspirations as a control variable, permits the conceptual framework and the choice of variables to concentrate on factors and attributes that might be uniquely associated with this particular group of students.

Specifically, this study seeks to answer the following research questions:

1. For baccalaureate aspirants beginning at community colleges, how do their precollege characteristics, their experiences while matriculating at college, as well as environmental factors affect the probability of transferring to baccalaureate-granting institutions?
2. For those baccalaureate-aspiring students who successfully transfer to four-year

institutions, how do these modeled characteristics affect the probability of attaining a bachelor's degree?

3. For those baccalaureate-aspiring students who successfully transfer to four-year institutions, how do these modeled characteristics affect student college persistence?

4. For those baccalaureate-aspiring students who successfully transfer to four-year institutions, how do these modeled characteristics affect their academic achievement at four-year institutions?

Conceptual Framework and Relevant Literature

The theoretical model guiding this study conceptualizes the influences of precollege characteristics, psychological attributes, postsecondary educational experiences, as well as environmental factors in predicting the transfer and educational outcomes of baccalaureate aspirants. This model provides the conceptual and analytic underpinnings of the proposed research by integrating college persistence literature, empirical evidence on community college student outcomes, as well as theories in psychology (see Figure 1).

[Insert Figure 1 about here]

Three broad sets of variables are theorized to influence the educational outcomes of baccalaureate aspirants beginning at community colleges: precollege characteristics, postsecondary educational experiences, and environmental factors. Three groups of precollege characteristics are hypothesized to affect the probability of student transfer and eventual educational outcomes: demographic background, academic preparation, and psychological attributes.

Demographic Background

Student demographic background variables include gender, race/ethnicity, and

socioeconomic status (SES). Most of the models discussed in the student persistence literature have explored the contribution of these entry characteristics on the probability of staying in college and, ultimately, attaining a degree (e.g. Adelman, 1999; Tinto, 1993). Extensive empirical research has confirmed the pronounced impact of these characteristics on the educational outcomes of the general student population (Pascarella & Terenzini, 1991, 2005). Specific to community college students, prior research has also indicated that gender, SES, and race/ethnicity influence the likelihood of transfer as well as educational attainment (e.g. Lee & Frank, 1990; Velez & Javalgi, 1987).

Academic Preparation

Academic preparation in the model is represented by high school academic ability, measured by cognitive test scores, and academic resources, measured by high school curriculum track. Prior studies have shown that high school academic ability is one of the determinants of student college success (e.g. Eskew & Faley, 1988; Grabe & Latta, 1981). Recent literature also suggests that apart from grades, the academic resources students bring to college have emerged as one of the strongest predictors of transfer to a four-year institution among community college students (Hoachlander et al., 2003) and bachelor's degree attainment (Adelman, 1999).

Psychological Attributes

A common limitation of existing persistence models is that most of the factors included in the models are external rather than internal to students. Even when considering student entry characteristics, most operationalized definitions of these characteristics are limited to family background, race/ethnicity, gender, and prior academic achievement only. Including student precollege attitudinal and motivational traits, an important internal dimension shaping individual behaviors, is especially relevant for studying baccalaureate aspirants beginning at community

colleges, who, by nature of their more complicated path to the bachelor's degree, obviously encounter more barriers and have to deal with more challenges as they experience additional transitioning in postsecondary education. It seems reasonable to assume that students who are successful in transferring and then negotiating the complex process of transitioning from one educational setting (the community college) to another (the four-year institution) are an especially motivated and resilient group (Lee et al., 1993). These qualities are difficult to capture with the measures traditionally incorporated in educational research, such as race/ethnicity and academic preparation. Therefore, this study's conceptual model also includes a set of precollege psychological attributes, namely perceived locus of control, self-concept, and perceived value of education, as predictor variables.

Rooted in social learning theory (Lefcourt, 1981, 1982, 1983; Rotter, 1966, 1975), the concept of locus of control attempts to explain a person's sense of control (internal locus of control) or lack of control (external locus of control) over his or her environment. Locus of control as a psychological construct is often studied in conjunction with academic outcomes (Pascarella & Terenzini, 1991; Perry, 1991). Research on the effect of internal locus of control has addressed academic achievement (Findley & Cooper, 1983; Grimes, 1997; Kaiser, 1975; Martin & Bowman, 1985), self-motivation (Nelson & Mathias, 1995), and educational and occupational attainment (Li-Ya, Kick, Fraser, & Burns, 1999). Substantial evidence has also pointed to the importance of internal locus of control for the academic development and outcomes of college students (Gifford, Mianzo, & Bricerio-Perriott, 2006; Grimes, 1997; Martin & Bowman, 1985). There is reason to believe, therefore, that internal locus of control, as baccalaureate aspirants perceive themselves, may play a positive role in determining whether they can successfully negotiate the complicated process of persisting to their degree goals.

Self-concept refers to the individual's thoughts and feelings with reference to self (Rosenberg, 1986), and has a profound impact on student future success (Goleman, 1995; McClelland, 1993). Though the research evidence on self-concept has been largely derived from the studies of preschool, elementary, and secondary school students, existing research on college students has also shown self-concept to be important in explaining educational outcomes (Smart & Pascarella, 1986). It is reasonable to argue that the baccalaureate aspirants who have positive self-concept are more likely to follow their educational goals than those with similar abilities and backgrounds but with negative self-concept.

A third psychological attribute included in the model is perceived value of education. This construct draws upon the expectancy-value theory. Motivation theorists in this tradition believe that individuals' choice and persistence in a given activity can be explained by beliefs about how well they will perform on the activity (expectancy), and the extent to which they value the activity (value) (Atkinson, 1957, 1964; Atkinson & Feather, 1966; Wigfield, 1994; Wigfield & Eccles, 1992). The value component of this theory is particularly important, as the motivation for achieving a certain outcome is largely determined by the value people place on it (Tuckman, 1999). Therefore, considered from this theoretical perspective, the amount of effort students put in achieving a bachelor's degree depends partly on their perceived possibility of obtaining the degree (expectancy) and perceived importance and value of education (value). Given the fact that the student population of this study is restricted to baccalaureate aspirants, it can be argued that they already attained expectancy by expecting to earn a bachelor's degree. It leaves the value component, students' perceived importance and value of postsecondary education, to further influence how well they progress on the way to the baccalaureate.

Apart from precollege characteristics, students' postsecondary educational experiences at

community colleges and four-year institutions (for those who transferred from community colleges) are also posited to affect their educational outcomes. Prior research has indicated that students' experiences in college may be as important for their persistence to degree goals as their pre-college characteristics (Cabrera, Nora, & Castaneda, 1993; Tinto, 1993). This group of variables in the conceptual model includes student attendance patterns, remediation received, college involvement, as well as academic performance at community colleges.

Attendance Patterns

Attendance patterns include enrollment intensity—whether students attended community colleges or four-year institutions full-time, and simultaneous enrollment—whether students had enrolled in multiple institutions simultaneously during their postsecondary education career. Whether students choose to enroll full-time or part-time not only points to the amount of time students might be able to engage in academic learning, but also may be an indicator of students' psychological commitment to their educational experience. Therefore, whether students enroll full-time or not could very likely have some effect on their achievement and future attainment. Existing empirical studies have also confirmed that full-timers are more likely to persist and attain a credential in postsecondary education (Berkner, Cuccaro-Alamin, & McCormick, 1996; Horn & Premo, 1995). In addition, there has been a dramatic rise in the rates of simultaneous enrollment during the past two decades (Pascarella & Terenzini, 2005), and these students' characteristics and success have received some empirical interest. Currently, there is one study suggesting that simultaneous enrollment is positively related to bachelor's degree attainment and persistence (Peter & Forrest Cataldi, 2005). According to the authors, simultaneous enrollment, or co-enrollment, appeared to be positively related to their rates of persisting and attaining a bachelor's degree, especially among students who began at four-year institutions. However,

empirical research exploring how this enrollment pattern impacts student educational outcomes is still minimal. In particular, the effect of simultaneous enrollment on the student body of this study's interest remains unknown. Examining how this enrollment pattern affects student educational outcomes would add to the very limited literature on simultaneous enrollment in multiple institutions.

