

APPROVAL SHEET

Title of Dissertation: A PATH TOWARD EDUCATIONAL EQUITY: FACTORS
FACILITATING THE PERSISTENCE OF RACIAL/ETHNIC
MINORITY STUDENTS AT COMMUNITY COLLEGES

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ABSTRACT

Title of Document: A PATH TOWARD EDUCATIONAL EQUITY: FACTORS FACILITATING THE PERSISTENCE OF RACIAL/ETHNIC MONORITY STUDENTS AT COMMUNITY COLLEGES

Tymofey Wowk, Ph.D., 2020

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This study investigates the effects of students' on- and off-campus contexts and experiences on their community college persistence. Building from Crisp and Nunez's (2014) Conceptual Model of Vertical Transfer and Bean and Metzner's (1985) Conceptual Model of Nontraditional Undergraduate Student Attrition, this research examines the role of pre-entry characteristics, psychosocial factors, environmental factors, socio-academic factors, and institutional environments. Specifically, I address two main research questions: (1) to what extent do these factors vary by race/ethnicity (White, Black, and Latinx students)? (2) to what extent are these factors associated with community college student persistence?

Using data from the Beginning Postsecondary Students Longitudinal Study 2004:09 and the Integrated Postsecondary Education Data System 2003, and a sample of over 4,000 students and 800 institutions, I employed Hierarchical Linear Modeling for estimating associations between factors and persistence. Findings demonstrated

that the main factors associated to community college persistence were indicators of students' pre-entry characteristics and environmental contexts, with one psychosocial (highest degree expected) and socio-academic factor (college GPA), respectively.

This research demonstrates that the combined theoretical model previously posited would be strengthened by integrating a third theory, namely Tinto's (1975) Theory of Student Departure, due to the significance of family income and parent education on student persistence. Findings from a supplementary analysis also suggest that men and women experience community college persistence due to slightly different factors – as well as show one racial/ethnic difference by gender. This study advances our understanding of which factors influence community college students persisting in college, thereby offering insights to community college administrators in best serving their student populations, as well as how some college support systems can best help men and women at community colleges specifically.

A PATH TOWARD EDUCATIONAL EQUITY: FACTORS FACILITATING THE
PERSISTENCE OF RACIAL/ETHNIC MONORITY STUDENTS AT
COMMUNITY COLLEGES

By

Tymofey Wowk

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, Baltimore County, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2020

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Dedication

For Mikhailo

Acknowledgements

A special thank you to my entire committee. Your thoughtful and thorough comments greatly improved the quality of my work. Thank you to Dr. Mallinson and Dr. Galindo for helping me navigate the home stretch. And to Dr. Galindo, thank you for a wonderful eight years – I will be forever grateful to you for all you have done. Also, a special thank you to everyone in LLC who has helped me through all the ups and downs of this experience.

Thank you to all my friends. Your moral support helped me never give up, especially when times were tough. I am very fortunate to have you in my life.

Most important, thank you to my family. I never could have done this without you. I cannot express my gratitude for each and every type of support and guidance you offered over this long journey. This was definitely a team effort.

And to Lyndsey, Sal, and Deedee, thank you for bringing such joie de vivre back into my life.

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Chapter 1: Introduction

"The American Dream is that dream of a land in which life should be better and richer and fuller for everyone, with opportunity for each according to ability or achievement."

It is not, "... a dream of motor cars and high wages merely, but a dream of social order in which each man and each woman shall be able to attain to the fullest stature of which they are innately capable, and be recognized by others for what they are, regardless of the fortuitous circumstances of birth or position" (James Truslow Adams, 1931).

Background

James Truslow Adams' quote, who coined the term the 'American Dream', specifically includes three phrases: *according to ability*, *innately capable*, and *regardless of the fortuitous circumstances of birth or position* relevant to this dissertation. This passage refers directly to the concept of equality of opportunity, which relates individual outcomes to individual effort and ability in an environment thought to be fair. Unfortunately, within the American higher education system, which is supposed to facilitate individuals' achievement of their full potential— *birth or position* (i.e. ascribed status) appear to matter much more than ability. Research shows that this is particularly true at two-year community colleges, where attention to the removal of barriers to access to higher education often overlooks the continued significance of ascription for student achievement (Carnevale, Fasules, Quinn, & Campbell, 2019). It appears that access to higher education does not necessarily create the conditions for successful completion for all students.

