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Latino Students & the educational pipeline

a three-part series

Part III:

Pathways to the bachelor's degree for Latino students

by:
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PART III

Pathways to the Bachelor's Degree for Latino Students

The third component of our three-part series focuses on students who attained a bachelor's degree and what it took to get there. We used multiple regression analysis to determine the factors that seemed to matter on the pathway to the BA. The appendix of this report provides methodological details to this analysis.

About the Authors

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Table of Contents

About the Authors ii
Table of Contents iii
Executive Summary 1
Introduction 4
Descriptive Overview 9
Research 15
Findings 15
Policy Implications 21
References 26

Appendix A — Methodology 30
Appendix B — Descriptive Statistics 32
Appendix C — Delta P Values 34
Appendix D — Beta Values 36
Appendix E — Persistence as a Longitudinal Model 38

Preface



Dr. Watson Scott Swail
President
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Researchers, policymakers, and educators as a whole often wonder what becomes of students as they progress through the educational system. As a former teacher, I think back to students I taught whose names are now lost, but whose faces and personalities remain very much intact. I often wonder what happened to them since we last met. Did they finish high school? Go on to college? Get married and have children? Did they meet their personal goals? Ultimately, I want to know if things worked out for them. The memories of these students still mean a lot to me. They helped shape me into the individual I am today, and they—well, most of them—made my life much, much better just through the opportunity to get to know and work with them. Unfortunately, as with most teachers, I am left mostly with memories.

I mention this because knowing what becomes of students is a very critical part of the development of public policy and sound educational practice. But like teachers, only rarely do we ever get a glimpse into the lives of past students.

This report is one of a series of three reports on Latino students in the educational pipeline, all of which are available for free download on the web at *www.educationalpolicy.org*. The purpose of this series is to provide a sense of the challenges facing Latino youth compared to White youth on the pathways to postsecondary education and the baccalaureate. The series relies on data from the National Educational Longitudinal Study (NELS), sponsored by the National Center for Education Statistics in 1988 to follow 8th grade students from middle school through to the workforce. In total, over 26,000 8th-grade students were surveyed in 1988, with followup surveys in 1990 (10th grade), 1992 (12th grade), 1994 (2 years after scheduled high school graduation), and finally in 2000 (8 years after scheduled high school graduation). NELS gives us the best glimpse of students in and beyond the educational pipeline in America.

While we cannot answer questions about what happened to James, Sarah, or Juan, we can show trends based on students as a whole and certain subsets. We can see if these students graduated from high school, if and where they went to postsecondary studies, and what's happened to them since. Because NELS is a nationally-representative and randomly-assigned database, we have a fairly accurate portrayal of students in America. The one unfortunate truth is that we can't look at the state or local level. The sampling design doesn't allow that type of specificity.

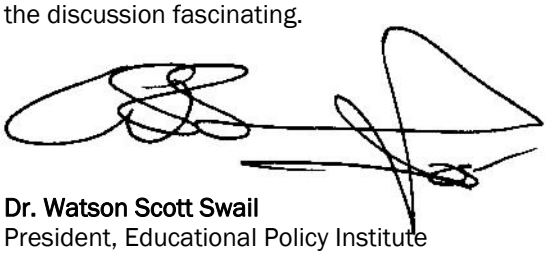
Still, this is a magnificent research tool that provides us with a glance into our future through a look at the past experiences of the NELS cohort. We can wrestle with what these data mean and try to assess what educational and social policies can make a difference. While it is true that NELS is somewhat

dated (the 1988 8th grade class?), one must remember that it is the power of time that makes this database so unique: 12 years following one cohort of students.

Many researchers have analyzed the information from NELS since the first database was released in 1991. Some were commissioned directly by the US Department of Education. Others, like us, received grants to study certain aspects of NELS, and still others include university-based researchers and graduate students who were simply interested in what NELS had to say. Our purpose in this study, supported by a generous grant from Lumina Foundation for Education, is to focus in on the Latino population as they completed middle school, made their way through high school, and looked toward post-secondary education and the workforce. Throughout the report, we compare Latino students with White students. We omitted other race/ethnic groups not because they are less important, but because discussion of more than the two groups of specific interest tends to get overly complex.

I would also like to thank Alberto Cabrera, a senior scholar for EPI and a professor at the University of Wisconsin, for his leadership during this series. As well, Chul Lee provided exceptional data support and Adriane Williams helped us with the final reporting of these findings. I also must acknowledge Tina Gridiron Smith of Lumina Foundation for Education, who understood the importance of this effort and provided unwavering support.

After working with these data for the past 10 years, I feel like the NELS students are mine. While I can't find out what happened to my middle school students back in Winnipeg, Manitoba, and Hampton, Virginia, I have a pretty good idea what happened to the NELS students of 1988. I think you'll find the discussion fascinating.



Dr. Watson Scott Swail
President, Educational Policy Institute

April 4, 2005

Executive Summary

For many years the question of how to provide Latinos with greater access to and through higher education has lingered. Although we have learned much about Latinos through sponsored research, we lack a comprehensive picture of the overall impact of various sources on educational attainment. This study seeks to fill the gap by following students in the educational pipeline from the moment they and their families begin to aspire to postsecondary studies to the point of degree completion.

Less than one quarter (23.2 percent) of Latino postsecondary students graduate with a four-year degree within 10 years of leaving high school—less than half the rate of White students (47.3 percent). But by taking into consideration student and family characteristics, postsecondary aspirations and planning behaviors, secondary school activities, postsecondary activities, and financial support factors, this study shows that the BA degree persistence gap between Latino and White students can be dramatically reduced by taking action in specific areas.

The analysis in this report was guided by Swail's (2004) *Integrated Model for Student Success* (IMSS) and the *Pathways to College* model (Cabrera and LaNasa, 2000). Swail's model asserts that the student experience is the result of an interaction of cognitive, social, and institutional factors. Whereas the cognitive and social factors impact students' abilities to persist and succeed in education, the ability of various educational institutions and agencies to understand these factors and make appropriate reflections about their practice and service is also critical to students' potential success.

The sample for this study was drawn from the National Educational Longitudinal Study of 1998 (NELS:88) and only Whites and Hispanics in the cohort groups from 1988 base year through 2000 fourth follow-up survey are selected. The stratified sample strategy followed an original sample of 8th graders in 1988 to 2000; 12 years after expected high school graduation. This analysis is based on those 8th grade students who become postsecondary attendees between 1992 and 2000.

Research Findings

The results of this analysis fall in line with previous research on Latino students: socioeconomic status, parental expectations, planning, course-taking patterns, and student postsecondary behaviors have a significant impact on postsecondary degree completion. These findings also present very clear direction for further research and policy focuses because the factors with the most impact—planning and postsecondary behavior—produce changes of more than 40 percent, and some cases 60 percent, in the probability of completion.

Family and Student Characteristics. The findings indicate that Latina students are 20 percent more likely to complete a four-year degree than their male counterparts. Middle-income Latino students had a 17 percent higher probability of completing a four-year degree than low-income Latino students. Affluence had no significant effect for Latinos.

Expectations and Aspirations. Expecting their children to attend some college or to get a bachelor's degree had no significant effect for Latinos, but parental expectation of advanced degrees had a large and significant effect for Latinos, demonstrated by an increase in the probability of completion by 46 percent. Latino students planning for some college increased the probability of BA completion by 48 percent, and those who planned for a bachelor's degree increased the probability by 53 percent.

Preparation for Postsecondary Education. Receiving help in completing applications, applying for financial aid, and writing essays produced no significant effects for Latinos or Whites. Course-taking patterns, however, did produce positive effects. Taking pre-calculus and calculus produced positive effects for both Whites and Latinos with increases of 20 and 12 percent respectively. According to this analysis, remedial math served no one. However, remediation in English proved positive for Latinos with an increase of 26 percent.

Postsecondary Activities and Experiences. Beginning postsecondary studies at a four-year institution increased the probability of completion by 29 and 35 percent for Latinos and Whites respectively, and maintaining continuous enrollment increased the probability by 60 and 42 percent respectively. Additionally, earning a GPA between 2.50 and 3.19 increased the probability of completion by 47 percent for Latinos and 42 percent for Whites and earning a GPA between 3.20 and 4.00 increased the probability of completion by 62 percent for Latinos and 45 percent for Whites. Choosing to delay enrollment between high school and college reduced the probability of completion for Latinos by 20 percent.

Financial Aid. There was no difference in the effect of receiving grants, loans, or participating in work study programs.

Policy Implications

Postsecondary planning, academic preparation, and taking the right steps in college matter for Latino persistence. These are the areas where we found the most significant effects. It is important to note that the nature of the analysis means that the size of the effect is dependent on the presence of all of the other factors as well. We present policymakers and practitioners with a set of options at several important levels: middle school, high school, and postsecondary institution.

Middle School. The middle school level is critical according to our findings because Latinos who enter high school with a plan for any type of postsecondary study—with a sense of the purpose of their high school work—are far more likely to graduate college than those who have no plan. In fact, Latino students who had a plan to attend college improved the chances of graduation by 48 percent compared to other students. Of course, having a plan to attain a BA degree improves the chances by an additional 5 percent (53 percent). Thus, developing college knowledge among students and families can have a major impact on future educational opportunities.

High School. Academic preparation for college must begin immediately with the first math courses that students take. Latinos need to be enrolled in and master Algebra I no later than the ninth grade in order to reap the benefits of high mathematics achievement on postsecondary persistence. Latinos who take more than three years of mathematics beginning with Algebra I have a higher probability of graduating from college than those who take fewer than three courses. In addition, remediation in English is also important for Latinos.

It is during high school that solid advising must take place about postsecondary education and the type of institutions students and families should consider. Latinos seeking a four-year degree are somewhat disserved by beginning at a two-year institution.