Academic Performance

Academic performance early on during college years has been proved to be the single strongest predictor for degree attainment (Pascarella & Terenzini, 1991, 2005). Voluminous studies have found that early academic performance during postsecondary education plays a significant role in explaining final degree completion (e.g. Adelman, 2006; Desjardins, Kim, & Rzonca, 2003; Reason, 2003). In this study, early academic performance in postsecondary education is represented by student grade point average (GPA) at community colleges, the first postsecondary institutions students attended.

Remediation

For many community college students and community college transfers, remediation is often a necessary part of the curriculum. Open access has brought to community colleges a large number of lower-income, minority, and immigrant students, many of whom arrive at community colleges academically under-prepared (Cohen & Brawer, 2003). These students must be provided with a fair amount of remedial work. Despite the evident need for remedial education, however, there has not been conclusive evidence on the effectiveness of remediation. Much empirical research has indicated that remedial interventions appear to promote persistence and degree completion (Pascarella & Terenzini, 2005). However, some other studies have suggested the opposite: that enrolling in remedial courses has a negative effect on graduation and degree

attainment (Adelman, 1999; Bailey & Alfonso, 2005). This study contributes to this research debate by investigating the effect of remediation on the educational outcomes of baccalaureate aspirants. Moreover, the study's emphasis on, and distinction between, the two most prominent forms of remediation, math and reading, help generate differentiated knowledge in terms of the effects of different kinds of remediation.

College Involvement

Student college involvement is another dynamic that warrants attention when examining bachelor's degree seekers' educational attainment. According to Astin, student involvement refers to "the amount of physical and psychological energy that the student devotes to the academic experience" (1984, p.518). Much research has suggested that student involvement and integration on campus are key to persistence to degree (e.g. Bean, 1990; Swail, Redd, & Perna, 2003; Tinto, 1993). The effect of student involvement has been extensively studied in the area of college student development. Many empirical studies revealed that college student involvement is positively related to their educational and personal development. In addition, what students engage themselves in doing during college years has an even greater effect on desired student outcomes than student background characteristics and institutional characteristics (Astin, 1993; Pascarella & Terenzini, 1991). However, available knowledge about student involvement is by and large based on research conducted on the more "traditional" student population: Students who enter a four-year institution as freshmen. Given the critical role of college involvement for traditional students exhibited by existing literature, it would be interesting to explore how college involvement might influence the final educational outcomes of community college transfers.

Environmental Factors

Environmental factors and external demands may play a role in shaping student persistence

and outcomes. Working long hours and having dependents might restrain students from achieving their educational goals. Bean (1990) and Bean and Metzner (1985) suggested that environmental variables such as hours of employment and family responsibilities may interact with other factors to cause students to persist in postsecondary education or leave college. Previous studies have also found that such circumstances as employment and having dependents pull students away from full integration to postsecondary education (Nora, Cabrera, Hagedon, & Pascarella, 1996; Nora & Wedham, 1991). To control for the potential influences of these external demands, the conceptual model also includes such environmental factors as work hours and whether students have dependents.

Together, these dynamics are presumed to influence the likelihood of bachelor's degree-seekers' educational outcomes.

Research Method

Databases

To explore the proposed research questions, I drew on the data from the National Education Longitudinal Study of 1988 (NELS: 88) and the Postsecondary Education Transcript Study (PETS). Initiated by National Center for Education Statistics (NCES), NELS: 88 followed a nationally representative sample of eighth graders first surveyed in the spring of 1988. PETS, a supplementary study of NELS: 88/2000, was conducted in 2000 to collect information on postsecondary education experience and enrollment. Transcripts were requested from 3,213 postsecondary schools that NELS: 88/2000 students reported attending during the data collection of either the third or the fourth follow-up. NELS: 88/2000 and PETS contain rich information that allows researchers to examine student access to postsecondary institutions, persistence, and completion of postsecondary degrees. In addition, NELS's unique merit is that it includes student

psychological variables, college involvement questions, as well as official transcript information on remediation courses which are all of substantial interest to this study.

Sample

Among the 12,144 cases in the NELS: 88/2000 database, over 2,300 students (approximately 20%) enrolled in a community college during 1992 and 1993, soon after high school graduation. For the purpose of this study, only community college entrants who expected to complete a bachelor's degree or higher were retained. As a result, 1,421 cases (roughly 62% of the community college sample) make up the initial dataset. Appropriately weighted, this sample is representative of baccalaureate-aspiring high school graduates of 1992 who entered community colleges soon after completing high school.

Measures

Dependent variables

There are four dependent variables in this study, three dichotomous and one continuous. Given the study's primary focus on the transfer and final educational attainment of bachelor's degree-seeking community college students, the first two dependent variables, both dichotomous, include whether a student transfers to a four-year institution (a dummy variable that equals to one if the student transfers to a baccalaureate-granting institution and zero otherwise) and whether a student attains a bachelor's degree (a dummy variable that equals to one if the student attains a bachelor's degree and zero otherwise). Another two dependent variables are persistence and academic achievement at four-year institutions. Persistence is considered to be the progressive college reenrollment either continuous from one term to the next or temporarily interrupted and then resumed (Pascarella & Terenzini, 1991). Following this definition, persistence is measured as a dummy variable that equals to one if the student's college enrollment is progressive and zero

otherwise, as suggested in the transcript record. Academic achievement at four-year institutions (measured by college GPA) is also modeled as a continuous dependent variable.

Most of the independent variables are either directly available in NELS or PETS or can be logically derived from existing variables in the datasets. I performed a principal component analysis on the items that were designed to represent locus of control and self-concept. I used direct Oblimin rotation method in an effort to make the factors more interpretable while accounting for the inter-correlation between the two factors. As predicted, two factors emerged, in a substantive way representing self-concept and perceived locus of control. I kept survey items with factor loadings of .50 or higher and dropped those with lower loadings from the analysis. As a result, I retained ten individual items, with five loaded on each of the two constructs. Based on these items, I created two summated scales to represent students' self-concept and perceived locus of control. Reliability of the scales is represented by internal consistency. I used Cronbach's alpha to assess the internal reliability of the items by domain. The alpha values for the two scales are both above 0.70, which indicates that the scales are fairly reliable (DeVellis, 1991). The appendix provides a description of the variables that comprise the factors, alpha reliability coefficients, and respective factor loadings.

Descriptive statistics and the definitions of all the independent variables used are presented in Table 1.

[Insert Table 1 about here]

Analytic Strategies

The NELS: 88/2000 survey, like numerous other national surveys produced by NCES, is characterized by data collection through complex survey design. As such, there are two analytical issues associated with the use of data collected through complex sampling designs: the

representativeness of the sample being analyzed and the correct assessment of population variances that form the basis for the identification of statistical effects and hypothesis testing (Thomas & Heck, 2001). I addressed these analytical issues in the following manner: I incorporated the appropriate sampling weight variable (F4F2P3WT) in the analyses. This weight generalizes to the NELS: 88/2000 postsecondary education participants with complete postsecondary transcript information for whom data were collected in 1992, 1994, and 2000. To accurately estimate population variances and standard errors, I analyzed the data with Stata, an integrated statistical package that adjusts for complex survey design effects through its survey commands.

After initial data screening and data reduction for the psychological variables, I used a two-stage estimation approach to data analysis. At the first stage, a binomial logistic regression analysis was conducted on the sample consisting of all baccalaureate degree-seeking students starting at community colleges (N = 1,421) to estimate the influence of the set of independent variables in predicting the probability of student transfer to a baccalaureate-granting institution. At the second stage, only those students who successfully transferred to four-year institutions were retained (N = 604). Two separate binomial logistic regression models were used to measure the effects of the same set of independent variables, with the addition of variables on remediation, involvement, and simultaneous enrollment, on the probability of this second sample's attaining a bachelor's degree by 2000, and the probability of enrolling in college in a progressive manner (persistence).

The logistic regression model is specified as a linear model for the natural logarithm of the odds of the outcome occurring:

$$g(\mathbf{x}) = \log\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k, \quad (2)$$

where $g(\mathbf{x})$ is the logit transformation of the odds that the student attained the educational outcome under study (transfer, bachelor's degree, or continuous enrollment), given the set of \mathbf{x} covariates, or predictors, in the models.

In addition, for the fourth research question, the more traditional Ordinary Least Squares (OLS) regression model was estimated to explain student academic achievement at four-year institutions.