Community colleges in the United States were created by states in the early 1900s, mainly as a response to global economic competition, and as a means for

students to complete their first two years of college coursework through a largely liberal arts curriculum (Phillippe & Patton, 2000). After the Great Depression and subsequent citizens' financial hardships, the function of community colleges shifted towards job training and technical education, a trend that continued throughout the post-World War II era (Phillippe & Patton, 2000). Community colleges, offering both vocational and academic programs, significantly expanded in the 1960s when they became part of a national network of public schools and also tried to accommodate the increasing enrollment of Baby Boomers. Since then, they have experienced a continued expansion, today offering a myriad of pathways for students, including vocational, academic, remedial, continuing education, and technical programs (Dougherty & Townsend, 2006). Currently, a main goal of community colleges is to provide higher education to low-income students, academically underprepared students, and adults returning to school for additional job training (Shannon, & Smith, 2006). Thus, they represent a democratizing agent to local communities, providing access to higher education to its citizens (Palmer, 2000). Indeed, this open access mission has significantly expanded the educational opportunities for students who could not previously access higher education (Meier, 2013).

Although college access has improved during the past 50 years, there is still a major disparity between college access and college success. At community colleges, three-year completion rates are 20 percent, and over 40 percent of students drop out of college, whether in their first year or within a six-year period. In addition, only around a quarter of community college students transfer to a four-year institution. Given this reality, it is also important to examine how community college subgroups

measure on college success and which groups are most at risk for failing. Specifically, a college success gap exists between racial/ethnic minority and low-SES students, and their more privileged peers. Black and Latinx students and low-SES students complete college credentials and transfer at lower rates than White students and high-SES students.¹ Further, at community colleges, Black students (78.3%), Hispanics (74.9%), and low-income students (75.5%) of any race/ethnicity are more likely to take developmental courses than White students (63.6%), and middle/high-income students (59%), respectively (NCES 2016-405). This relates to persistence in that for community college students, only 13.1 percent of developmental students completed a one-year certificate in 1.5 years as compared to 22.6 percent of all students, and only 9.5 percent of developmental students completed a two-year Associate's degree in 3 years as compared to 13.9 percent of all students (CCA, 2011). Therefore, it is critical to examine which factors relate to student persistence at community colleges in general and for these underserved groups specifically if equality of opportunity is to become a reality in this country.

The purpose of my research is to identify factors that provide a comprehensive descriptive examination of factors that influence community college student persistence, and then estimate how the influence of these factors operates for a nationally representative sample of students. Drawing from Bean and Metzner (1985) and Crisp and Nunez (2014), I identify conceptual categories of persistence factors as well as specific factors from both these scholars and from empirical studies. These

¹ In the BPS data, NCES uses the following terms, based on the U.S. Census, for these three racial/ethnic groups: White, Black or African American, Hispanic or Latino. For White and Black students, I am using these terms from the BPS for the purpose of this dissertation. For Latino students, however, I am using the gender-neutral term, Latinx, as per Onis (2017).

factors identified and tested in previous work can be grouped into several categories: pre-entry characteristics, psychosocial attributes, socio-academic experiences, environmental pull factors, and institutional-level factors. Although these categories guide the research for this study, the ultimate purpose is to provide evidence to community college administrators, who are working diligently on improving student persistence rates, particularly concerning racial/ethnic minority students who on average succeed in college at lower rates than White students.² Specifically, while I identify numerous factors that influence persistence, the ones that are most feasible to impact are the ones of most interest. Resolving socioeconomic disparities, for example, is beyond the scope of any single policy initiative. The implementation of policies that can increase low-income and disadvantaged minority student persistence, on the other hand, lies in the purview of community college presidents. It is with this purpose, and the accompanying hope that evidence will drive policy, that I pursue this research.

Research Questions

This quantitative study consists of secondary analysis of two national datasets (the Beginning Postsecondary Students Longitudinal Study 2004:09 and the Integrated Postsecondary Education Data System 2003) to answer the following research questions:

² The focus of this research is on underserved communities. And, even though we know that some Asian groups (Vietnamese, Laotians, etc) experience educational marginalization in this country, other groups experience positive educational experiences (e.g., model minority). Unfortunately, the BPS study does not allow us to disaggregate a pan-ethnic group considering the diversity of this population. Because of this, I decided to exclude this group from my analysis.

1. To what extent do community college students' pre-entry characteristics vary as a function of race/ethnicity?
2. To what extent do community college students' off-campus environments vary as a function of race/ethnicity?³
3. To what extent do community college students' on-campus experiences and environments (students psychosocial attributes; socio-academic experiences, including participation in developmental courses; institutional and structural environments) vary as a function of race/ethnicity?
4. What is the association between persistence factors (pre-entry characteristics, off-campus experiences, and on-campus experiences and environments) and student persistence?
 - a. To what extent do the associations among these variables vary as a function of race/ethnicity.

By drawing from multiple large data sources in order to demonstrate patterns and trends, my goal is to inform community college leaders about how to better enable community college students to persist in college. If a holistic picture of persistence factors on a national level can be established, community college administrators can use findings from this study to help guide internal research and decision-making about their unique institutions and students.