Postsecondary Institution. Helping Latinos maintain continuous enrollment and providing academic support while they are enrolled is the primary role of the postsecondary institution in the effort to improve the completion rates of Latinos. The provision of academic support is evinced as important by the large effect of grade point average on the probability of completion. Of course, being academically prepared when they enter is important for all students, but being able to take advantage of academic support services undoubtedly helps students to maintain high performance in an academic culture that differs significantly from high school.

Conclusion

Latino students who are supported by their families in the pursuit of a postsecondary education, create a plan by the eighth grade, take three years of mathematics or more, start at a four-year institution, maintain continuous enrollment and a GPA of 2.50 or above can close the gap between Latinos and Whites in the completion of four-year degrees. The findings in this study do not suggest that the work to make these things a reality is easy, but they do suggest where to begin.

Introduction

The research literature is full of papers discussing the plight of Latino students. Most focus on the barriers that these students face as compared to others, most notably White students, but also Asian, Black, and Native Americans. Some studies focus on particular school districts or college campuses. Others use broader databases, while still others, unfortunately, use little data and even less analysis.

Lumina Foundation for Education was generous enough to provide the Educational Policy Institute with a grant to study Latino students in the educational pipeline using the most powerful longitudinal database available: the National Educational Longitudinal Study (NELS). Started in 1988, the NELS study randomly sampled 26,000 8th-grade students, and followed them up four times over the course of the next 12 years. The final followup, in 2000, provides us with a unique glimpse into the lives of this student cohort 8 years after scheduled graduation. This long-range view allows us to see what happened to these students in high school, postsecondary education, and into the job market.

This report series is divided into three sections to answer three questions regarding Latino progress through the educational pipeline:

> **Question One.** What happened to 1988 NELS 8th-grade Latino students in the 12 years that followed? How did their progress compare with White students throughout the various stages of the educational and occupational pipeline? (Part I)
>
> **Question Two.** What are the primary differences between Latino and White students for those who completed a BA and other levels of education? (Part II)
>
> **Question Three.** What factors seem to have the most impact on Latino students' ability to navigate the educational system and achieve higher levels of learning? (Part III)

This report, Part III, focuses on the latter question. As with the other two parts of our series, we used the NELS database to gain a perspective on what really matters to those students who earn a bachelor's degree.

For many years, the question of how to provide Latinos with greater access to and through higher education has lingered. The importance of this question is heightened by the fact that in the coming years Latinos in the US will be the largest minority by a significant margin. Although we have learned much about Latinos through sponsored research, we lack a comprehensive picture of the overall impact of various factors on educational attainment.

In this report we want to inform readers about what factors relate to the persistence of Latino students to BA degree completion. Latino postsecondary

students have a 23.2 percent probability of graduating with a four-year degree within 10 years of leaving high school—less than half the rate of White students (47.3 percent). Our analysis suggests that it is possible to reduce this gap significantly by adjusting public policy in several critical areas.

By taking into consideration student and family characteristics, postsecondary aspirations and planning behaviors, secondary school activities, postsecondary activities, and financial support factors, this study shows that Latino persistence to degree completion can be directly affected by taking action in specific areas. Informing the educational expectations that parents have for their children, helping them to develop high aspirations in their children, and supporting students in making postsecondary plans by the 8th grade are vital steps to take toward the goal of postsecondary persistence. As well, ensuring that students who aspire to a four-year degree begin at four-year institution immediately after graduation, maintain continuous enrollment, and perform well while in school are critical actions at the postsecondary level.

Significant Challenges

The educational experiences of Latinos from the earliest grades through postsecondary completion are colored by significant challenges. An analysis of data from the Early Childhood Longitudinal Study found that as early as kindergarten, Latinos score on average 5.5 points lower than Whites (45.5) on mathematics assessments. The average of 40 depends heavily on high scoring Cubans (46.1) and South Americans (42.4). All other Latino groups score much lower with the highest score at 39.7 by Salvadorans (Center 2004; Pew Hispanic Center 2004; PHC 2004).

In secondary school, where academic performance becomes important for college admission and success, Latinos are less likely than White and Asian students to take a rigorous set of mathematics courses.

Once Latinos arrive in elementary school this gap continues. An analysis of NAEP data shows that Latinos and Whites have starkly different performances on math assessments. Thirty-four percent of Hispanics score in the first (lowest) quartile with only 11 percent in the fourth (highest) quartile. Conversely, 16 percent of Whites are in the first quartile with 32 percent in the fourth quartile (PHC 2004).

In secondary school, where academic performance becomes important for college admission and success, Latinos are less likely than White and Asian students to take a rigorous set of mathematics courses or demonstrate solid mathematical skills on college entrance tests. A prior analysis of NELS data shows that Latino completion of three years of math or more falls below the national average by 14 percentage points at 42 percent (Swail, Cabrera et al. 2004). This was accompanied by the high rate of remediation in math at 16 percent compared with 8 percent for Whites. Latinos score below the national average on the ACT and the SAT by 2 and 75 points respectively. White

students regularly score above the national average (CGCS 2001a; CGCS 2001b).

Possibly the result of the academic challenges confronted to this stage in the educational pipeline, Latinos are less likely to graduate from high school or receive a GED than any other group (86.4 percent vs. 92.3 percent; (Swail, Cabrera et al. 2004). Two-thirds of Latinos do enroll in postsecondary institutions, but the majority (40 percent) enrolls in two-year institutions compared with 30 percent of Whites. Twenty-two percent of Latinos enroll in four-year institutions whereas 41 percent of Whites do. The end of postsecondary careers for Latinos in the NELS:88 database is largely disappointing. As previously stated, 23.2 percent received four-year degrees within eight years of graduating from high school compared to 47.3 percent of Whites students.

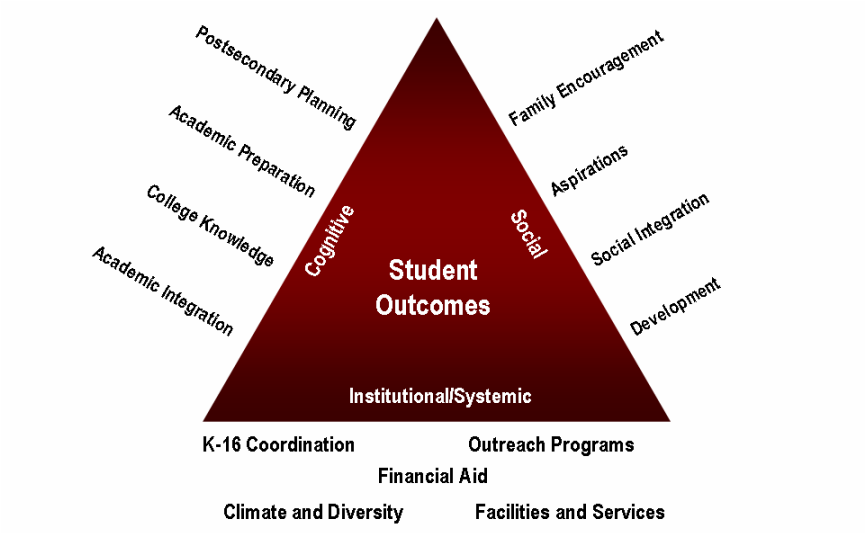
This study seeks to understand the set of circumstances that contribute to this inequitable outcome. More specifically, we ask: For Latinos who completed four-year degrees, what factors affected their probability of degree completion and to what extent?

Integrated Model of Student Success

This analysis was guided by a model based on the Geometric Model of Persistence and Achievement (Swail 1995; Swail, Redd et al. 2003). The model asserts that the student experience is the result of an interaction of cognitive, social, and institutional factors, which are represented in Figure 1 as the three sides of a triangle. Whereas the cognitive and social factors impact students' abilities to persist and succeed in education, the ability of various educational institutions and agencies to understand these factors and make appropriate reflections about their practice and service is also critical to a students' potential success. Thus, dynamic changes on the systemic side of the model allow for the inclusion of K-16 coordination and put forth the idea that there are multiple institutions at play producing a larger system in which students and families interact and function. In addition to the geometric model, we also rely on the pathways to college model (Cabrera and LaNasa 2000). This model argues that success in college begins in middle school when parents and children being to aspire and plan for college.

The foundation of the triangle consists of systemic factors, K-16 coordination, outreach programs, financial aid, climate and diversity, and facilities and services. The first two elements can contribute to the development of cognitive and social factors conducive to postsecondary success early in the academic experiences of students.

Exhibit III-1. Swail's Integrated Model of Student Success



The cognitive factors consist of postsecondary planning, academic preparation, college knowledge, and academic integration. Although the first three elements happen prior to entering a postsecondary institution, they are crucial to postsecondary success and can be the result of early interaction with postsecondary institutions through K-16 coordination and outreach programs. Academic integration is taken from the larger research on persistence, specifically Tinto's (1975) student integration model.

The social factors consist of family encouragement, student aspirations, social integration, and development. Again, the family encouragement and student aspiration elements must begin far in advance of the postsecondary institution. In fact, they are crucial to ensuring postsecondary access. It is these elements that influence the pre-collegiate cognitive factors. The social integration and development elements to be considered in the context of student development theories are supported in the research literature by Tinto (1975) and Pascarella and Terenzini (1991; 2005).

In addition to the elements found on the different sides of the triangle is the geometric character of the model itself. Just as Swail's geometric model suggests, when one side of the triangle is lacking, it changes the character of the entire interaction and potentially weakens the structure. In other words, all of the elements working in concert produce the ideal outcome. In less than ideal circumstances, it is possible for elements from one side to contribute to the strengthening of elements from the other. For instance, in the event that families are not encouraging and students have low aspirations, one can expect to see a lack of academic planning and preparation. At this point, systemic elements can contribute to the college knowledge of families and students potentially promoting family encouragement and helping both the families and students to develop higher aspirations (Auerbach 2001).

A key understanding of the model is that educational institutions—whether elementary, secondary, or postsecondary—must measure and understand the cognitive and social realities of the student.