Results

Descriptive Statistics

Descriptive statistics for the outcome variables were calculated based on weighted data (see Table 2). Among the baccalaureate aspirants who attended community colleges in 1992 or 1993, 42.5% eventually transferred to a four-year college or university while 57.5% did not transfer. Among those who transferred, 65.2% attained a bachelor's degree by the year of 2000 and 34.8% did not do so by the end of the same time period. Also referring to this population of community college transfers, 77.8% persisted in postsecondary education while 22.2% did not persist. The GPA of community college transfers at four-year institutions has a mean of 2.79, with a standard deviation of 0.49.

[Insert Table 2 about here]

Regression Analyses

Transfer

The first logistic regression analysis examined the likelihood of baccalaureate aspirants' transferring to four-year institutions (coded 1) versus not transferring (coded 0). A set of demographic, precollege, postsecondary education, and environmental predictors were entered into the logistic regression equation simultaneously. Table 3 summarizes the results from the analysis.

[Insert Table 3 about here]

The results from the logistic regression model predicting transfer indicate that, among baccalaureate-aspiring students beginning at community colleges, the likelihood of transferring to four-year institutions is associated with the following factors: SES, perceived value of education, enrollment intensity at community colleges, and GPA at community colleges.

Specifically, controlling for other independent variables in the model, students with higher socioeconomic status are more likely to transfer than students with lower socioeconomic status. For every increase of one quintile in SES, the odds that the student transfers increases by a factor of 1.281, or 1.281 times, when other variables in the model are held constant. The odds of transferring to four-year institutions for a student with strong perceived value of education is estimated to be 3.104 times as large as the odds for a similar (in respect to other covariates in the model) student without such a strong perceived value. In terms of enrollment intensity, the odds of transferring to four-year institutions for students who enrolled in community colleges full-time is 3.097 as large as the odds for students enrolled less than full-time, after partially out the effects of the rest of the independent variables in the model. Also, when community college GPA increases by one point, the odds that the student transfers to a four-year institution increases by a

factor of 3.412, holding other variables constant.

Attaining a bachelor's degree

The second logistic regression model estimated the likelihood of attaining a bachelor's degree among the baccalaureate-aspiring community college transfers. Apart from the predictor variables entered in the first logistic regression model, I also added to this second model a number of college related variables including remediation, college involvement, and simultaneous enrollment to examine their respective impact on student final degree attainment.

The results for the attainment model are presented in Table 4. The results indicate that among community college transfers who accessed postsecondary education through community colleges during 1992 and 1993, the likelihood of attaining a bachelor's degree is significantly associated with some of their demographic characteristics, including gender and race/ethnicity. It should be noted that for analytical practicality, the "Other" race/ethnicity category is an aggregate of Asians, American Indians, and those who reported "Unknown" to the race/ethnicity question. The odds of attaining a bachelor's degree is also significantly predicted by some precollege factors, namely students' high school curriculum track and perceived value of education. In addition, several postsecondary education related variables emerged as significant predictors for baccalaureate attainment: remediation in math, enrollment intensity, and community college GPA.

[Insert Table 4 about here]

In terms of the specific effects of individual predictors, female students are 3.230 times as likely as male students to attain a bachelor's degree, controlling for other variables in the model. Being Hispanic has a negative effect on the likelihood of baccalaureate attainment. Specifically, the odds of obtaining a bachelor's degree for Hispanic students is 0.334 times as large as that for

white students, holding other variables constant, which suggests that white students with similar characteristics on other measures are almost three times as likely to attain a bachelor's degree. This race/ethnicity related attainment gap between "Other" and Whites is even more salient. Students in "Other" category are only 0.154 times as likely as white students to earn a bachelor's degree. In terms of the effect of high school curriculum, it is estimated that students who were on academic curriculum have an odds of attaining a bachelor's degree that is 3.182 times as large as that for students whose high school curriculum is vocational or other, holding other predictors constant. For students who attached great value to education, the odds of earning a bachelor's degree is estimated to be 5.261 times as large as that for those students who did not perceive a strong value of education. The odds of baccalaureate attainment for students who took remedial course in math is only 0.386 times that for students who did not receive remediation in math. Students who transferred to four-year institutions with better GPA from community colleges apparently have better chances to earn a bachelor's degree: a one-point increase in GPA is associated with an increase in the odds of earning the baccalaureate by a factor of 6.508.

Persistence

I entered the same set of independent variables in the last logistic regression model to predict persistence in postsecondary education among the community college transfers. The parameter estimates for the persistence model are reported in Table 5.

[Insert Table 5 about here]

Three independent variables emerged as significant predictors for continuous enrollment in postsecondary education among community college transfers: perceived locus of control, community college GPA, and remediation in reading. Controlling for other predictors in the model, the more internal students perceived locus of control to be, the more likely they persist in

postsecondary education. For one-point increase on the locus of control scale (ranging from 5 to 20, higher scores associated with greater internality of locus of control), the odds that community college transfers continuously enrolled in postsecondary education is estimated to increase by a factor of 1.233. Also, students who earned better GPA from community colleges tend to be more likely to persist when holding other predictors constant. The odds of being continuously enrolled in postsecondary education increases by a factor of 4.152 for a one-point increase in community college GPA. Taking remedial courses in reading is negatively associated with the likelihood of persisting. Students who had remediation in reading are only 0.253 times as likely to persist as similar students who did not take remedial courses in reading. Put in another way of interpretation, students who never had remediation in reading have an odds of persisting that is almost four times as large as that for their counterparts who had remediation in reading.

Academic achievement

In the last step of the analysis, I estimated an OLS regression model to predict community college transfers' GPA at four-year institutions, based on the same set of predictors used in the last two logistic regression models. The results from the OLS regression analysis predicting GPA at four-year institutions are given in Table 6.

[Insert Table 6 about here]

Overall, the model explains 78.86% of the total variance in GPA at four-year institutions ($p < 0.01$). A couple of variables significantly predict community college transfers' GPA at four-year institutions. These are demographic variables including being female and being black, psychological attributes including self-concept and perceived value of education, high school test score, as well as college experiences including full-time enrollment, simultaneous enrollment, community college GPA, and social involvement. Being female is positively related to student

GPA: with all other aspects being equal, a female student's GPA is predicted to be 0.144 higher than that of a similar male student. Being black is negatively associated with GPA. A black student's GPA is predicted to be 0.320 point less than that of a similar white student. Students with positive self-concept do better academically than students with lower self-concept, controlling for other variables. A one-point increase in the self-concept scale (ranging from 5 to 20, higher values associated with more positive self-concept) predicts an increase of 0.015 points in GPA. Additionally, for students with strong perceived value of education, their GPA is predicted to be 0.293 point higher than students without such strong perceived value, holding other predictors constant. A one-point increase in 12th grade standardized test score is associated with a 0.006 point increase in GPA, controlling for other variables in the model. Community college GPA is a strong predictor for GPA at four-year institutions. A one-point increase in community college GPA is associated with 0.611 point increase in GPA at four-year colleges and universities while controlling for the rest of the independent variables in the model. Students who enrolled full-time in four-year institutions are predicted to perform better than students who enrolled less than full-time, holding other variables constant. This difference is about 0.134 point. In addition, students who had enrolled in multiple institutions simultaneously reported a predicted GPA 0.110 higher than that for those who never did, controlling for other variables.

Due to the complex survey design of the data used in this study, Stata does not provide the standardized regression coefficients which are often used to assess the relative importance of significant predictors for the dependent variable. As a result, only unstandardized regression coefficients were reported. This does not necessarily represent poor practice, however, because unstandardized regression coefficients of the predictors are particularly useful when comparing results across different studies and when a researcher develops policy implications based on the

study (Keith, 2006). Nonetheless, the relative importance of the independent variables can still be evaluated through the t -values for the regression coefficients, since comparing t -values is equivalent to considering the reductions in R^2 obtained by eliminating each of the variables and comparing standardized regression coefficients is equivalent to comparing t -values (Bring, 1994). As suggested by the absolute t -values of the significant predictors, community college GPA has the largest effect, followed by perceived value of education, being female, being Black, full-time enrollment, social involvement, test score, self-concept, and simultaneous enrollment.

Discussion

The findings from this study reinforce the notion that the educational outcomes of baccalaureate aspirants who access postsecondary education through community colleges can be explained, to some extent, by the combined influence of various personal, sociological, and psychological factors, as well as student experience in postsecondary education.