Significance of this Study

This research is potentially significant for several reasons. First, there is an opportunity to make a theoretical contribution by proposing a merged theory from

³ Variables in this category stem from Bean & Metzner (1985) and Crisp & Nunez (2014), and are included in Chapters 3 and 4.

Bean and Metzner (1985) and Crisp and Nunez (2014) and testing how well this proposed theory can explain findings from the analyses. Second, because this research uses nationally representative data, findings from the analysis are relevant for community college administrators, especially when some factors facilitating the persistence of racial/ethnic minorities are more malleable and thus in the direct potential control of institutions. College presidents who are interested in student completion agendas can draw from the findings of this study to support their decisions to other policy makers at the local and state levels. Ideally, they can triangulate findings from this study with internal research on their unique student populations. Third, this research merges data from two nationally representative datasets and uses HLM to estimate factors that may influence persistence. A much more comprehensive picture of student persistence can be ascertained using this method. Specifically, the combination of individual level factors with institutional ones provides depth and breadth to understanding the experiences of community college students and can inform future research using the next BPS dataset that is released in its entirety in the coming years. Fourth, based on additional exploratory regression analyses, there is an opportunity to impact future research based on college persistence by both race/ethnicity and gender.⁴ Last, this research has the potential to contribute to political and educational efforts toward equity. We know that there are barriers inhibiting equity, and if more malleable persistence factors can be identified, there is a greater probability that progress toward more educational and thus societal equity can be achieved more effectively.

⁴ The term ‘gender’ contains connotations, but similar to the racial/ethnic classifications, I use the term based on its presence in the BPS data.

Conclusion

This introduction provides a brief overview of this research project. Student completion agendas have become commonplace at community colleges, and completion is one of the measures of student persistence that equates to student success. However, many of the past studies and theories on persistence were based on the experiences of students at four-year schools. Further, more recent studies have used community college student samples but have drawn merely from one national dataset. Last, most previous studies have used theories from single disciplines instead of an interdisciplinary approach. Therefore, this research aims to resolve these three gaps in the literature and arm community college policymakers with evidence that can serve the greatest number of today's students, specifically racial/ethnic minorities and low-income students who are persisting at lower rates than their White and/or high-income peers. Perhaps then, to revisit the words of Adams (1931), "each man and each woman shall be able to attain to the fullest stature of which they are innately capable."

Chapter 2: Community College Students in Context

Introduction

Higher education is crucial for both national economic development and for individual upward mobility (Bureau of Labor Statistics, 2017). Human capital theory argues that as levels of education increase so do individuals' skill and knowledge, resulting in higher productivity and income (Becker, 1975; Eide & Showalter, 2010). Higher rates of return, socially (i.e., decreased crime, increased political participation, and social equality) and financially (i.e., income taxes, increased economic growth), are also observed among countries and states that in the aggregate have higher levels of education (Psacharopoulos, 1985; Dissou, Didic, & Yakautsava, 2016). In addition to social and economic benefits, access to higher education promotes democracy through an educated citizenry, who make wise choices, particularly if facing totalitarian threats; further, equality in democracy can only be a result of the law and education (Hutcheson, 2011). Like most institutions, the higher education system in the United States has changed over time, particularly due to the creation of community colleges (Gilbert & Heller, 2013).⁵

Today, community colleges are often viewed as an accessible and cost-effective opportunity for students, especially for racial/ethnic minorities or first-generation college going students, who might have not been able to otherwise access and afford higher education. With the intention to respond to growing demand for higher education, community colleges are also the first destination for students

⁵ Although two-year colleges could be private for profit or non-profit, the majority (95 percent) are public institutions (NCES, 2017-024).

requiring developmental education (National Center for Public Policy & Higher Education & the Southern Regional Education Board, 2010). Thus, community colleges are fulfilling an unprecedented role as the primary point of access for a large segment of the national college-going population.

In this chapter, I provide an overview of the literature on community colleges and community college students. In part one, I discuss community colleges as they have developed and expanded over the last century, including both community colleges' current mission and purpose, as well as external forces that impact community colleges' purposes. I conclude this part with a discussion of community college student demographics and enrollment trends. In part two of this chapter, I focus on the role of developmental education in the community college context. I conclude the second part by discussing student populations placed in developmental courses, with a special focus on race/ethnicity and socioeconomic status.

Overview of Community Colleges in American Higher Education

Community colleges are often referred to as 'two-year schools', a distinction that separates them from universities and four-year colleges. The terminal degree for undergraduate students at community colleges is an Associate's degree, which is equivalent to the first two years of credit courses at four-year schools, whereas a bachelor's degree is the terminal degree for undergraduates at four-year schools. The terms 'two' or 'four' correspond to the expected amount of time to completion if enrolled full-time, as well as the depth of knowledge gained.