Interaction is the key to this model. The condition of each element on each side of the triangle has an impact on the student outcome. There are four possible outcomes for students: secondary school dropout, high school graduate, postsecondary dropout (immediately or after stop-out) and post-secondary success (directly or after stop-out). The elements in this model are central to understanding the causes of student outcomes. The integrated model of student success guided the variable selection and choice of analytical methods.

A key understanding of the model is that educational institutions—whether elementary, secondary, or postsecondary—must measure and understand the cognitive and social realities of the student. If these are not systematically measured and considered, the institution has little ability to make the type of systemic and programmatic alterations in practice that can make a difference. Student unit-record information is crucial to changing educational practice and expanding educational opportunities for students.

Research Methodology

The target population for this study involves 1988 eight-grade students who went on to some form of postsecondary education between 1992 and 2000. Drawn from the National Educational Longitudinal Study of 1998 (NELS:88), our cohort follows White and Hispanic students from the 1988 base year through the fourth follow-up survey in 2000. This sample represents 72 percent of the entire 1988 eight-grade cohort.

Created under the auspices of NCES, two databases were used in this study (NELS:88 CD 2003-348 and NELS:88 CD 2003-402). The databases contain extensive socioeconomic status, parental expectation, planning for college, high school-based support, curriculum, high school characteristics, diverse activities in postsecondary education, financial support, and types of PSE completion. NCES followed a stratified sample strategy in creating the NELS:88 whereby the original sample of 8th graders was adjusted to represent about 3 million population. Subsequent weights reflect the number of individuals attending postsecondary institutions. In this study, we used the panel weight of fourth follow-up survey (F4BYPNWT), which adjusts the NELS:88 data to reflect the number of 1988 middle school juniors who coherently succeeded first through fourth follow-up surveys. As noted by Adelman (1999), standardized statistical packages such as SPSS significantly underestimate the sampling error when handling stratified samples. We used AM to correct for this problem during the regression analysis.

Descriptive Overview

The following section provides more detail about the sample group studied, including descriptive statistics about their background characteristics, preparation behaviors, access variables, and persistence behaviors. This analysis paints a detailed picture of the educational path of Latinos and sets the stage for our regression analysis to follow. It should be noted that the results of this section will differ from those of Part I of this report series due to a difference in the cohort group. Part I studied all NELS 8th grade students, while Part III focuses exclusively on those students who entered some form of postsecondary education by 2000. However, we strongly encourage readers to review both Part I and Part II reports, as they provide indepth descriptive and inferential analysis of the NELS cohort.

Family & Student Characteristics

Background characteristics do not provide specific educational policy implications regarding the educational path of Latino students as compared to White students. Data on these characteristics do, however, point to policy areas that have an impact on educational outcomes.

Educational Legacy. The educational attainment of parents and older siblings is an indication of the kinds of educational goals and expectations for the child (Sewell and Shah 1968; Auerbach 2001; Choy 2001). Latino students were much less likely to have a parent with an earned educational credential—at any level—than White students. In fact, 42 percent of Latino students had parents whose highest level of education was less than a high school diploma compared to 18.2 percent of for White students. At the other end of the spectrum, 81.8 percent of White students had parents with some college or more, while 58 percent of Latinos had the same educational legacy.

Approximately 46 percent of Latino students came from a family with family income below $25,000 (1988 dollars) and only 9.2 percent were from high income families (above $75,000).

Family Income. The socioeconomic background of students weighs heavily on their academic achievement at the K-12 level and is a significant barrier in preparing for postsecondary education and gaining access to institutions (Alexander, Pallas et al. 1987; Baker and Velez 1996; Cabrera and La Nasa 2001; ACFSA 2002). Latino 8th-grade students were much more likely to hail from low-income backgrounds than White students. Approximately 46 percent of Latino students came from a family with family income below $25,000 (1988 dollars) and only 9.2 percent were from high income families (above $75,000). Comparatively, less than one quarter (17 percent) of White students were low-income and 21.7 percent were from high income families.

Gender. The pool of eighth-grade Latino students was slightly more female than the White cohort. About 55 percent of Latino students were female compared to 52.7 percent of White students.

Expectations & Aspirations

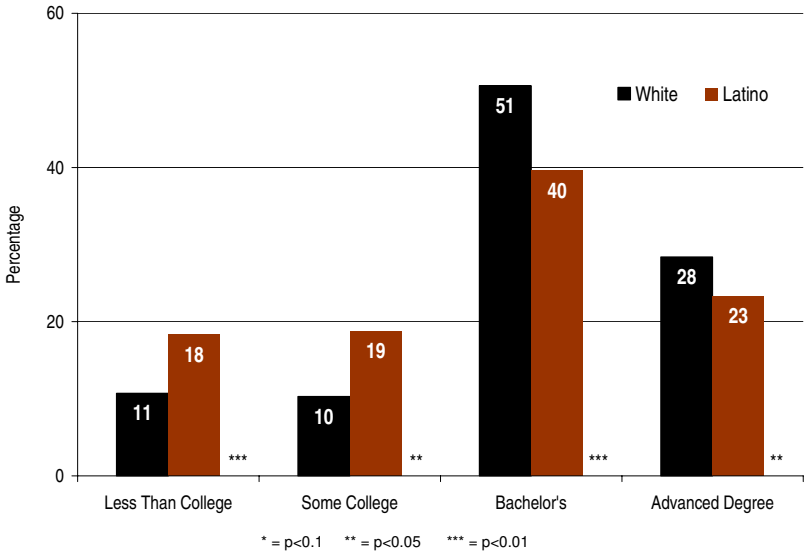
The expectations and aspirations of parents, peers, family members, and the students themselves have a direct impact on the educational planning and eventual educational opportunities of students. These issues have policy implications with regard to our ability to create programs to educate these individuals about the importance of postsecondary education and career planning.

Parental Expectations. Parental encouragement is pivotal in the development of a predisposition for postsecondary study and eventual occupational attainment (Sewell and Shah 1968; Sewell and Hauser 1975; St. John and Noell 1989; Stage and Hossler 1989; Flint 1993; Hossler and Vesper 1993; Berkner and Chavez 1997; Flint 1997; Horn 1997; Hossler, Schmit et al. 1999; Cabrera and LaNasa 2000; Perna 2000; Terenzini, Cabrera et al. 2001). Expectations signal the level of encouragement that parents will provide. Based on our analysis, Latino parents are less likely to have high postsecondary expectations for their children. Forty-two percent of Latino parents have as their highest expectation a high school diploma or a general equivalency diploma, while 18.2 percent of White parents have those expectations. Conversely, 81.8 percent of White parents expect their children to have some college or above by the end of their academic careers, while 58 percent of Latino parents have that expectation.

White students were much more likely than Latino students to aspire to a postsecondary degree while in the 8th grade, especially a BA or higher.

Postsecondary Aspirations. What students aspire to attain, in educational terms, has an effect on their academic behaviors and outcomes (Sewell and Shah 1968; Chapman 1981; Cabrera and LaNasa 2000; Cabrera and La Nasa 2001; Cooper 2002). White students were much more likely than Latino students to aspire to a postsecondary degree while in the 8th grade, especially a BA or higher (see Exhibit III-2 on page 11). In total, 79 percent of White students expected to earn at least a BA; 28.4 percent planned on an advanced degree. By comparison, 62.9 percent of Latino students planned on earning at least a BA, with 23.3 percent looking forward to an advanced credential.

Exhibit III-2. Postsecondary Aspirations of 1988 8th Grade Latino and White Students



Preparation for Postsecondary Education

A rigorous course load is used as a signal of postsecondary fitness and is highly correlated with high performance on college entrance-type examinations like the ACT and the SAT.

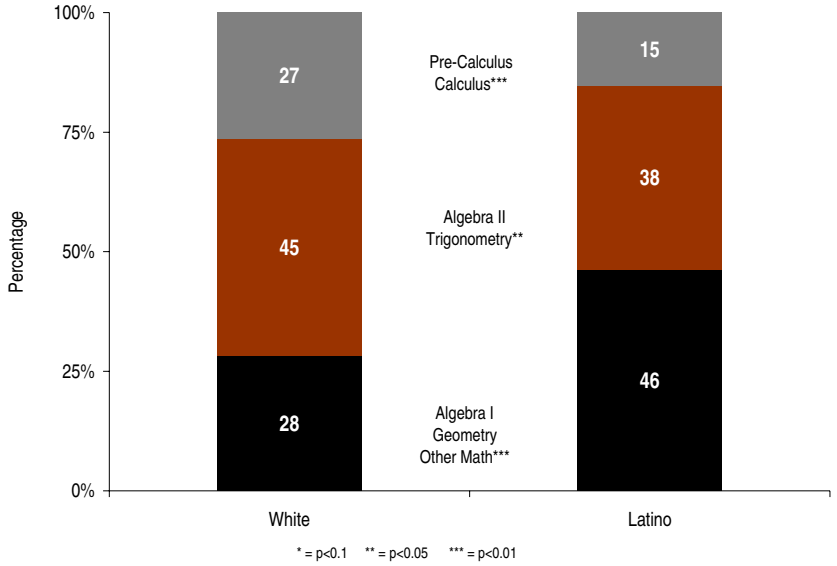
How students prepare for postsecondary education is a critical area for concern among educators and policy makers, and no less important to the students themselves. Academic preparation impacts the attention one spends to the prospect of postsecondary education and has a direct impact on the type of school a student applies and is ultimately admitted. Arguably the most important characteristic of students who succeed in postsecondary institutions is that they are academically prepared for postsecondary studies (Tinto 1993; Adelman 1999). A rigorous course load is used as a signal of postsecondary fitness and is highly correlated with high performance on college entrance-type examinations like the ACT and the SAT (CGCS 2001a; CGCS 2001b).