Transfer to a Four-year Institution

Baccalaureate aspirants with higher SES are more likely to successfully transfer to four-year institutions, essentially the first step towards their degree goal, than their counterparts from families of less favorable socioeconomic status. Similar findings have been reported in many previous studies that examined the influencers of the probability of transferring from two-year to four-year colleges (e.g. Bailey et al., 2005; Bradburn, Hurst, & Peng, 2001; Velez & Javalgi, 1987). Other demographic variables in the model, namely gender and race/ethnicity, however, exert no significant effects on the probability of transferring to a baccalaureate-granting institution. This finding deviates from the results of the studies from earlier decades in which race/ethnicity and gender were found to be determinants of transferring (e.g. Anderson, 1984; Breneman & Nelson, 1981; Dougherty, 1987; Velez & Javalgi, 1987). Studies based on more

recent national samples, however, have reported the effects of race/ethnicity and gender on the probability of transfer in a much more similar pattern as in the current study. That is, it is the disadvantage in SES, rather than race/ethnicity and gender, that impedes community college students from transferring (Lee & Frank, 1990; Nora & Rendon, 1990). This confirmed positive effect of SES on transferring highlights the fact that even though the availability of community colleges has provided an easy and alternative access to postsecondary education for those high school graduates seeking a bachelor's degree or above, sorting by class still seems to exist in community colleges. It negatively affects many students from more humble social backgrounds, regardless of their gender and race/ethnicity and despite their aspirations that go beyond an education from community colleges. It may be that in terms of socioeconomic backgrounds, baccalaureate aspirants who eventually transferred resemble those students who first attended four-year institutions more than their community college peers.

The effect of perceived value of education indicates that students who attach great value to education are more likely to transfer to fulfill their long-term educational goals than those who do not. Rarely explored in prior research, the effect of perceived intrinsic value of education on the probability of transfer is best understood in the light of expectancy-value theory. According to this theory, the value that an individual places on a given task and his or her perceived probability of success determine the amount of effort that the person will exert in attempting to complete the task successfully (Wigfield, 1994). In particular, the motivation in completing the task is largely determined by the subjective value that the individual places on the attainment (Bandura, 1997). Though expectancy-value theory has been primarily applied in the research on various cognitive processes, it is also a very plausible theory to explain broader problems of achievement and attainment in postsecondary education. Empirically, research on college student

achievement that utilized the concept of subjective value has demonstrated positive effects of perceived importance or value of certain educational outcome on actually attaining the outcome (Tuckman, 1993). The results from this study reiterate the importance of value: those students who value education may be more motivated and put forth more effort to make upward progress (transfer) towards the attainment of their ultimate educational goal (a bachelor's degree or higher). This finding may suggest that those 12th-grade baccalaureate aspirants with a stronger intrinsic value attached to postsecondary education may sustain a strong commitment towards a bachelor's degree while attending community colleges. Perhaps the baccalaureate aspiration and the value placed on education reinforce each other to keep the students from straying off the route to earning a bachelor's degree as they planned in the 12th grade.

Consistent with previous findings from the studies utilizing national surveys such as NELS and Beginning Postsecondary Survey (BPS) (Dougherty & Kienzl, 2006), enrollment intensity plays a significant role in predicting the probability of transferring to four-year institutions. Students who started as full-time students are more likely to transfer. Indicative of a stronger educational commitment and perhaps less external demands, full-time enrollment might also strengthen student academic and social integration into postsecondary education by exposing students more to the academic and social resources available on campus, thus facilitating their progress, which is transfer in this case, in reaching their educational goals.

Community college GPA is another significant predictor of the likelihood of transferring from two-year to four-year institutions. Given the critical role college grades play in shaping student persistence and degree completion (Pascarella & Terenzini, 1991, 2005), this result is not surprising, since transfer is a legitimate and essential part of the process of persisting to their degree goals among baccalaureate aspirants beginning at community colleges. Other things being

equal, students with higher GPA from community colleges are much more likely to transfer to four-year universities than their academically lower-performing counterparts. Considered in conjunction with the non-significant effect of 12th-grade test score in the presence of community college GPA, this finding further indicates that it is a more global measure of academic achievement such as GPA that entails the compounded effects of a combination of students grades in a wide array of subject matters, rather than a single measure of cognitive test score, that influences student forward progress.

Earning a Bachelor's Degree

Similar to the pattern revealed in the estimation of the transfer model, the probability of earning a bachelor's degree among community college transfers is also a function of demographic, psychological, and college experience correlates. In particular, being female is positively related to the probability of baccalaureate attainment while being Hispanic or "Other", both in comparison to being White, affects this probability negatively. It is interesting to observe that different from the results of the transfer model which indicate the overwhelming effect of SES instead of gender and race/ethnicity, among those who did transfer, gender and race/ethnicity do matter in predicting baccalaureate attainment, whereas there is no carry-over effect of SES. A possible explanation is that through the sorting mechanism based on SES in community colleges, students with more favorable SES transferred and thus it is no longer a significant distinguisher in terms of who eventually attained a bachelor's degree. On the other hand, men, Hispanics, and student in "Other" race/ethnicity category (Asian, American Indians, and Unknowns) who transferred from community colleges seem to be at a disadvantage in earning a bachelor's degree. Although lacking empirically based explanations for this particular pattern revealed by the study, abundant prior literature has demonstrated the influence of

demographic characteristics such as gender and race/ethnicity in the successful completion of high education degrees (e.g. Adelman, 1999; Roksa, 2006).

Community college transfers who perceived a strong value of education continue to have better chances in earning a bachelor's degree. Since earning a bachelor's degree may well be a salient indicator of getting good education, students attaching great importance and value to education are more likely to expand efforts in order to attain the degree. Another carry-over effect from high school is high school curriculum. Students who were on academic curriculums are more likely to attain a bachelor's degree than those on vocational or other curriculums. In the presence of high school curriculum, high school test score is not a significant predictor for baccalaureate attainment. These findings are consistent with what has been revealed in recent research based on the general student population in postsecondary education: high school curriculum track is an even stronger predictor of baccalaureate attainment than standardized test scores or other measures of high school academic achievement (Adelman, 1999; National Center for Education Statistics, 2001). The strong predictive value of high school curriculum may suggest that instead of test scores which may be a snapshot of student academic performance on a given day, completing a high quality academic curriculum in high school might imply a long-term academic investment and may help student overcome socioeconomic disadvantages.

Community college GPA continues to be a strong and significant predictor, which is not surprising given the ample amount of previous empirical evidence suggesting the positive effect of grades in predicting baccalaureate attainment (Pascarella & Terenzini, 1991, 2005).

Having taken remedial courses in math is negatively related to the probability of earning a bachelor's degree, while remediation in reading does not have any significant effect on attainment. It should be mentioned that this result speaks of an aggregated effect of remediation

in math and reading, since there is not way to distinguish between remediation taken in community colleges and remediation taken in four-year institutions, given what is available in the datasets. As mentioned previously, the effect of remediation on persistence and graduation is a “grey area” in the research surrounding the educational attainment of either community college transfers or the general student population. Prior research has produced mixed results in terms of the effects of remediation on persistence and attainment and tends to focus on the overall effectiveness of remedial courses. This study specifically examined the effects of remediation in math and reading, the two most common types of remediation. Contrary to many studies that reported the positive effects of remediation on the likelihood of degree completion (e.g. Braley & Ogden, 1997; Weissman, Silke, & Bulakowski, 1997), this study found that remediation in reading does not have any effect on bachelor’s degree attainment among community college transfers, and remediation in math negatively affects the probability of baccalaureate attainment. A cautionary note is that it may be that the remediation practiced during the period of the data waves in this study (1988-2000) is not particularly effective for community college transfers, and that better designed remedial interventions could actually have large benefits. As for the negative effect of math remediation, a possible reason might be that such remediation could slow academic progress by diverting students’ academic efforts away from the courses that actually count toward completing a degree. It is also possible that remediation in math might reinforce students’ negative perceptions of their own academic abilities, thus discouraging students and increasing the possibility of dropping out of postsecondary education without earning a bachelor’s degree.