Community colleges in the United States were created by states in the early 1900s, mainly as a response to global economic competition, and as a means for

students to complete their first two years of college coursework through a largely liberal arts curriculum (Phillippe & Patton, 2000). Joliet Junior College in Illinois was the first public community college in the United States, founded in 1901 to offer two years of college coursework for high school graduates who could not afford direct entry into universities (Phillippe & Patton, 2000). After the Great Depression and subsequent citizens' financial hardships, the function of community colleges shifted towards job training and technical education, a trend that continued throughout the post-World War II era (Phillippe & Patton, 2000). Community colleges, offering both vocational and academic programs, significantly expanded in the 1960s when they became part of an affordable national network of public schools and also due to the increasing enrollment of Baby Boomers. Since then, they have experienced a continued expansion, today offering a myriad of pathways for students, including vocational, academic, remedial, continuing education, and technical programs (Dougherty & Townsend, 2006).

Current purpose and mission of community college

Currently, community colleges' main goal is to provide higher education to low-income students, academically underprepared students, and adults returning to school for additional job training (Shannon, & Smith, 2006), and thus to serve as a democratizing agent to local communities, providing access to higher education to its citizens (Palmer, 2000). Indeed, this open access mission has significantly expanded the educational opportunities for a group of students who could not previously access higher education (Meier, 2013).

The purpose of community colleges, however, has changed over time. In 1947, President Truman's Commission on Higher Education report, recommended the significant expansion of community colleges. In fact, it was at this time that two-year schools, known as 'junior' colleges, were labelled 'community' colleges, which was an acknowledgement that two-year schools were seen more importantly as vocational training institutions for local communities than as pathways to four-year colleges and universities (Gilbert & Heller, 2013). Thus, the change of the name signaled a change in purpose. Since then, however, community colleges have focused on a comprehensive mission, resulting from their open-access mission, to serve the needs of all students in the community. Concurrently, Meier (2013) notes that these multiple roles have led to ambiguity in community colleges' missions, or what he calls "muddled institutional identity" (p. 4). One possible shift in purpose, however, can be seen through public community college missions since 2004. In a study using the Integrated Postsecondary Education Data System (IPEDS) database, Ayers (2015) compared the available 427 mission statements from public two-year colleges in 2004 to 1,009 two-year college mission statements from 2012. He found that the word 'degree' was used significantly more frequently in 2012, and the words 'occupational', 'training', and 'vocational' were significantly less frequently used. He posits that this change may be a response to national proposals such as the 2009 American Graduation Initiative. This initiative was proposed by the Obama administration and it emphasized a shift toward degree completion as is evident from the expected outcomes: "By 2020, America will once again have the highest proportion of college graduates in the world, and community colleges will produce an

additional 5 million graduates” (The White House, 2015). While this might appear to resolve community colleges’ ‘muddled identity’ to some extent, Meier (2013) warns that mission statements do not necessarily reflect colleges’ practices. He argues that community colleges often ignore their own public missions and instead respond to external forces “in the restless pursuit of new opportunities” (p. 5). Some of these external forces include local and national economic pressures, and the increasing competition for state-level funds and from for-profit higher education institutions.

External forces impacting community colleges’ purposes

One external force impacting community colleges’ purpose and mission is the local economic context and its need for skilled workers. This need can be met by community colleges through contracted training arrangements, specialized training programs, outreach to support small businesses, among others (Mars, 2013). This in turn affects the types of programs offered at community colleges (i.e., transfer, workforce development, adult education, remedial education), and the area in which colleges prioritize their resources (Dougherty & Townsend, 2006). If colleges emphasize workforce development and job placement, for instance, their funds for transfer programs or adult education may become limited. In a study of the 108 colleges in the California Community College System, Gill and Leigh (2009) found that some colleges emphasized one purpose at the expense of another, with 26 schools offering a transfer specialization⁶ to students and 19 schools offering a non-transferable vocational education specialization. These 45 colleges allocated funds intently into a particular purpose, thereby limiting funds to an alternative purpose.

⁶ The authors state, “a college specializes in a transferable curriculum if it emphasizes transferable credits while de-emphasizing nontransferable voc-ed credits” (p. 76).

One major factor influencing this phenomenon was the presence or absence of a need for skilled workers in the community where the colleges were located, as the authors discussed.

Another external force impacting community college missions is the national economy. With global competitiveness increasing, there is a need for a labor-force with greater skills than during the period of industrialization. Therefore, community colleges feel more pressure to respond to immediate demands from business and industry than to the more general long-term programmatic needs to prepare students to transfer to four-year schools (Mars, 2013). The pressure from economic globalization in turn creates more public demand to connect career and technical training to labor markets (Dar, 2013).