Remedial Course-Taking Patterns during High School. Latino students were more likely than White students to take mathematics and English remedial/developmental courses in during high school. Latino students were also more likely to be multiple remedial-course takers. In remedial mathematics, 15.8 percent of Latino students took one or more remedial courses compared to 8 percent of White students. In English, 12.6 percent of Latino students took one or more remedial courses, compared with 5.6 percent of White students.

Course-Taking Patterns. It is widely acknowledged that students require at least three years of mathematics consisting of courses in Algebra I, Geometry, and Algebra II to enroll into a four-year institution without being placed

on academic probation or being placed in remedial postsecondary courses. Taking advanced mathematics courses makes a student far more competitive and is more likely to be part of an academically-focused curriculum (Adelman, 1999).

Exhibit III-3. High School Mathematics Course-Taking Patterns of 1988 8th Grade Latino and White Students



Our analysis shows that almost half of Latino students are concentrated in courses below the Algebra II level while White students are concentrated at the Algebra II and Trigonometry level.

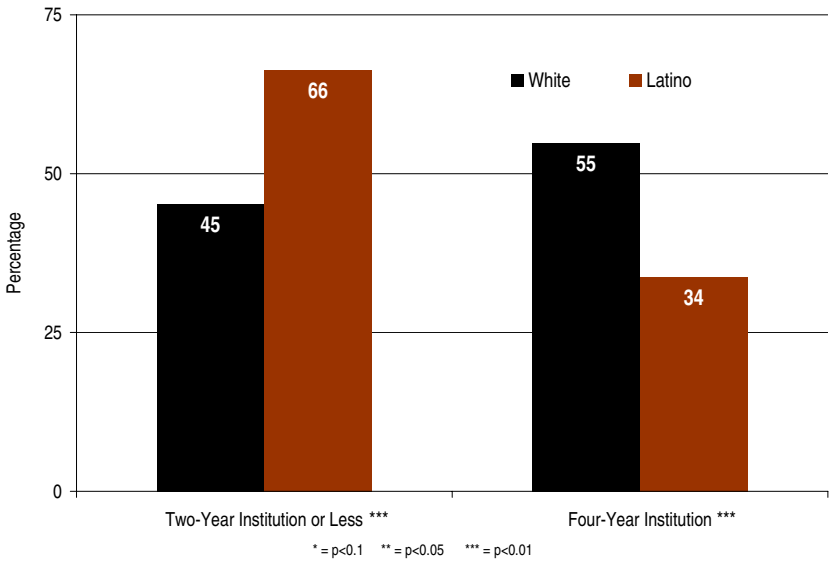
However, our analysis shows that almost half (46.2 percent) of Latino students are concentrated in courses below the Algebra II level while White students are concentrated at the Algebra II and Trigonometry level (45.4 percent). At the highest mathematics levels, 26.5 percent of White students take Pre-Calculus and Calculus courses, compared to only 15.4 percent of Latino students. Latinos are also less likely to be enrolled in an academically-oriented high school program than White students (65.6 percent vs. 75.5 percent).

Access to Postsecondary Education

The type of postsecondary institution a student attends is an important factor in their development and future opportunity. Although many students who earn a BA start at a two-year institution, credits earned at two-year institutions are not always transferable or do not count toward a degree (Cabrera, Burkum et al. Forthcoming).

Postsecondary Enrollment. By the year 2000, 8 years after high school graduation for the cohort, 33.7 percent of Latinos in the sample were enrolled in a four-year institution and 66.3 percent were enrolled at the two-year level. Conversely, 54.8 percent of White students were enrolled in four-year programs with 45.2 percent in two-year programs.

Exhibit III-4. First Postsecondary Institution Attended, Two-Year versus Four-Year



Postsecondary Attendance, Persistence, & Completion

How students attend postsecondary education has an important impact on their ability to persist and complete education. This section looks at the attendance patterns, delayed entry into postsecondary education, academic achievement, and degree completion.

Attendance Patterns. There are two important indicators of attendance patterns for students. The first is whether students attend full-time or part-time, the other an observation of the consistency of their attendance. Although attending part-time and in a consistent pattern may be a necessity and choice for students, it is known that both options have negative consequences on the ability of students to persist and complete a degree program (Adelman, 1999).

Over half of Latino postsecondary students attended in a part-time status (51.8 percent), compared to 37.1 percent of White postsecondary students. With regard to continuous enrollment, 39.6 percent of Latino students attended their postsecondary studies continuously compared to two-thirds (64.2 percent) of White postsecondary students.

Delay of Entry to PSE. Latino students were more likely to delay entry into postsecondary education following successful graduation from high school. A gap of 5.6 points between Latinos (76.7 percent) and White students (82.3 percent) exists with regard to entering postsecondary education within 7 months of high school graduation. Conversely, 23.3 percent of Latino youth

delay entry to postsecondary education at least 8 months past high school graduation compared to 17.7 percent of White youth.

Low-income students and students of color are generally less likely than middle/high SES, and White students to complete a degree program. The gaps are wide and widening in this regard.

Academic Achievement. How well a student performs is also an important factor to consider in postsecondary persistence. Performance as measured by grade point average (GPA) differs significantly between Latinos and Whites. Fifty-two percent of Latinos earned GPAs of 2.49 and below, and 68.1 percent of White students earned GPAs of 2.50 and above. Additionally, 18.6 percent of Latino students scored above 3.20, 10 percent lower than White students (28.6 percent).

Degree Attainment. Low-income students and students of color are generally less likely than middle/high SES and White students to complete a degree program. The gaps are wide and widening in this regard (Cabrera and LaNasa 2000; Harvey 2003; Walpole 2003). More than three-quarters of Latino students who enrolled in a four-year postsecondary institution, or 76.8 percent, did not earn a degree by the year 2000. Comparatively, 52.7 percent of White students did not complete.

Financial Aid

Financial concerns tend to loom large in persistence to degree completion. The actual availability of resources and how students perceive the availability of resources and their capacity to acquire them also has an impact on persistence (Bean 1986; Metzner and Bean 1987; Cabrera, Castaneda et al. 1992; Cabrera, Nora et al. 1992). Types of aid also matter inasmuch as type of aid and combination and cost are considered, especially for students of color (Pantages and Creedon 1978; Porter 1989; Murdock 1990; St. John 1991; St. John and Starkey 1995; Mumper 1996; St. John, Paulsen et al. 1996; Perna 1998; Fenske, Porter et al. 2000).

The only significant differences between Whites and Latinos are in grant receipts, work study programs, and holding on-campus jobs. Latinos received grants more often than Whites (51.4 percent versus 43.8 percent), and Whites received work-study aid at a higher rate than Latinos (10.1 percent versus 6.9 percent). As well, White students were more likely to hold on-campus jobs at a rate of 23.6 percent compared to 16.7 percent for Latinos.

Although the differences were not statistically significant, more White students received loans (30.2 percent) than Latinos (26.1), and a higher percentage of White parents borrowed money for college (14.6 percent) than Latino parents (12.3 percent).

Research Findings

This section of the report focuses on the regression analysis of the NELS:88/00 database. The results of our analysis fall in line with other research: socioeconomic status, parental expectations, planning, course-taking patterns, and student postsecondary behaviors have a significant impact on postsecondary degree completion. These findings also present very clear direction for further research and policy focuses because the factors with the most impact—planning and postsecondary behavior—produce changes of more than 40 percent, and some cases 60 percent, in the probability of completion. Detailed tables of findings can be found in Appendix C.

What is extraordinary about the analysis is that the 24.1 percentage point gap in BA probability between Whites and Latinos is substantially reduced when all factors are held constant, which is to say this model suggests that attending to the following factors would significantly increase the chances that Latinos will graduate from a four-year institution at rates comparable if not equal to those of Whites.

Family & Student Characteristics

Gender. While it is already established that Latinos attend four-year institutions at much lower rates than Whites, this analysis shows that being Latina increased the probability of graduation by 20 percent[1] (Baseline p=.232). It is unclear from this analysis what extra barriers presented themselves to young men, but the difference between males and females is statistically significant (p<0.01).

Middle-income Latinos had a 17 percent higher probability of earning a BA compared to low-income Latinos.

Income. Middle-income Latinos had a 17 percent higher probability of earning a BA compared to low-income Latinos. Being upper income had no significant effect for Latinos. Socioeconomic status worked differently for Whites. Being middle class only increased the probability of completion by 10 percent (Baseline p=.473), but high-income Whites had a 24.0 greater probability of completion than low-income students. No significant effects of having college educated parents were found for either group.

Educational Legacy. This last finding can be seen as a challenge to the standing research on the value of having college-educated parents. There are several ways to consider this finding, which would suggest that it is complimentary and not contradictory. Having a college education places individuals in a higher-income bracket (Baum and Payea 2004), meaning that the family income variable does contain some of the effect of parental educational attainment. Further, subsequent findings concerning expectations

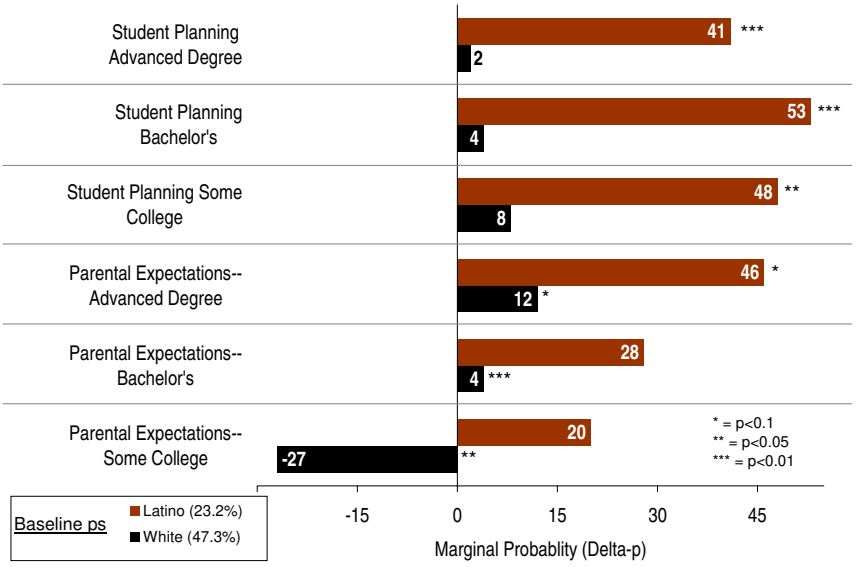
[1] All findings are reported in terms of Delta-p unless otherwise noted. For a discussion of the interpretations see Appendix A.

and planning reflect a degree of knowledge on the part of parents who have college degrees or some college experience.