Persistence

Three independent variables significantly predict the probability of persistence—continuous

enrollment in postsecondary education: perceived locus of control, remediation in reading, and community college GPA. Although a number of studies have examined how college affects the development of students' perceived locus of control (Pascarella & Terenzini, 2005), the effect of perceived locus of control on persistence in postsecondary education has not been explored in prior research. This study adds to the literature by finding a positive effect of 12th graders' perceived locus of control on their future persistence in postsecondary education. It appears that an internal locus of control, as students perceived themselves, outweighs many other personal traits and college variables in keeping students enrolled continuously in postsecondary education. This finding indicates that students who perceived locus of control as more internal may be more determined to realize their educational plans by holding themselves accountable for the process, which is partly reflected by continuing to enroll, and may be more resilient when faced with external demands and obstacles.

Student academic performance represented by community college GPA once again is strongly and significantly indicative of whether students continuously enroll in college, which is key to attaining their educational goals. A plausible explanation is that students who earn higher grades from community colleges might be better integrated, at least academically, into the learning environment of postsecondary education and are thus strongly motivated and more inclined to persist.

Remediation in reading has a negative effect on the probability of persisting in college. Exactly why this happens remains a question to be further studied. However, considered together with the negative effect of remediation in math on baccalaureate attainment, this finding suggests that, instead of helping students overcome academic disadvantages, remediation tends to redirect them from achieving their desired educational goals. In addition, given the fact that about two-

thirds of colleges and universities nation wide restrict registration in certain courses until remediation requirements are fulfilled (Long, 2005), the placement into remediation could increase the length of the time to degree completion by restricting students' class schedules. This may also have special implications for those remedial students who depend heavily on financial aid, for whom taking remedial courses that do not count towards the degree might implicate running out of financial support to pay for college before completing a degree, due to federal time limits regarding financial aid. All this could pose possible barriers to persistence and increase the likelihood and stopping out and dropping out.

Academic Achievement

Community college transfers' college GPA at four-year institutions is influenced by a number of independent variables: being female, being black, self-concept, perceived value of education, high school test score, full-time enrollment, simultaneous enrollment in multiple institutions, college social involvement, and community college GPA.

Being female is associated with having higher GPA at four-year institutions than being male, holding other variables constant. Though gender differences in academic achievement persist throughout the educational system, most of the empirical attention has been at the elementary and secondary school levels (Hallinan, 2000; Nowell & Hedges, 1998). Limited existing studies provide mixed, if not contradictory, results regarding gender differences in college academic achievement. Though some studies have suggested that gender is unrelated to academic achievement (e.g. Keller, Crouse, & Trusheim, 1993), others have shown that although male students tend to have better precollege test scores, female students tend to earn higher grades in college (Peter & Horn, 2005). Part of this gender related gap might be explained by the differences in educational engagement between male and female students. Female students are

reportedly more likely to exhibit a higher level of academic effort than male students during college (Kuh, Hu, & Vesper, 2000). Perhaps this pattern holds true among community college transfers in this study, that is, woman students in general tend to be more academically engaged than their male counterparts and thus are more likely to achieve better grades.

Regarding the race/ethnicity based achievement gap, community college transfers who are black are predicted to have lower GPA than white community college transfers at four-year institutions, when other predictors are controlled for. An increasing amount of literature has pointed to the persistent gap in academic performance between Whites and Blacks at all levels of schooling from elementary school to higher education (Jencks & Phillips, 1998; Kane, 1998). A variety of explanations have been offered to account for this achievement gap. Most arguments focus on the differences in socioeconomic background and cognitive abilities measured by test scores (Bowen & Bok, 1998; Jencks & Phillips, 1998). In light of this general pattern regarding the racial disparity in academic achievement, the finding from this study suggests that such disparity does exist among community college transfers, even after socioeconomic conditions and previous test scores are accounted for. It may suggest that variables other than existing socioeconomic background and prior achievement might help explain this disparity. Some of these dynamics might involve the differential degrees of integration in four-year institutions based on race/ethnicity, social and cultural capital differentials, negative stereotype threat, and the college campus and classroom climates, all of which have been found to partly account for the achievement gap between black and white students (Spenner, Buchmann, & Landerman, 2005).

Two of the psychological attributes: self-concept and perceived value of education significantly predict college GPA among community college transfers. More positive self-

concept and a stronger value attached to education are associated with higher GPA. The finding regarding self-concept resonates with the results from very limited prior research on the effect of self-concept on college academic achievement: pre-college self-concept has a positive and direct influence on collegiate academic achievement, even when other factors such as secondary school achievement, degree aspirations, and the selectivity of the institution attended were controlled for (Pascarella, Smart, Ethington, & Nettles, 1987). The finding from this study offers additional empirical support to the positive effect of self-concept on academic achievement specifically pertaining to community college transfer students. Because self-concept has been documented as motivating and guiding behavior and influencing the individual's educational, social, and occupational performance (Markus & Kitayama, 1991), community college transfers with positive self-concept are likely to possess stronger motivation to cope with the new learning environment at four-year institutions and exhibit a greater degree of commitment and participation which would potentially lead to better academic achievement.

Consistent with the findings from previous models, perceived value of education remains a significant predictor, which indicates that a strong value attached to education might sustain student effort directed towards achieving their academic success. Similarly, full-time enrollment emerged again as a significant predictor for academic achievement as another measure for educational outcomes among community college transfers.

Social involvement in postsecondary educational system has a significant effect on academic achievement at four-year institutions. Among community college transfers, students who are socially involved tend to have better grades than those who are not socially involved. This result lends additional support to the findings from previous research conducted on other student populations and adds to the empirical evidence demonstrating that social involvement

exerts significant and positive influence on student academic success (Pascarella & Terenzini, 2005). Whether community college transfer students are socially involved or not might be indicative of the degree of the commitment they exhibit to the overall educational experience of which they are a part of and the amount of the effort they put in to enhance the outcome of this experience.

It should be noted that the non-significance of the effect of academic involvement in all three models does not necessarily translate into the irrelevance of academic involvement. On the contrary, academic involvement has been consistently singled out as an important factor in explaining student achievement and attainment (Pascarella & Terenzini, 1991, 2005). The non-significant effect of academic involvement in this study might result from the inconclusive measure of academic involvement. While formal tutoring and academic counseling received do represent some aspects of academic involvement, many of the variables underlying academic involvement, such as classroom behaviors and academically related interactions with faculty and student peers, are not available in the NELS: 88 databases.

Community college GPA is by far the strongest predictor of student academic achievement at four-year institutions. Previous research has shown that the type and quality of community college experiences such as GPA are not only determinants in decisions to transfer (Kraemer, 1995), but also key factors that lead to transfer students' academic success at four-year institutions (Montondon & Eikner, 1997). This study confirmed that academic performance at community colleges is defining for transfer students' future academic success at four-year institutions.

This is one of the very first studies that considered the impact of simultaneous enrollment on the educational outcomes of community college transfers. As indicated by the results, students

with the experience of simultaneous enrollment actually tend to have better grades than those without such experience. The exact reasons for this disparity warrant further studies in their own right. However, simultaneously enrolled students might be a particularly motivated group of students who understand how to navigate the educational system better than their counterparts, and therefore fare better in their academic performance. I should note, however, that simultaneous enrollment does not have significant positive or negative effect on community college transfers' persistence and baccalaureate attainment.

Policy and Research Implications of the Study

Policy Implications of the Study

A review of the findings from this study highlights several important implications for educational policy and practice. First and foremost, it is pivotal for state legislators and community college leaders to revisit the “cooling-out” effect of attending community colleges (Clark, 1960), particularly the effect on those baccalaureate aspirants from poorer socioeconomic background. Although community colleges have extended access to postsecondary education for socioeconomically disadvantaged students who otherwise would not have attended college at all, the sorting mechanism based on class persists to perpetuate social inequality to some degree, not only between community college and four-year university enrollees, as evidenced by prior research, but also among students who were hoping to use community colleges as an alternative route to the bachelor’s degree, as revealed in this study. Granted, existing socioeconomic status of students can hardly be changed for the better within a short period of time. It is crucial, however, for policy makers to consider the breath of the potential influences of student socioeconomic status when developing and evaluating policies that aim to promote transfer to baccalaureate-granting colleges and universities. The development and influence of various

transfer-related policies and programs need to be considered in relation to student socioeconomic background and how such policies and programs may be affected by the socioeconomic disparity among students. It leaves the state, the community college, as well as the four-year institution to develop feasible plans and initiatives that aim at sustaining the educational aspirations of students from more humble socioeconomic background.