A final major external force impacting community colleges' missions is their competitors or other higher education institutions. First, because public two- and four-year schools in the same states require state-level funding, they are in competition for funding. This phenomenon aligns with resource dependency theory, which posits that organizations competing over resources will make acquiring and maintaining those resources their primary objective (Meier, 2013). Further, public higher education faces budgetary challenges, as states decrease funding for higher education every year. For example, funding by California for the U.C. college and university system decreased by one billion dollars between 2007 and 2011 (Kissel, 2011), and between 2008 and 2017, state-level funding for two- and four-year schools on a national level decreased by nine billion dollars (Mitchell, Leachman, & Masterson, 2017). For both types of institutions, there is increased pressure to tie

student performance indicators to missions as a justification for funding (Lake, & Mrozinski, 2011; Kissel, 2011). This therefore can constrain the comprehensiveness of community colleges' missions. Second, starting in the 1990s private institutions and smaller for-profit trade schools target company employees and low-income minorities, offering specialized technical degrees tied directly to jobs (Jacobs & Dougherty, 2006). For instance, for-profit schools like the on-line University of Phoenix have resources that far surpass public non-profit institutions in their ability to market to and recruit students (Lowman, 2010). Therefore, comprehensive community college missions – ones that encompass the full array of student outcomes – may lead to increasing pressure from specialized competitors and difficulty sustaining resources needed for multiple programs in times of decreased state funding (McPhail & McPhail, 2006). This also influences the dilemma discussed above about community colleges prioritizing job placement over transfer to four-year schools.

While the purposes of community colleges vary by individual institutions, these schools have both changed over time and share pressures from external forces. The major similarity among them is their open-access mission, which has served as an entry point for a large portion of the college-going population, who may not have been able to otherwise access higher education. This population has also changed over time, resulting in more higher education opportunities to more diverse students today than ever before in American history.

Current demographics and enrollment trends at community colleges

Overall enrollment in higher education has increased over time and the access gap among racial/ethnic groups has somewhat narrowed since 1975. Some of the

trends discussed in this section are not only pertinent for community colleges, as four-year colleges have also experienced enrollment shifts over time⁷.

It is important to also examine trends over time to provide context to current enrollment demographics. Community colleges have experienced vast shifts in the number and type of students who attend them over time. In the last 50 years, there have been two major trends in community college enrollment and since 2000, two minor trends have also emerged.

First, community colleges have experienced steady overall enrollment growth (see Table 2.1).

Table 2.1

Community College Enrollment Trends over Time

	1965	1997	2013
Total Students	1.5 million	5.5 million	7.4 million

(Baum, Little, & Payea, 2011; AACC, 2015)

Between 2000 and 2010, enrollment in community colleges increased by 29 percent. In 2015, 38 % of all full-time undergraduates attended community colleges (NCES, May 2017). In 1970, only 23 % of full-time students were enrolled in community colleges, as compared to 28 % in 1980 and 27 % in 1990 (NCES, 2015, Table 303.70). Of note, these data show the distribution of full-time students at community colleges as compared to four-year institutions. Within each type of institution, however, there is a different trend: since 1975, community colleges have always

⁷ In 1970, around 7 million students were enrolled in degree granting institutions (both 2- and 4-year), whereas around 17 million were enrolled in 2015 (NCES, 2015, Table 303.70).

enrolled more part-time than full-time students, whereas the inverse is true at four-year schools (see Table 2.2).⁸

Table 2.2

Community College Enrollment by Full-time Status over Time

	1975	1990	2005
Full-time	44%	41%	42%

(NCES, 2015, Table 303.70)

While the numbers of students who access higher education via community colleges as their first institution of enrollment has drastically increased over time, and the proportion of all full-time students enrolled in community colleges has also increased, the percentage of students attending these colleges on a full-time basis has remained almost identical in the last 40 years. Second, long-term patterns indicate that the enrollment of racial/ethnic and low socioeconomic status students has also steadily increased over time. While in 1976 only 20 % of community college students were racial/ethnic minorities, and in 1997 only 32 % were of races/ethnicities other than White (Bryant, 2001),⁹ in 2014 nearly 50 % of community college students were minorities (NCES, 2015, Table 306.20)¹⁰. In addition, although White students still account for the majority of enrollment in higher education institutions,¹¹ they are more likely to enroll in four-year schools. In contrast, Black students and Latinx students enroll at a higher proportion in community colleges (see

⁸ In contrast, 78 percent of four-year school students were enrolled full-time in 2015 (NCES, 2015, Table 303.70).

⁹ It is also important to note that over the past four decades, Black students' and Latinos' access to four-year schools has also increased. For instance, in 1976 only 8.7 percent of four-year students were Black and 2.5 percent were Latino, as compared to 14.4 percent for Black students and 12 percent for Latinos in 2012 (NCES, 2013).