Expectations & Aspirations

Parental Expectations. Parent expectations and the degree of planning that took place in the 8th grade were also analyzed. Expecting their children to attend some college or to get a bachelor's degree had no statistically-significant effect for Latinos (see Exhibit III-5). However, parental expectation of advanced degrees had a large and significant effect for Latinos increasing the probability of completion by 46 percent. Parents who have high expectations for their children clearly behaved in ways that had strong positive effects on their children's behaviors. This finding reflects the research suggesting that parental engagement and involvement are crucial to student success (Conklin and Dailey 1981; Hoover-Dempsey and Sandler 1995; Cabrera and LaNasa 2000; Cabrera and La Nasa 2001).

Exhibit III-5. Percent Change in the Probability of Completing a Four-Year Degree Due to Expectations and Aspirations



Planning for college at the 8th-grade level also had large and significant effects for the probability of completion. Latino students planning for some college increased the probability of BA completion by 48 percent.

Planning for College. Planning for college at the 8th-grade level also had large and significant effects for the probability of completion. Latino students planning for some college increased the probability of BA completion by 48 percent, and those who planned for a bachelor's degree increased the probability by 53 percent. This is one of the most robust findings of the study. It suggests that students who entered high school with a plan and sense of purpose had a much greater probability of taking all the necessary steps to succeed in high school, apply to and enroll in a four-year institution, and persist to degree completion. Research suggesting that students without a purpose are more likely to drop out is supported by these findings (Connell

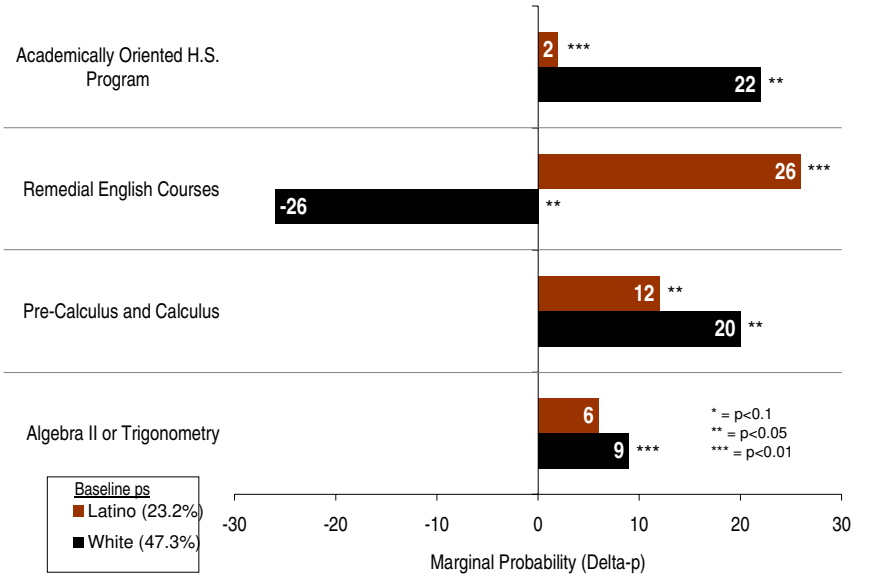
1982; Rosenbaum 2001). Furthermore, policymakers interested in promoting persistence to degree completion would be well served by focusing their efforts on helping families and students develop and work toward clearly formed educational goals. The goals should be clearly formed and articulated because although it is beneficial to plan for some college, it is far more beneficial to plan for a bachelor's degree if that is the desired goal.[2]

Preparation for Postsecondary Education

No amount of assistance in going through the motions of applying to college will go as far as being academically prepared to succeed once a student enrolls.

Course Taking Patterns. Measures of high school based support—such as receiving help in completing applications, applying for financial aid, and writing essays—produced no significant effects for Whites or Latinos. Course-taking patterns, however, did produce positive effects. For White students taking Algebra II or Trigonometry versus taking courses below Algebra I produced positive effects. Taking pre-calculus and calculus produced positive effects for both Latino and White students, with increased probabilities of 12 and 20 percent respectively. It is reasonable to assume that these findings indicate the value of academic preparation over simple college preparatory assistance programs. No amount of assistance in going through the motions of applying to college will go as far as being academically prepared to succeed once a student enrolls.

Exhibit III-6. Percent Change in the Probability of Completing a Four-Year Degree Due to Academic Preparation



[2] For a description of a longitudinal model that considers the importance of the temporal nature of planning see Appendix E.

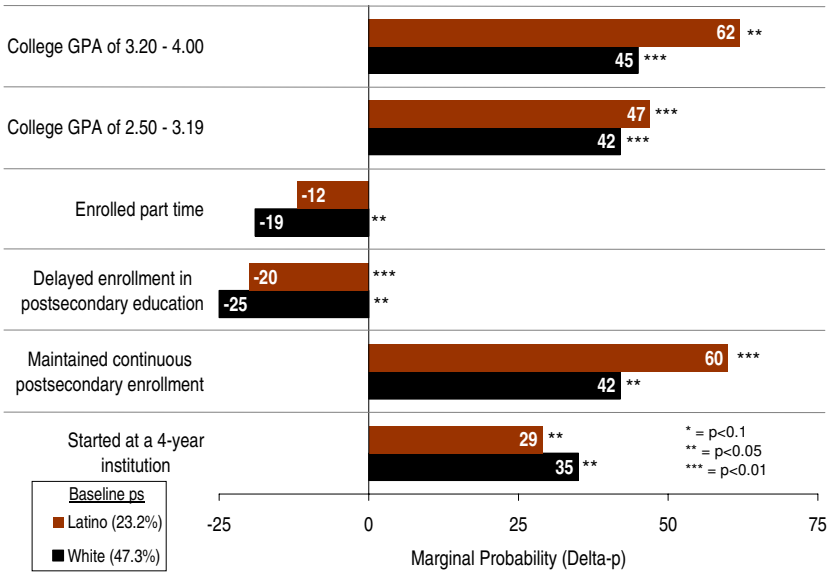
The level of remediation also mattered. According to our analysis, remedial math served no one particularly well. Remediation in English, however, proved positive for Latinos with an increase of 26 percent, but proved negative for Whites at a decrease of 26 percent. This finding very likely reflects a significant number of English language learners and non-native English speakers among Latinos as opposed to Whites. The effect of remediation in English for native speakers is similar to remediation in any other subject: it detracts from the time available to study and master rigorous academic course material. Conversely, remediation in English for non-native speakers can provide a necessary foundation. There are larger policy issues to which this analysis cannot speak, but this finding suggests that more research should be done to determine which remedial English courses provide benefits and which do not.

Public, private, or vocational orientation in high school had no significant effect on student postsecondary outcomes. However, schools with academic orientations produce small-but-significant positive effects of 2 percent for Latino students and 22 percent for White students.

Postsecondary Activities & Experiences

What students do during their postsecondary careers has a significant effect on students. Latino and White students who began their postsecondary studies at a four-year institution increased their probability of completion by 29 and 35 percent respectively. This finding is supported by existing research which asserts that beginning at a two-year institution is not necessarily the best step to take if one's ultimate goal is a four-year degree, even though many students use the two-year institution as a step stone due to financial concerns (Astin 1975; Breneman and Nelson 1981; Cabrera, Burkum et al. Forthcoming).

Exhibit III-7. Percent Change in the Probability of Completing a Four-Year Degree Due to Postsecondary Activities



Maintaining continuous enrollment in postsecondary education increased the probability of earning a BA by 60 and 42 percent for Latino and White students respectively. This finding, in combination with the literature on financial aid concerning the type of work that students do and the number of hours worked per week (Pascarella 1994; Horn and Chen 1998), paints a clear picture that shows the importance of continuous enrollment for success. Stopping out often leads to dropping out (Tinto 1975; Swail, Cabrera et al. 2004).

Having a GPA between 2.50 and 3.19 increased the probability of completion by 47 percent for Latinos and 42 percent for Whites, while a GPA between 3.20 and 4.00 increased the probability of completion by 62 percent and 45 percent respectively. Again, academic preparation remains critical to postsecondary success. Students who are better prepared academically are more likely to perform at higher levels at college.

There were postsecondary behaviors that had negative effects on students as well. Choosing to delay enrollment between high school and college reduced the probability of completion for Latinos by 20 percent and 25 percent for White students. Additionally, attending in a part-time capacity also had a significant negative effect for Whites with a 19 percent reduction in probability of earning a BA, but the negative effect for Latinos (12 percent) was not statistically significant.

Financial Aid

Although research supports the importance of financial factors in persistence, we found no significant effects of the five financial aid variables in this analysis. For instance, there was no significant difference in the effect of receiving grants, loans, or participating in work study programs (0.09), nor did holding a campus-based (0.02) or parent borrowing (-0.23). These findings support the research cited earlier showing that it is types of funding in certain combinations along with the costs that have an effect on persistence (Pantages and Creedon 1978; Porter 1989; Murdock 1990; St. John 1991; Blanchette 1994; St. John and Starkey 1995; Mumper 1996; St. John, Paulsen et al. 1996; Perna 1998; Fenske, Porter et al. 2000).