Equally important is the finding that precollege motivational attributes affect baccalaureate aspirants' educational outcomes, which underscores the importance of creating educational communities, in both two-year and four-year institutions, that promote positive motivational beliefs among students. This is particularly noteworthy for the student population of this study, because in order to navigate the less traditional educational trajectory to realize their educational goals, they need to keep up their motivation and develop positive motivational beliefs about themselves along the way. Policy makers at both two-year and four-year institutions are therefore charged with the responsibility of identifying effective educational programs and practices that mediate psychological traits to positively influence students' learning and educational outcomes. When assisting students who wish to transfer, community colleges should help cultivate in students the belief that values advanced education and that a community college education can be an effective route to the baccalaureate degree. At four-year institutions, programs and services targeted towards community college transfer students should focus on helping students make a smooth transition and engaging them in meaningful and constructive educational activities that reinforce the value and importance of a baccalaureate education.

More importantly, the efforts aimed at promoting desirable student attitudes such as internal locus of control and positive self-concept should be integrated in transfer student orientation programs, support services, as well as everyday classroom instruction. In transfer student

orientation programs, for example, emphasis should be placed on clearly explaining the academic practices, expectations, and introducing campus support and counseling programs and services available to students to meet those expectations. Through this process, students can become even more aware of the fact that their success at the new institution is essentially determined by their own efforts, self-initiation, and self-direction.

The very fact that community college GPA is the single best predictor of all measures of baccalaureate aspirants' educational outcomes once again pinpoints the core status of academic performance in education and its extended influence on virtually every aspect and dynamic of college life. The finding that the impact of academic performance at community colleges outweighs that of high school academic preparation brings attention to the defining role of the academic experience at community colleges in shaping baccalaureate aspirants' long-term educational outcomes. From the perspectives of policy makers and school leaders, promoting student learning and academic performance might represent the most effective approach to promoting desirable student outcomes.

The gender and racial/ethnic gaps in baccalaureate attainment, college persistence, and academic achievement among community college transfers suggest that four-year institutions hosting community college transfers should not label this student group as a homogenous student subpopulation. In fact, as revealed by this study, community college transfers can be a largely heterogeneous group and may differ substantially from one another in their educational outcomes. However, transfer students all arrived at an institution at a later entry point than native students. The disparities in attainment, persistence, and achievement based on gender and race/ethnicity might result from different student groups' differential reception of, and response to, their new experiences at four-year institutions. Therefore, it is helpful for administrators and faculty at

four-year institutions to consider the gender and racial/ethnic differences among community college transfers in this relearning process and form policies and strategies accordingly.

The finding in regard to remediation needs to be considered carefully. In recent years, the debate about the merits of remediation has intensified and mixed results have been produced in terms of the effect of remediation on student outcomes. This study found that among baccalaureate aspirants who accessed postsecondary education through community colleges, there is a negative effect of taking math remedial courses on baccalaureate attainment, as well as a negative association between remediation in reading and college persistence. However, this result needs to be interpreted with caution. Remediation has been an important part of higher education and has historically been intended to address the needs of under-prepared students. The finding that remediation in fact negatively affects student outcomes indeed poses a question mark surrounding this practice. It should be noted that the existence of remediation is rooted in the fact that many students coming out of high school under-prepared for coursework at the college level. It is already clear from the results of this study and some others that at national levels, collegiate remedial courses only serve to redirect baccalaureate aspirants from persisting and attaining their educational goals, probably by prolonging coursework and reinforcing negative academic self-efficacy. Therefore, a possible approach to reducing the need for remediation might lie in the communication and corporation between high schools and postsecondary institutions in regard to the academic expectations of study at the level of postsecondary education, as well as the development of feasible practices that prepare students in high schools to meet those expectations once they attend college. Additionally, program assessment of remedial services need to be in place at individual institutions to evaluate the effectiveness of remediation and thus decide whether they are worth investing.

The positive association between social involvement and academic achievement at four-year institutions lends empirical evidence to the notion that more involved community college transfer students are likely to have more gains academically from the educational experience at their new home institutions. Considering the significant effect of social involvement on academic achievement revealed by this study in conjunction with other empirical indications of the positive effects of academic involvement on educational outcomes, institutional policies and student affairs practices should aim at developing programs and activities that involve more students, especially community transfer students who arrive in the new college environment later than their native counterparts. Also, college administrators working with students should develop orientation programs and/or information system for transfer students to become more cognizant of the resources they can utilize.

Simultaneous enrollment in multiple institutions among baccalaureate aspirants beginning at community colleges does not seem to affect their persistence pattern and degree attainment. In fact, students who experienced simultaneous enrollment tend to have better grades in four-year institutions. There is no strong empirical evidence, therefore, to suggest that simultaneous enrollment be particularly discouraged or encouraged. However, as the trend for simultaneous enrollment or other forms of multiple institution attendance, such as swirling between institutions, becomes more notable in recent years, more clearly articulated policies and inter-collegiate agreement in terms of credit awarding and transferring for simultaneously enrolled students should be further developed. This may offer more flexibility and choices for students who desire to expand course availability and scheduling by taking advantage of the academic resources at multiple institutions.

The persistent positive effect of full-time enrollment on the educational outcomes of

baccalaureate aspirants may suggest the need to encourage stronger enrollment intensity. Mandatory requirement for full-time enrollment during particular semesters, as practiced in many institutions, is only one of the possible approaches to encourage stronger enrollment intensity. It is more important to offer a wider choice of courses and more flexibility in scheduling for students who might be otherwise constrained by external demands and work schedule from participating in learning full-time. Additionally, institutional efforts should be directed at promoting learning and a sense of learning community. These efforts should particularly reach out to and involve part-time students, because it might be what is associated with full-time enrollment (e.g. a stronger sense of community, stronger institutional commitment, and more interaction with students and faculty), rather than full-time enrollment per se, that facilitates student learning and promotes satisfactory educational outcomes. If the opportunities that help develop learning communities and academic socializations are made more available to part-time students, through the use of technology for example, the negative effects of attending part-time might be emolliated.

Implications for Future Research

Much of this study centers on the bachelor's degree-seeking community college beginners and examines within this group various factors that shape the differences in their educational outcomes. Currently, this focused approach provides the missing link in the research on community colleges and community college transfers. By placing the emphasis on the within group differences among baccalaureate-aspiring community college students, researchers in this vein can develop a more adequate understanding of factors that may help reduce this educational inequity that has been well documented in existing literature.

While there exist several models of educational attainment that have incorporated various

factors that might shape student outcomes, it is particularly important to expand on these models in an effort to understand how motivational attributes affect individual students. Relevant motivational variables are especially critical for the student population under discussion: community college beginners who seek a bachelor's degree through an untraditional route. This study illuminates the importance of considering the effects of several motivational attributes. The findings in this respect suggest that perceived value of education, perceived locus of control, and self-concept could influence the educational outcomes of baccalaureate aspirants attending community colleges. In addition, these effects persist even after students transferred to four-year institutions. The next logical step is to explore whether other motivational attributes, such as self-efficacy beliefs, also affect student outcomes and what measures are effective in promoting positive motivational beliefs to assist students better in their educational pursuits.

Though this study provides additional empirical evidence suggesting no effect or even a negative effect of remediation on baccalaureate-aspiring community college students' educational outcomes, remediation in postsecondary education may not go away in any near future and the debate on the effects of remediation will surely continue. As the community college student population continues to diversify and specific measures aimed at effectively fulfilling the remediation function are still evolving, researchers are still charged with the responsibility of identifying the most effective models of remedial education as well as the optimal methods in assessing the effectiveness of remedial education.

Community college beginners are the likely group to follow less conventional pathways in postsecondary education and it would be beneficial to examine the effects of different pathways on these students' outcomes. Simultaneous enrollment in multiple institutions as explored in this study is just one of the many patterns of enrollment among community college beginners.

Identifying these patterns and studying their effects on student attainment will inform policy makers and institutions in developing effective and seamless course credit tracking system. The work of Adelman (1999) has made some progress in classifying various patterns and combinations of institutions attended by students. This study has taken an initial step in assessing the effect of simultaneous enrollment on the educational outcomes of community college transfers. However, much remains to be done and future research will require careful analysis of enrollment histories in order to trace the movement of credits between institutions and its effects on student success.