¹⁰ This includes all non-White racial/ethnic groups.

¹¹ In 2013, 50% of community college students were White, and in 2015, 60% of public four-year school students were White (https://nces.ed.gov/programs/coe/indicator_csb.asp).

Table 2.3). Viewed over time, however, Black students and Latinx students have enrolled in higher education at increasing proportions (Table 2.3).

Table 2.3

Undergraduate Enrollment by Race/Ethnicity, Institution Type, and Year

<i>Percentage of 2014 public undergraduate enrollment by race/ethnicity</i>			
	Black	Latinx	White
4-year schools	14%	13%	62%
2-year schools	15%	23%	51%
<i>Percentage of undergraduate enrollment (combined two- and four-year schools) over time</i>			
1976	10%	4%	84%
2000	12%	10%	71%

(NCES, 2015, Table 306.20)

A similar pattern is observed when disaggregating students by income in the new millennium. In 2011, 31 % of the lowest income students enrolled in community colleges, whereas only 17 % of the highest income students enrolled at these colleges (Ma & Baum, 2016).

In addition to the macro-level trends concerning overall enrollment and enrollment by race/ethnicity and income, there are newer, subtler micro-level trends. One newer enrollment trend in community colleges is related to international students. Since the start of the new millennium, community colleges have been attempting to compete with four-year schools for these students (Hagedorn & Zhang, 2013). As international students typically pay higher tuition than those who are attending college in-district or in-state¹², there is a financial incentive to recruiting students from abroad. Currently, community colleges enroll less than 15 % of all international students: during the 2015-2016 academic year, of 700,000 international

¹² In 2016-2017, the average in-district tuition for community-college was \$3,131, in-state at public four-year schools was \$9,650, and out-of-state at public four-year schools was \$24,930 (College Board 2017). <https://trends.collegeboard.org/college-pricing/figures-tables/average-published-undergraduate-charges-sector-2016-17>

students, only 95,000 of them were enrolled in community colleges (Loo, 2016). Also, country of origin relates to the type of higher education institution international students attend. Those from less developed countries are more likely to attend community colleges (Hagedorn & Zhang, 2013). On the other hand, the top three countries that supply students entering four-year schools are China, India, and South Korea (Institute of International Education, 2011). However, as Hagedorn and Zhang (2013) point out, given that many countries do not have a comparable higher education institution as community colleges¹³ and because their cost is much lower, community colleges should see an increase in international students.

Another important trend is the increasing community college enrollment of students living in immigrant families. Overall, immigrant students (foreign-born without an F-1 visa) are more likely to enroll in any college than native-born students of the same race/ethnicity. However, immigrant students are also more likely to enroll in community colleges over four-year institutions (Teranishi, Suarez-Orozco, & Suarez-Orozco, 2011). The two largest immigrant groups enrolling in higher education: Latinx students and Asian Pacific Americans are particularly likely to enroll in community colleges. For example, in the 2007-2008 academic year, over half of foreign-born Asian Pacific American undergraduates and half of foreign-born Latinx undergraduates enrolled in community colleges. Only 44 % of all undergraduates in the U.S. enrolled in community colleges as compared to four-year schools in the same academic year (Kim & Diaz, 2013).

Given that racial/ethnic minority, low-income, and immigrant students are more likely to enroll in community colleges than four-year schools, community

¹³ The authors state that “the community college is a relatively new concept outside of the U.S. (p. 58).

colleges are tasked with meeting the needs these students bring with them to college. And since community colleges are open-access, these students' needs are most frequently ones of academic (under)preparation to handle the demands of college-level work. As such, community colleges have become an even greater bridge to higher education by offering pre-credit developmental education programs to academically unprepared students.

Taken together, these trends demonstrate that community colleges today are the higher education context of the greatest student diversity, particularly in terms of race/ethnicity, poverty, international and immigrant status.

In the following sections, I discuss the purpose of developmental education programs, including a debate on their effectiveness. I then provide data on the students that take these courses and how there is variation by race/ethnicity, family income, and country of origin.

Role of Developmental Education Programs at Community Colleges

Developmental education, also known as remedial education, refers to “courses described with terms like developmental, remedial, precollegiate, and basic skills” (NCES, 2016-405, p. 8), which serve the purpose of preparing students for the academic demands of college credit bearing courses. In most cases, students lacking the academic preparation for college credit coursework, determined by their placement exams upon college entry, enroll in non-credit college courses that they are required to pass in order to then take regular college courses. Most commonly, developmental courses are offered for English and Math (NCES, 2016).

Multiple studies demonstrate that developmental education at community colleges is more a norm than an exception. One study analyzing the National Educational Longitudinal Study (NELS) data shows that 58 % of students who entered community colleges in 2000 took at least one developmental education course (Bailey, 2008). Similar findings were observed in a study of 250,000 students from 57 community colleges nationally, where 59 % of entering students took developmental math and 33 % took developmental reading (Bailey, Jeong, & Cho, 2010). It is clear that developmental education plays a major role in students' college experiences at community colleges.