Policy Implications

Postsecondary planning, academic preparation, and taking the right steps in college matter for Latino persistence. These are the areas where we found the most significant effects. It is important to note that the nature of this analysis means that the size of the effect is dependent on the presence of all of the other factors as well.

At the outset of this report, we presented a framework for consideration of how student outcomes are the result of the interplay of student proficiencies in the cognitive and social areas with the strategies and conditions of a system or organization. Our analysis found that these items matter to Latino students and that the ability of schools and communities to provide the resources to develop these skills and knowledge bases is critical to the educational improvement of Latino students.

For purposes of clarity, we have partitioned our policy discussion into three pieces: middle school, high school, and postsecondary institution.

Middle School

Because Latino students are more likely to be from low-income families and less likely to have college-educated parents than other students, it is less likely that their families will have the knowledge and skills necessary for the development of aspirations for postsecondary study. From a policy perspective, while poverty and educational legacy are outside the control of the educational institutions serving Latino students, it is a viable option to work with families to develop college knowledge—the knowledge and skills guiding preparation and success for postsecondary education. Two federal programs, GEAR UP and Upward Bound, help low-income students learn more about postsecondary education, therefore providing them with the foundation to make further educational strides. Other, non-federal programs, such as AVID, MESA, Puente, College Summit, and numerous other community-based programs are examples of efforts to engage students early. Many of these programs begin at the middle school level and follow students into high school. The guidance counselor, however, remains a critical piece in the pre-planning of students in middle school before high school courses have been selected. Career-orientation programs help students understand the possibilities before they become tracked outside the academic pipeline.

It is a viable option to work with families to develop college knowledge—the knowledge and skills guiding preparation for and success in postsecondary education.

According to our findings, middle school is important because Latinos who enter high school with a plan for any type of postsecondary study—with a sense of the purpose of their high school work—are far more likely to graduate from college than those who have no plan. In fact, having a plan to attend college with no real degree aspirations improves the chances of

graduation by 48 percent for Latino youth. Of course, having a plan to attain a BA degree improves the chances by an additional 5 percent (53 percent).

Planning for college and taking appropriate math courses are intertwined (Cabrera & La Nasa, 200). Those two factors themselves are in turn dependent upon the extend parents themselves maintain high degree aspirations for their children. It stands to reason that policies addressing these three factors simultaneously would enable Latino students and their families to be better equipped to undertake a successful postsecondary education journey.

Recommendations:

- Make certain that middle school children and their parents are aware of the economic and social benefits of professional and technical occupations while spelling out the curricular choices needed to eventually attain such occupations;
- Clearly communicate to parents and their middle high school children the practical applications of math and its connection to access to professional and technical occupations;
- Actively involve Latino parents in school activities while providing them with useful information about curriculum planning, financing options, and applying for college;
- Increase the amount of information on career and postsecondary options for students, starting in the 6th grade, if not earlier. Included is the realization of the importance of the importance of course-taking patterns during both middle and high school;
- Engage influential Latino organizations to the point they themselves can disseminate information on career and postsecondary options for students, starting in the 6th grade or earlier;
- Fully utilize the expertise of guidance counselors who are trained in career and academic development to appropriately support the needs of students and families;
- Encourage the development of supplementary pre-college programs and community partnerships that support career and academic development of students and parents;
- Encourage increased parental involvement in the career and academic development of the child;
- Develop policy to encourage the selection of Algebra I at the 8th grade in order to open up further academic options for students in high school.

High School

The popular idea that high school is where planning for college begins is disproved by this analysis. Planning must begin earlier.

The popular idea that high school is where planning for college begins is disproved by this analysis. Planning must begin earlier. Still, academic preparation during high school sets the stage with the first math courses that students take. Latinos need to be enrolled in and master Algebra I no later than the ninth grade in order to reap the benefits of high mathematics achievement on postsecondary persistence. Latinos who take more than three years of mathematics beginning with Algebra I have a higher probability of graduating from college than those who take fewer than three courses. Thus, those students who start on the mathematics track in their freshman year of high school have a much higher propensity to complete those courses before high school graduation.

Remediation in English is also important for Latinos. More research must to be done to determine if the finding is reflective of the needs of non-native speakers and/or first generation English speakers. Additionally, more research is needed to determine if different types of courses have different effects. While some courses may be considered remedial, they may be linguistically appropriate thus providing benefits to students who need it and producing negative effects for those who do not.

It is also at the high school level that solid advising needs to take place about the type of institutions students and families should consider. Latinos seeking a four-year degree are somewhat disserved by beginning at a two-year institution. Our analysis found that BA-directed Latino students who started at a four-year institution had a 29 percent increase in probability of graduating than those who started at a community college. Thus, high school counselors armed with appropriate knowledge and materials are in a position to make sure that Latino families and students make prudent decisions related to education and career goals.

The most important information that families and students need to have in high school is that delaying entry and taking breaks is detrimental to academic careers. If staying in school continuously increases the probability of graduating by 60 percent, the second largest and most significant effect in the analysis, then students and families need to be armed with that information before they begin.

Recommendations:

- Develop policy to encourage and allow for the completion of Algebra II by 9th grade and Geometry by 10th grade;
- Ensure that math competencies are articulated throughout K-12 and that Latino students master them at grade level;
- Provide remedial English programs for Latino students;

- Provide adequate advising and counseling support at every grade level during high school, and ensure a responsible student:counseling ratio;
- Provide dropout prevention programs for Latino students that help them to understand the purpose of high school and to develop a plan for postsecondary life.

Postsecondary Institution

Helping Latinos to maintain continuous enrollment and providing academic support while they are enrolled should be the primary role of the postsecondary institution in the effort to improve the completion rates of Latinos. The provision of academic support is evinced as important by the large effect of grade point average on the probability of completion. Of course, being academically prepared when they matriculate is important for all students, but being able to take advantage of academic support services undoubtedly helps students maintain high performance in an academic culture that differs significantly from high school.

Helping Latinos to maintain continuous enrollment and providing academic support while they are enrolled should be the primary role of the postsecondary institution.

This study does not sufficiently address the impact of financial aid due to statistically-insignificant findings for Latinos. Regardless, as mentioned throughout this paper, the literature on financial aid is somewhat consistent in this area. Although the analysis includes variables on different types of financial aid, it could not measure the combination of aid packages with costs, which is what affects student persistence.

Recommendations:

- Make certain that classroom and out-of-classroom experiences are geared to enhance learning and acquisition and use of competencies;
- Provide appropriate levels of academic and social "safety nets" for students;
- Track student progress throughout the postsecondary experience, with special emphasis on the freshman year;
- Stress financial aid policies and programs that enable Latino students to maintain continuous enrollment while bringing about engagement with faculty and academic staff;
- Adopt a long-term strategy whereby year-to-year persistence strategies are articulated with the objective of securing a four-year degree;
- Provide invasive counseling for students to encourage continuous enrollment and prudent course selection;

- Link the financial aid office with academic and social services to ensure that students are provided with a coordinated level of support that encourages continued enrollment and progress toward student goals.

In Conclusion

Encouraging Latino students to explore and develop their career and academic interests is important to keeping them in the academic and career pipeline. This analysis found that Latino students who are supported by their families in the pursuit of a postsecondary education, create a plan by the eighth grade, take three years of mathematics or more, start at a four-year institution, maintain continuous enrollment and a GPA of 2.50 or above can significantly improve their chances of postsecondary and career success.

The findings in this study do not suggest that the work to make these things a reality is easy, but they do suggest where to begin.

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Appendix A – Methodology

Database. The sample for this study was drawn from the National Education Longitudinal Study of 1998 (NELS:88) and only Whites and Latinos in the cohort groups from 1988 base year through 2000 fourth follow-up survey were selected. Created under the auspices of NCES, the two databases (NELS:88 CD 2003-348 and NELS:88 CD 2003-402) are used in this study, and key variables demographic and school related variables were retrieved. Those relate to socioeconomic status, parental expectation, planning for college, high school based support, curriculum, high school characteristics, diverse activities in postsecondary education, financial support, and types of PSE completion.

Weight Employed in the Analyses. NCES followed a stratified sample strategy in creating the NELS:88 whereby the original sample of 8th graders was adjusted to represent about 3 million population. Subsequent weights reflect the number of individuals attending postsecondary institutions. In this study, we used the panel weight of fourth follow-up survey (F4BYPNWT), which adjusts the NESL:88 data to reflect the number of 1988 middle school juniors who coherently succeeded first through fourth follow-up surveys. As noted by Adelman (1999), standardized statistical packages such as SPSS significantly underestimate the sampling error when handling stratified samples. To correct for this problem we used AM to run all logistic regression models and estimate the correct standard errors for all analyses reported through this report. The AM statistical software, developed by the American Institutes for Research (2002), is distributed is endorsed and distributed by the Association of Institutional Research.

Dependent Variables

Four-year degree completion. Students who secured at least a bachelor's degree by 2000 were considered degree completers for this study. Degree completion is coded as 1 and 0 for those who did not complete a four-year degree. This variable was ascertained from PETS (NESL:88 2003-402) and the original code for this variable is HDEG.

Independent Variables

Background. Gender (F4SEX) is coded as 0 for male and 1 for female. Ethnicity (RACE4) only includes White and Hispanic (White=0, Hispanic=1), and other ethnic groups are excluded from the logistic regression analysis.

Family Income. The original code of this variable is FAMINC 92 in NELS:88 CD 2003-402. The 6 original income categories were collapsed into three: low (less than $25,000), middle ($25,000 to $74,999) and high ($75,000 or more).

Highest Parental Expectation. This variable was attained from EDEXP92 in NELS:88 2003-402. This variable reports how far in school 8th graders believe their parents think they should go. The basic level is high school graduate or less and it is compared to some college, bachelor's or advanced degree.

Planned for college at 8th grade. Created by (Berkner & Chavez, 1997), BYS45 (NELS:88 CD 2003-348) identifies the highest degree planned to obtain when the subject was in the 8th grade. This nominal variable is also coded high school graduate or less, some college, bachelor's, and advanced degree.