Finally, much more research is needed to investigate how state policies and institutional practices could influence the academic performance of community college students, enrollment intensity, and transfer students' academic and social integration at four-year institutions. These, among other predictors, are found to be closely tied to community college beginners' educational outcomes. Exactly what factors are related to these dynamics remain unanswered questions in this study. It will be a daunting undertaking to examine all factors at different levels that shape student educational outcomes. It is crucial, however, that higher education researchers take gradual and solid steps to fully understand the constellation of elements that define educational trajectories and develop policies accordingly to promote satisfactory student outcomes.

Limitations of the Study

The limitations of this study are primarily associated with the use of extant data. While NELS: 88 and PETS datasets present a rich resource for researchers to base their studies on nationally representative samples, the design of the survey questions was guided by broad research and policy interests, rather than very specific research hypotheses or questions. As a result, the information on specific variables of a researcher's particular interest might not be

available, or the variables of interest might be measured in a different manner than the researcher would have preferred. For example, the information regarding remediation variables is based on students' transcripts throughout their entire postsecondary education as of 2000, and it is impossible to determine where students took the remedial courses: community colleges, four-year institutions, or both. Therefore, while the study has been able to identify the aggregated effects of remediation in postsecondary education, it is difficult to arrive at a more differentiated knowledge with reference to whether the timing and context of remediation – remediation in community colleges as opposed to four-year institutions or both places – matter in defining student educational outcomes.

Additionally, although this study utilized the most recent wave of the NELS survey, it is based on data over an eight-year span from 1992 to 2000 and thus unable to capture trends and patterns surrounding the research questions in more recent years. During the past eight years, a growing number of students have sought the entry into postsecondary education through community colleges. Meanwhile, various external and internal influences have been underlying the expansion and redefinition of the institutional missions of community colleges and four-year institutions. It would be interesting to replicate the study on more recent national samples, when new waves of the NELS data are available, to examine how these changing dynamics at the individual, institutional, and state levels affect the educational attainment of baccalaureate aspirants beginning at community colleges.

Because of the study's emphasis on baccalaureate aspirants who resort to community colleges as an alternative route to their degree goals, I excluded other possible measures of educational outcomes of community college beginners, for example, earning an associate degree. Although successful transfers include those students who earned an associate degree as well as

those who did not, attaining an associate degree was not studied in its own right.

Notwithstanding this study's focused position on factors defining the baccalaureate path for these students, any consumer of the findings should bear in mind that these students' success can be viewed through multiple lenses and thus should be measured in multiple ways.

Conclusion

This study focuses on community college entrants who aspire to a bachelor's degree or higher, a student subpopulation largely neglected in the research literature. Students who access postsecondary education through community colleges affect the development of the missions of the institutions they attend, two-year or four-year, not only by the very unique characteristics they have, but more importantly by the educational goals and aspirations they embrace, that is, what they expect the institutions to offer them. The most prominent of these goals is arguably to attain a bachelor's degree by transferring to a four-year institution.

Community colleges represent democratic values and offer a wide array of educational opportunities. Yet empirical evidence has suggested that community college students who wish to transfer to four-year institutions face barriers and obstacles. The results of this study show that baccalaureate aspirants who are least likely to transfer are those from disadvantaged socioeconomic background, with lower perceived value of education, lower community college GPA, and who enrolled part-time. These findings are useful information for community colleges in providing effective educational practices to help students move further towards their degree goals.

Community college students, particularly those potential transfer students aspiring to the baccalaureate, not only affect and influence the missions and functions of community colleges, but also help redefine and expand the missions of four-year colleges and universities. Swing

(2000) contended that four-year institutions are making a minimal, but increasing attempt to respond to the needs of transfer students through a variety of support programs. This has become the trend to stay, and some of the public institutions that have not placed much attention on transfer students will have to allocate substantial time and effort to develop policies and practices to be more supportive of these students. This research contributes to the discussion of the growing support of community college transfers by identifying a number of factors associated with community college transfers' educational outcomes at four-year institutions, such as motivational attributes, enrollment intensity, and remediation. These results have important policy implications for four-year institutions receiving community college transfers with regard to student retention and success.

The findings of this study should also be of interest to policymakers at the state and national levels in expanding the cooperation and collaboration among all institutions of higher education and formulating well-informed policies to assist students with successful baccalaureate completion. As college tuitions keep spiraling upward, community colleges are likely to increasingly become the entry into postsecondary education for many disadvantaged students. How well community colleges and four-year institutions respond to the needs and issues of concern facing their students is going to be tested in the days to come, and educational policies and programs that effectively meet student expectations and promote student development are of greatest importance and value to them. The development and selection of such policies and programs should be based on a sound knowledge of their students and various sociological, psychological, and environmental factors that affect their educational success, as well as a vision of the changing demographic, economic, and social contexts of higher education. On the other hand, more extensive research is needed to further study and analyze the impact of these factors

and the institutional and societal mechanisms by which that impact is mediated and transmitted. Only when steps are taken in facilitating the transfer process and promoting the long-term educational outcomes for baccalaureate aspirants beginning at community colleges can the broader issues of educational access and equity be addressed.

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Appendix

Reliability Coefficients and Factor Loadings for Locus of Control and Self-concept

Description of factors	Factor loading
<i>Locus of control ($\alpha = 0.751$)</i>	
I don't have enough control over the direction my life is taking.	0.606
In my life, good luck is more important than hard work for success.	0.817
Every time when I try to get ahead, something or somebody stops me.	0.564
My plans hardly ever work out, so planning makes me unhappy.	0.664
Chance and luck are very important for what happens in my life.	0.765
<i>Self-concept ($\alpha = 0.802$)</i>	
When I make plans, I am almost certain I can make them work.	0.536
I feel good about myself.	0.806
I feel I am a person of worth, the equal of other people.	0.783
I am able to do things as well as most other people.	0.683
On the whole, I am satisfied with myself.	0.810

Figure 1. An attainment model for baccalaureate aspirants beginning at community colleges.