Although the overall purpose of developmental education is consistent across institutions and states (NCES, 2016-405), its implementation varies widely. For instance, in some states like California, remediation is optional as students are allowed to enroll in credit courses regardless of low scores on placement exams (Bailey, 2009). In other states like Florida, it is mandatory to enroll in remediation courses if students fail their placement tests (Bailey, 2009)¹⁴. In addition, variation also occurs at the institutional level. For example, in only 12 states¹⁵ are the cutoff scores set at the state level (Hughes & Scott-Clayton, 2011).

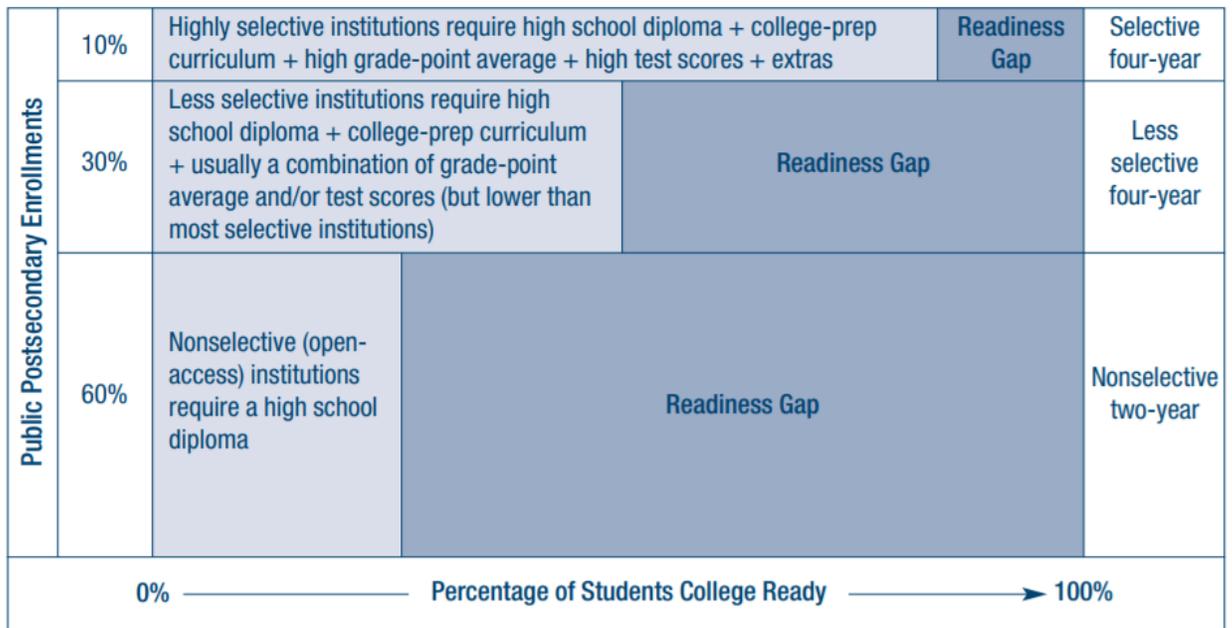
Despite state and institutional variability, community colleges share the burden of providing developmental education programs for academically unprepared students. Based on the varying criteria for developmental course enrollment, estimations of college-readiness are around a mere 25 % of students who enter

¹⁴ Yet, in Florida, some ineligible students still have ended up in credit courses even when they placed directly into remedial courses (Bailey, 2009), an indication that policies are not always enforced.

¹⁵ Arkansas, Colorado, Florida, Georgia, Hawaii, Idaho, Louisiana, Massachusetts, Mississippi, South Dakota, Texas, West Virginia

community colleges prepared for credit courses (Bailey, 2009). Indeed, Figure 1 from the National Center for Public Policy and Higher Education and the Southern Regional Education Board (2010) supports the view that there is an inverse relationship between college readiness and college selectivity. As demonstrated in Figure 1, community colleges bear the brunt of providing developmental education (60% of students requiring it) due to their open admissions policies, as compared to four-year schools (10% requiring developmental education at selective and 30% requiring it at less selective institutions).

Figure 1: The Readiness Gap by Institutional Sector



Source: National Center for Public Policy and Higher Education and the Southern Regional Education Board (2010)

Given the increasing prevalence of developmental education in community colleges, it is important to investigate how well these programs are serving students. Some scholars question the efficacy of developmental programs to prepare students for success in credit courses. Clotfelter and colleagues (2015) found that in

community colleges in North Carolina, taking a developmental course lessened the chance of both students' success in college and success in a college-level course in the remediated subject. Hughes and Scott-Clayton (2011), after reviewing several studies, concluded that developmental education has no impact on college completion, and positive impacts on transfer for younger students (first-time freshmen) in developmental math. Roska and Calcagno's (2010) study of academically unprepared students at the community colleges in Florida from 1998-2003 shows that developmental education positively impacted transferring to four-year institutions; however, academically unprepared students still lagged behind their prepared peers in their rates of transfer.