High school based support. Three variables in regard to school based support have been used in this study. The first one received help PSE applications (F2S57A), the second is received help filling out financial aid form (F2S57B), and the third to receive assistance in writing PSE application (F2S57C). All these variables are retrieved from NELS:88 CD 2003-348.

Highest mathematics in high school. Adelman and associates developed this variable, labeled HIGHMATH in CD# 2003-402, based on high school and postsecondary transcripts. They originally categorized highest mathematics course students took into seven categories, but in this study is it re-categorized into three. Base category includes alge-

bra I, geometry, and other math. Next category includes algebra 2 and trigonometry. The top category includes pre-calculus and calculus.

Remediation. Two measures were employed signifying the number of remedial courses in math (REMMTH) and reading (REMREAD) the community college student took. These variables were derived from college transcripts CD 2003-402 (see Adelman, 1999). It is modified to binary variable, in which 0 indicates no remedial course and 1 means 1 or more remedial course.

High school type. This variable came from NELS:88 CD 2003-402. The public school is used as base group.

High school program. High school program (F2RTRPRG) is determined from high school credits and the three groups are undecided or general, mostly vocational, and academic or rigorous academic program. The undecided is used as base group. F2TRTPRG is in NELS:88 CD 2003-348.

PSE activity. Five indicators were employed in the logistic regression analysis–if students started at a four-year institution or not (REFINST by INSTCOMB), if they continued college enrollment (CONTIN), if they delayed PSE entry (DELAY), and if they attended as part time (F4EPARTT). Whether attending part time was based on self-reported information contained in NELS 2003-348. The other variables were derived from college transcript databases (NELS 2003-402).

Undergraduate Grade Point Average. PETS database (NELS:88 CD 2003-402) has GPA. It is derived from PETS (NELS:88 2003-402). We categorize GPA score from 0 to 4 as following: GPA less than 2.5, GAP 2.5 through 3.19, and GPA 3.2 through 4.0 The base groups is less GPA less than 2.5.

Financial support. Five important variables are related to financial support in postsecondary education. They are all derived from NELS:88 2003-348, and they signify whether the student received grants to attend PSE (GRANTS), loans (LOANS), work study programs (WORKSTDY), or held a campus-based job (CAMPJOB), or whether his or her parent borrowed (PARNBORW).

Interpretation of Logistic Regression Results

Baseline p - observed probability of the dependent variable. For instance, the observed probability that 1988 cohort would eventually secure a four-year degree by 2000 is 0.4468, meaning that 45% of them graduated. Observed probabilities are also referred as "unadjusted probabilities." Baseline *p* serves as a benchmark to assist in assessing how much each independent variable contributes to the probability of the dependent variable.

Beta weights. In contrast to OLS, interpretation of logistic parameter estimates is not straightforward. Unlike OLS, the metric of individual coefficients is expressed in terms of logits rather than in terms of the original scale of measurement. This problem is particularly accentuated for categorical variables; the corresponding beta weights represent contrasts among categories summarized in terms of differences of logits. For instance, the SES effect of 1.07 for all indicates that Highest-SES originated students, on the average, are 1.07 logit units more likely to obtain a bachelor's degree than are Lowest-SES students. To overcome this problem, logistic regression results are usually presented in terms of changes in probabilities and adjusted probabilities.

Delta-p. Developed by Peterson (1985), delta-*p* reflects the incremental change in the dependent variable (e.g., completing a 4-year degree) due to a unit change in the independent variable (e.g. college academic performance). For instance, the delta-p value of .47 associated with higher undergraduate GPA means that if a student gets a higher GPA compared to the lowest one, the probability of degree completion increases by 47% percent. When the independent variable is dichotomous (e.g. gender), delta-*p*s are interpreted as differences between the two categories.

[3]Appendix B – Descriptive Statistics

Descriptive Statistics for the Variables Employed in the Logistic Regression Models

Factors	Variables	All (%)	White (%)	Latino (%)	Comparison between White and Latino	
					% difference	S.E.
Completion of 4-year degree	Four-year Degree or higher	44.7	47.3	23.2	24.1***	0.0266
Ethnicity	Whites	88.6				
	Latinos	11.4				
Gender	Male	47.1	47.3	45.4	1.9	0.0376
	Female	52.9	52.7	54.6	-1.9	0.0376
Family Income	Low (Less than $25,000)	19.9	17.0	46.2	-29.2***	0.0333
	Middle ($25,000-74,999)	59.6	61.3	44.6	16.7***	0.0318
	High ($75,000+)	20.5	21.7	9.2	12.5***	0.0293
Parental Education	No HS, or HS diploma, or GED	20.6	18.2	42.0	-23.8***	0.0293
	Some college or above	79.4	81.8	58.0	23.8***	0.0293
Parental Expectations for child	Parent expected No PSE or don't know	6.6	6.3	9.3	-3.0**	0.0176
	Parent expected Some college	12.2	11.9	14.5	-2.6	0.0198
	Parent expected Bachelor's	43.6	44.6	35.2	9.4***	0.0251
	Parent expected Advanced degree	37.6	37.2	41.0	-3.8	0.0275
Planned for College at 8th grade	Less than college	11.6	10.7	18.3	-7.6***	0.0252
	Some college	11.3	10.3	18.8	-8.5**	0.0401
	Bachelor's	49.3	50.6	39.6	11***	0.0325
	Advanced degree	27.8	28.4	23.3	5.1**	0.0253
Received help with college application		47.2	46.9	49.2	-2.3	0.0265
Received in applying for financial aid		37.4	35.9	50.0	-14.1***	0.0269
Received help with college essays		30.1	29.4	35.3	-5.9**	0.0267
High School Math Taken	Algebra I, Geometry, and Other Math	30.0	28.1	46.2	-18.1***	0.0346
	Algebra II and Trigonometry	44.7	45.4	38.4	7**	0.0346

[3] The 2000 panel weight F4BYPNWT was used to estimate the number of 8th graders in the population that participated in both the base year and the fourth followed up that took place 12 years later. Due to the complex stratification procedures used in selecting the cases, the AM statistical software (American Institutes for Research, 2002) was used in estimating the correct standard errors for the *t*-test comparisons reported in the table.

Factors	Variables	All (%)	White (%)	Latino (%)	Comparison between White and Latino	
					% difference	S.E.
	Pre-Calculus and Calculus	25.3	26.5	15.4	11.1***	0.0206
Remedial courses in MATH	None	91.2	92.0	84.2	7.8***	0.0218
	1 or more remedial courses	8.8	8.0	15.8	-7.8***	0.0218
Remedial courses in English	None	93.7	94.4	87.4	7.0***	0.0204
	1 or more remedial courses	6.3	5.6	12.6	-7.0***	0.0204
High school type	Public	88.3	88.1	90.4	-2.3	0.0247
	Private	11.7	11.9	9.6	2.3	0.0247
High school program	Undecided	15.9	14.9	24.2	-9.3***	0.0288
	Vocational oriented	9.6	9.6	10.1	-0.5	0.0176
	Academically oriented	74.5	75.5	65.6	9.9***	0.0314
First Postsecondary institution attended	less than 2-year or 2-year institution	47.6	45.2	66.3	-21.1***	0.0310
	4-year	52.4	54.8	33.7	21.1***	0.0310
Maintained continuous PSE enrollment		61.4	64.2	39.6	24.6***	0.0316
Delayed enrollment in PSE	Entered within 7 months	81.6	82.3	76.7	5.6*	0.0291
	Delayed 8~20 or more than 20 months	18.4	17.7	23.3	-5.6*	0.0291
Enrolled part time		38.8	37.1	51.8	-14.7***	0.0348
College-GPA	0.00 ~ 2.49	34.0	31.8	52.0	-20.2***	0.0381
	2.50 ~ 3.19	38.4	39.5	29.4	10.1***	0.028
	3.20 ~ 4.00	27.6	28.6	18.6	10.0***	0.0277
Received grants	Yes	44.6	43.8	51.4	-7.6*	0.0426
Received loans	Yes	29.7	30.2	26.1	4.1	0.0295
Received work study programs	Yes	9.8	10.1	6.9	3.2**	0.0144
Parents borrowed	Yes	14.3	14.6	12.3	2.3	0.0221
Held a campus-based job	Yes	22.9	23.6	16.7	6.9***	0.0247

1. The 2000 panel weight F4BYPNWT was used to estimate the number of 8th graders in the population that participated in both the base year and the fourth followed up that took place 12 years later. Due to the complex stratification procedures used in selecting the cases, the AM statistical software (American Institutes for Research, 2002) was used in estimating the correct standard errors for the t-test comparisons reported in the table.

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Appendix C – Delta P Values

Change in the probability of completing a four-year degree among members of the 1988 8th cohort that became postsecondary education attendees due to background, socioeconomic status, parental expectations, preparation for college, high school factors and postsecondary experiences.