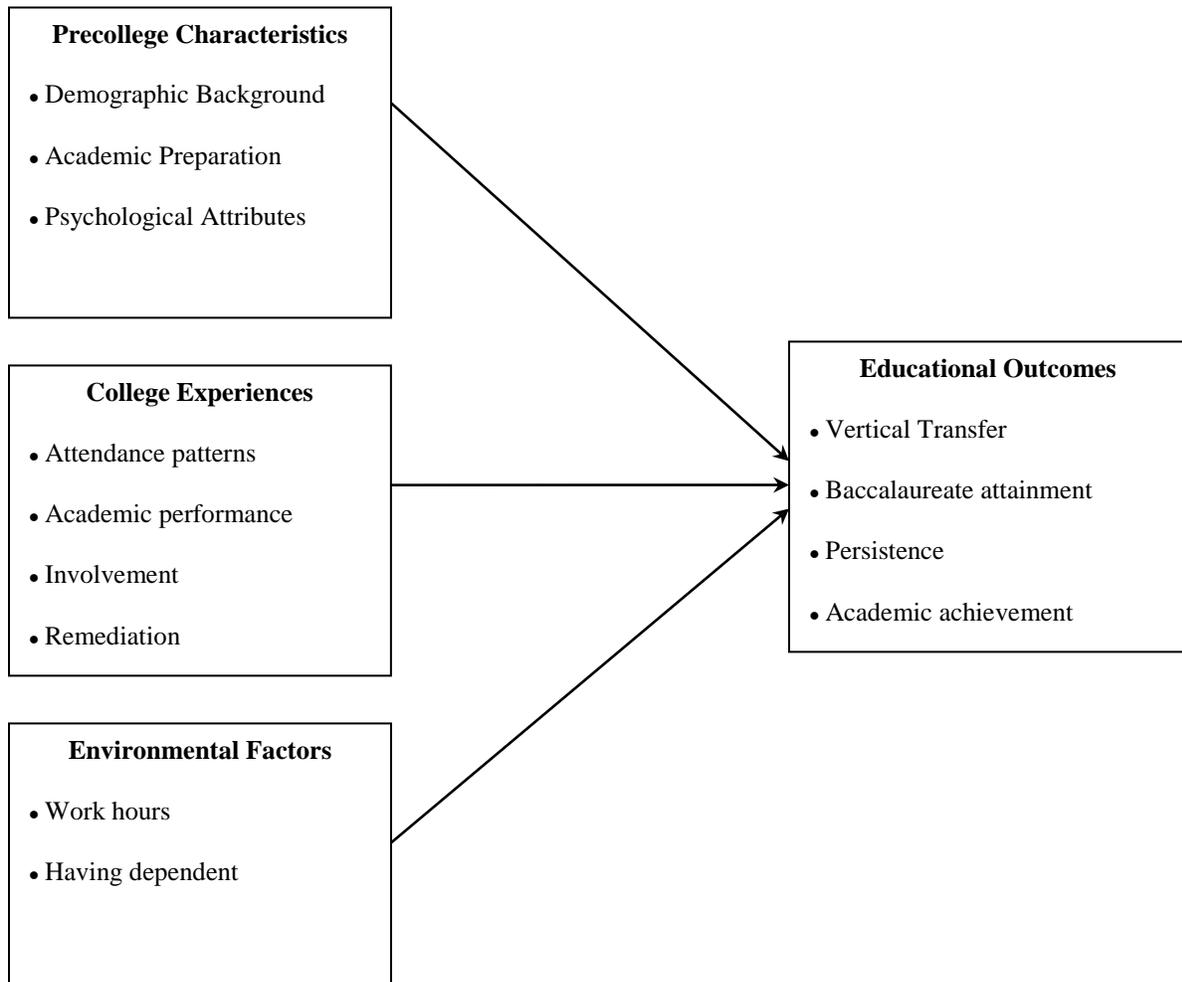


Table 1

Weighted Means and Standard Deviations and Definitions for Independent Variables

Independent Variables	Mean	S.D.	Definition
<i>Demographic background</i>			
Female	0.493	0.500	Dummy variable (coded 1 for females and 0 for males)
Black	0.093	0.290	Dummy variable (coded 1 for African Americans and 0 for Whites)
Hispanic	0.128	0.337	Dummy variable (coded 1 for Hispanics and 0 for Whites)
Other	0.058	0.233	Dummy variable (coded 1 for Asians, Indians, and Unknowns combined and 0 for Whites)
Socioeconomic status	3.37	1.276	Quintile based on a composite measure of parents' education, occupation, and income
<i>Precollege characteristics</i>			
High school curriculum	0.773	0.419	Dummy variable (coded 1 for academic curriculum and 0 for vocational and other)
Test score	51.11	8.180	Standardized composite test score (math and reading)
Locus of control	15.143	2.593	Summated scale measuring perceived locus of control
Self-concept	16.152	2.337	Summated scale measuring self-concept
Perceived value of education	0.895	0.386	Dummy variable (coded 1 for perceiving getting good education as very important)
<i>Postsecondary education experience</i>			
Full-time enrollment	0.823	0.382	Dummy variable (coded 1 if students enrolled full-time)
Simultaneous enrollment	0.098	0.298	Dummy variable (coded 1 if students had enrolled in multiple institution simultaneously)
Remediation in reading	0.182	0.386	Dummy variable (coded 1 for students who took remedial courses in reading)
Remediation in math	0.430	0.495	Dummy variable (coded 1 for student who took remedial courses in math)
Social involvement	0.332	0.471	Dummy variable (coded 1 if students participated in extra-curriculum activities)
Academic involvement	0.511	0.500	Dummy variable (coded 1 if students received academic services such as formal tutoring)
Community college GPA	2.419	0.817	Student GPA earned at community college they attended
<i>Environmental factors</i>			
Work hours	30.11	12.194	Average hours student worked per week
Dependent	0.042	0.201	Dummy variable (coded 1 if students contribute to anyone else's support)

Table 2

Descriptive Statistics for the Dependent Variables

Dichotomous dependent variables		Percent
<i>Transfer</i>	Transferred to a four-year institution	42.5
	Did not transfer	57.5
<i>Baccalaureate attainment</i>	Attained a bachelor's degree	65.2
	Did not attain a bachelor's degree	34.8
<i>Persistence</i>	Continuous enrollment	77.8
	Discontinuous enrollment	22.2
Continuous dependent variable		Mean (S.D.)
Academic performance (four-year GPA)		2.79 (0.49)

Note. Percentages refer to within column proportions and to weighted data.

Table 3

Logistic Regression Parameter Estimates: Transfer to Four-year Institutions

Independent variables	<i>b</i>	<i>S.E</i>	Odds Ratio ^a
Female	-0.358	-0.225	
Black	-0.599	0.388	
Hispanic	-0.163	0.328	
Other	-0.265	0.359	
SES	0.248**	0.090	1.281
High school curriculum	0.291	0.330	
Test score	0.248	0.090	
Locus of control	-0.090	0.052	
Self-concept	0.047	0.046	
Perceived value of education	1.133*	0.494	3.104
Full-time enrollment	1.130**	0.328	3.097
Community college GPA	1.227**	0.167	3.412
Work hours	-0.001	0.008	
Dependent	-0.567	0.721	

a. Odds ratios are reported only for statistically significant coefficients.

* $p < 0.05$, ** $p < 0.01$

Table 4

Logistic Regression Parameter Estimates: Baccalaureate Attainment

Independent variable	<i>b</i>	<i>S.E.</i>	Odds Ratio ^a
Female	1.172**	0.373	3.230
Hispanic	-1.096*	0.525	0.334
Black	0.334	0.741	
Other	-1.867*	0.782	0.154
High school curriculum	1.157**	0.424	3.182
Test score	-0.035	0.028	
SES	0.120	0.137	
Locus of control	0.108	0.767	
Self-concept	0.046	0.075	
Perceived value of education	1.660**	0.551	5.261
Remediation in reading	-0.536	0.527	
Remediation in math	-0.952*	0.377	0.386
Social involvement	0.470	0.355	
Academic involvement	-0.374	0.386	
Full-time enrollment	0.869	0.485	
Simultaneous enrollment	-0.105	0.495	
Community college GPA	1.873**	0.389	6.508
Work hours	-0.007	0.014	
Dependent	0.594	1.079	

a. Odds ratios are reported only for statistically significant coefficients.

* $p < 0.05$, ** $p < 0.01$

Table 5

Logistic Regression Parameter Estimates: Persistence

Independent variables	<i>b</i>	<i>S.E.</i>	Odds Ratio
Female	-0.544	0.418	
Hispanic	-0.212	0.554	
Black	0.332	1.157	
Other	0.250	0.682	
High school curriculum	-0.655	0.603	
Test score	-0.017	0.030	
SES	0.042	0.151	
Locus of control	0.209**	0.070	1.233
Self-concept	0.023	0.075	
Perceived value of education	0.546	0.563	
Remediation in reading	-1.373**	0.510	0.253
Remediation in math	-0.233	0.405	
Social involvement	-0.113	0.396	
Academic involvement	-0.074	0.425	
Full-time enrollment	-0.312	0.614	
Simultaneous enrollment	-0.107	0.584	
Community college GPA	1.424**	0.325	4.152
Work hours	-0.029	0.025	
Dependent	0.595	1.298	

a. Odds ratios are reported only for statistically significant coefficients.

* $p < 0.05$, ** $p < 0.01$

Table 6

Summary of OLS Regression Analysis for Variables Predicting GPA

Independent variables	<i>b</i>	<i>S.E.</i>	<i>t</i> -value
Female	0.144**	0.034	4.18
Hispanic	0.008	0.052	0.15
Black	-0.320**	0.078	-4.11
Other	-0.059	0.052	-1.13
High school curriculum	0.062	0.046	1.34
Test score	0.006*	0.003	2.38
SES	-0.002	0.013	-0.15
Locus of control	-0.014	0.008	-1.81
Self-concept	0.015*	0.007	2.14
Perceived value of education	0.293**	0.050	5.81
Remediation in reading	0.005	0.057	0.08
Remediation in math	-0.075	0.044	-1.71
Social involvement	0.120**	0.036	3.37
Academic involvement	0.036	0.415	0.88
Full-time enrollment	0.134**	0.040	3.39
Simultaneous enrollment	0.110*	0.054	2.06
Community college GPA	0.611**	0.038	16.17
Work hours	-0.000	0.002	-0.03
Dependent	0.123	0.074	1.67
Constant	0.438	0.235	

Note. $R^2 = 78.86\%$ ($p < 0.01$). Because analysis conducted under Stata's survey commands does not provide standardized regression coefficients, only unstandardized regression coefficients are reported.

* $p < 0.05$, ** $p < 0.01$