Factors	Variables and Values	Marginal Probability *Delta-P* All	White	Latino
Background				
	Latino v White	-0.03		
	Female v Male	0.00	-0.01	0.20***
Socioeconomic Status				
	Middle income v low income	0.11**	0.10*	0.17**
	High income v low income	0.26**	0.24**	0.20
	College educated parents	0.08	0.10	-0.01
Parental expectations				
	Some college v none or undefined	-0.24***	-0.27**	0.20
	Bachelor's v none or undefined	0.05	0.04	0.28
	Advanced degree v none or undefined	0.14**	0.12*	0.46*
Planned for college at 8th grade				
	Some college v none or undefined	0.09	0.08	0.48**
	Bachelor's v none or undefined	0.06	0.04	0.53***
	Advanced degree v none or undefined	0.03	0.02	0.41***
High school based support				
	Received help in writing college application v none	0.01	0.01	0.01
	Received help in applying for financial aid v none	-0.05**	-0.04	-0.11
	Received help with school application essays v none	0.02	0.03	0.00
High school math course				
	Algebra II or Trigonometry v less than Algebra II	0.09*	0.09***	0.06
	Pre-Calculus and Calculus v less than Algebra II	0.19**	0.20**	0.12**
High school remediation course				
	Took remedial courses in math	-0.01	0.02	-0.11
	Took remedial courses in English	-0.23*	-0.26**	0.26***
High school characteristics				

Factors	Variables and Values	Marginal Probability *Delta-P* All	White	Latino
	Private v Public	0.17*	0.15	0.22
	Vocational oriented program v undefined or general	0.16**	0.16*	-0.03
	Academic oriented program v undefined or general	0.21***	0.22**	0.02***
Postsecondary activity				
	Started at a 4-year institution	0.35**	0.35**	0.29**
	Maintained continuous postsecondary enrollment	0.44***	0.42**	0.60***
	Delayed enrollment in postsecondary education	-0.24**	-0.25**	-0.20***
	Enrolled part time	-0.19**	-0.19**	-0.12
	College GPA of 2.50 ~ 3.19 v less than 2.50	0.43***	0.42***	0.47***
	College GPA of 3.20 ~ 4.00 v less than 2.50	0.47***	0.45***	0.62**
Financial support				
	Received grants	0.03	0.02	0.09
	Received loans	-0.07	-0.08	0.09
	Received work study programs	0.08	0.08*	0.09
	Held a campus-based job	0.02	0.02	0.02
	Parents borrowed	0.03	0.02	0.19
Baseline *P* : Probability of Securing a 4-year degree		0.447	0.473	0.232
Model Chi-square, *df*		653092***, 32	590689***, 31	54220***, 31
Percent of Correctly Predicted Cases		89.4	89.8	84.6

* $p<0.1$
** $p<0.05$
*** $p<0.01$

Appendix D – Beta Values

Effects of background, socioeconomic status, parental expectations, preparation for college, high school factors and postsecondary experiences on the probability of completing a four-year degree among members of the 1988 8th cohort that became postsecondary education attendees

Factors	Variables and Values	Betas					
		All	S.E.	White	S.E.	Latino	S.E.
Background							
	Latino v White	-0.14	0.19				
	Female v Male	0.01	0.04	-0.05	0.10	0.94***	0.04
Socioeconomic Status							
	Middle income v low income	0.43**	0.07	0.40*	0.09	0.79**	0.10
	High income v low income	1.07**	0.22	1.04**	0.20	0.91	0.36
	College educated parents	0.33	0.18	0.39	0.16	-0.08	0.14
Parental expectations for child							
	Some college v none or undefined	-1.15***	0.10	-1.25**	0.19	0.93	0.47
	Bachelor's v none or undefined	0.22	0.19	0.16	0.20	1.23	0.76
	Advanced degree v none or undefined	0.56**	0.11	0.48*	0.16	2.03*	0.66
Planned for college at 8th grade							
	Some college v none or undefined	0.35	0.54	0.33	0.48	2.09**	0.45
	Bachelor's v none or undefined	0.24	0.38	0.18	0.33	2.38***	0.12
	Advanced degree v none or undefined	0.11	0.54	0.08	0.49	1.80***	0.39
High school based support							
	Received help in writing college application v none	0.05	0.11	0.05	0.11	0.08	0.21
	Received help in applying for financial aid v none	-0.22**	0.03	-0.17	0.07	-0.81	0.56
	Received help with school application essays v none	0.07	0.10	0.11	0.10	-0.02	0.30
High school math							
	Algebra II or Trigonometry v less than Algebra II	0.37*	0.09	0.36***	0.03	0.32	0.33
	Pre-Calculus and Calculus v less than Algebra II	0.79**	0.13	0.82**	0.15	0.60**	0.11
High school remediation							
	Took remedial courses in math	-0.03	0.20	0.09	0.32	-0.74	0.37
	Took remedial courses in English	-1.08*	0.29	-1.20**	0.27	1.16***	0.09
High school characteristics							
	Private v Public	0.68*	0.20	0.61	0.19	1.02	0.52

Factors	Variables and Values	Betas					
		All	S.E.	White	S.E.	Latino	S.E.
	Vocational oriented program v undefined or general	0.63**	0.09	0.67*	0.19	-0.19	0.44
	Academic oriented program v undefined or general	0.87***	0.05	0.91**	0.14	0.13***	0.01
Postsecondary activity							
	Started at a 4-year institution	1.58**	0.21	1.63**	0.20	1.30**	0.19
	Maintained continuous postsecondary enrollment	2.25***	0.18	2.24**	0.24	2.81***	0.23
	Delayed enrollment in postsecondary education	-1.14**	0.21	-1.12**	0.23	-2.19***	0.20
	Enrolled part time	-0.84**	0.12	-0.83**	0.14	-0.84	0.37
	College GPA of 2.50 ~ 3.19 v less than 2.50	2.14***	0.03	2.18***	0.09	2.07***	0.10
	College GPA of 3.20 ~ 4.00 v less than 2.50	2.63***	0.12	2.65***	0.08	2.93**	0.53
Financial support							
	Received grants	0.12	0.20	0.08	0.18	0.45	0.36
	Received loans	-0.28	0.24	-0.34	0.21	0.45	0.52
	Received work study programs	0.33	0.12	0.33*	0.11	0.45	0.51
	Held a campus-based job	0.08	0.08	0.08	0.12	0.10	0.06
	Parents borrowed	0.13	0.23	0.10	0.26	0.86	0.89
Constant		-6.13	0.15	-6.08	0.29	-9.58	1.09
Baseline *P* : Probability of Securing a 4-year degree		0.447		0.473		0.232	
Model Chi-square, *df*		653092, 32		590689, 31		54220, 31	
Percent of Correctly Predicted Cases		89.4%		89.8%		84.6%	

* $p<0.1$
** $p<0.05$
*** $p<0.01$

Appendix E – Persistence as a Longitudinal Model

Persistence is a process that begins no later than middle school. It is during the middle school years that the aspirations of families for their children concerning college are made explicit. The academics of middle school lay the foundation for high math achievement in high school because students must be ready to start a college preparatory course of study in math in the ninth grade. It is also in middle school where the aspirations of parents can be bolstered by clear information about what it takes to prepare for, apply to, and enroll in college. This college knowledge allows families and students to be more active participants in process of planning for college.

The foundation of family encouragement and involvement, making clear plans based on family aspirations, academic preparation, and a solid body of college knowledge not only helps students to get prepared for and into college, but it also helps them make it through. Once students are in college a number of other factors come into play. The students themselves will be much better served if they become integral parts of the academic and social communities of the institution. This integration can be helped or hindered by institutional characteristics such as racial/ethnic and economic diversity and the academic and social climate. The facilities of the institution and the degree that services are accessible also have an impact on how well students integrate themselves.

How institutional characteristics interact with the foundation of students when they arrive and affect student integration efforts can lead to positive and negative pre-baccalaureate outcomes such as transfer, stop-out, and dropout. An additional factor that contributes to these outcomes is financial aid. How well a family plans for the financial realities of postsecondary education, how much they save, and how savvy they are about financial aid, impacts every part of the process from deciding to prepare in middle and high school to choosing which institution to attend. Whether to remain in college is often affected by financial considerations as well.

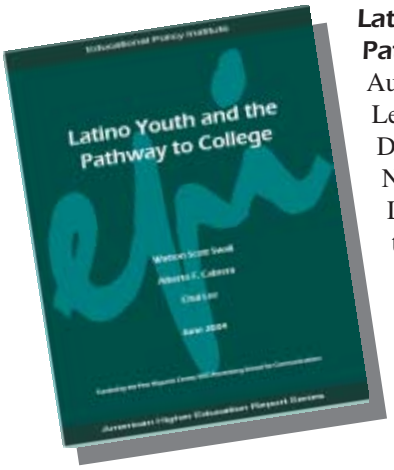
All of these things, from the elements of the foundation laid in middle school to the entire experience of the postsecondary institution, affect whether a student will complete a four-year degree. Having a four-year degree means having more opportunities. The path that is begun in middle school can result in further academic studies or better employment opportunities than the average citizen. Although the analysis here stops with the completion of the degree, further studies can consider the extension of this longitudinal model which includes several post-baccalaureate outcomes including higher incomes, better job performance, more job satisfaction, higher rates of loan repayment and higher degrees of satisfaction with the postsecondary institution and a commitment to support it.

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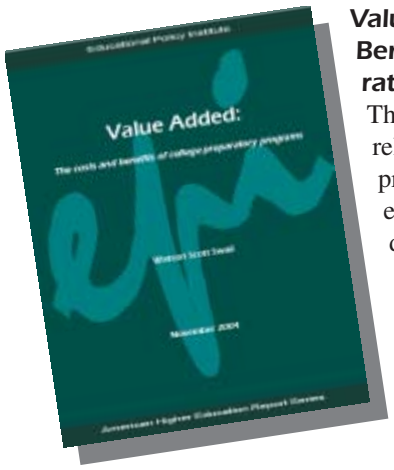
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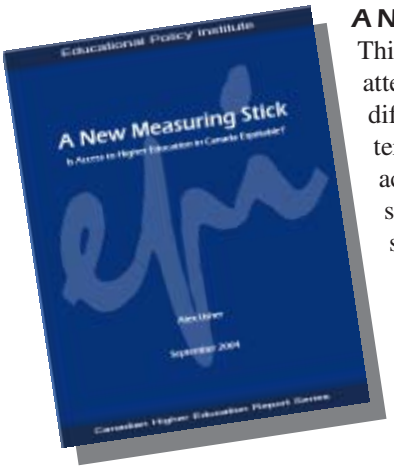
Latino Youth and the Pathway to College

Authors Swail, Cabrera, and Lee use data from the U.S. Department of Education's National Educational Longitudinal Study (NELS) to show how Latino students fair in the educational pipeline.



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