Mixed findings such as these have caused some critical scholars to call the role of developmental programs into question. Besides serving as a bridge to credit courses, researchers have also argued that a more covert purpose of these courses is to dissuade certain groups of students from continuing in college, and more specifically to separate lower scoring students from higher achieving ones (Clotfelter et al., 2015). Similar to tracking in K-12 education, developmental programs in higher education can be seen as a form of internal colonialism that is meant to separate the underrepresented groups, both by SES and race/ethnicity, from the dominant elite class, namely middle-to-upper class White students (Colley, 1998; Castro-Salazar & Bagley, 2010). As Diel-Amen and DeLuca (2010) note, "To imagine that youth in poverty can be upwardly mobile via college access denies the fact that the education system positions them to be members of an educational underclass and ensures that they experience a structured lack of opportunities" (p.

29). These perspectives can be viewed in light of differences in dropout rates between developmental and non-developmental students. Using nationally representative data on 95,000 undergraduates from the National Postsecondary Student Aid Survey (NPSAS), Barry and Dannenberg (2016) found that developmental students are 74 % more likely to drop out of college than their peers who begin college in credit-only courses (Barry & Dannenberg, 2016). Whether or not there are intentional reasons to restrict college access for certain groups of students scoring lower on placement tests, there are undoubtedly the effects that many students arrive to community colleges and do not begin working toward a certificate or degree at the start of their college careers.

Another dimension of developmental education is that these programs at some four-year schools today are being outsourced to community colleges. In Tennessee and Arizona, for example, there is a growing trend to prohibit four-year schools from offering developmental education. The University of Arizona system required students who score lower on placement tests to also enroll at community colleges in their remediation courses (Deil-Amen, 2011). In addition, in the late 1990s and early 2000s, the City University of New York created a policy to phase out developmental education from their four-year schools and mandated their students in need to enroll in developmental courses at their community colleges (Landesman, 1999).

A final notable dimension of developmental education programs at two- and four-year schools is the relationship between them and the finances of an institution. Developmental education requires a large financial commitment from states and institutions. In 2008, developmental education at community colleges on a national

level had an annual cost of around 2 billion dollars, whereas at four-year schools the annual cost was 500 million dollars (Bailey, 2008). From these figures it is apparent which type of institution bears the brunt of meeting the developmental education needs for students. Further, costs are not solely incurred by institutions but also by students. Based on data from the Department of Education for the 2013-2014 academic year – and a clear reflection of the relationship between college readiness and institution selectivity apparent in Figure 1 above – the total cost to students for remediation was \$33 million at the most selective public four-year schools, \$333 million at other public four-year schools, and \$920 million at public community colleges (Department of Education, 2017). Overall, it is clear that although developmental education programs can empower community college students to succeed in degree programs, these programs add time-to-degree and cost to degrees.

Developmental education at community colleges serves a large portion of the college-going population. The primary purpose of these programs is to prepare students for the academic demands of credit-level courses, although some scholars argue that this is not the only purpose. In the next section, I discuss the student populations that enroll in developmental education courses, including how they vary based on race/ethnicity, SES, and country of origin.

Student Populations Placed in Developmental Education Programs at Community Colleges

We know that there are both more students in developmental programs at community colleges than four-year schools and that enrollment in developmental education for community college students is more of a norm than an exception.

However, it is important to examine the characteristics of students in these courses to obtain an accurate picture of the developmental landscape in higher education. First, enrollment in developmental programs varies by SES and race/ethnicity (see Table 2.6).

Table 2.6

Percentage of Students Required to Take Developmental Courses by Race/Ethnicity & SES

Black	78%	White	64%
Latinx	75%	Middle/High Income	59%
Low-Income	76%		

(NCES 2016-405)

While over half of all community college students are required to take developmental courses, about 75 % of students in community colleges with higher concentrations of low-income and racial/ethnic minority students do so (Deil-Amen, 2011). In California, a state with a greater proportion of Latinx students, 85 % of them need developmental math courses and 72 % need developmental English courses (Solórzano, Acevedo-Gil, & Santos, 2013). Nationally, 61 % of Latinx students at community colleges take one developmental course, 21 % take two courses, and 11 % take three (Crisp & Nora, 2010). Similarly, Black students at community colleges take an average of 3.5 developmental courses (NCES, 2016-405)¹⁶. For Latinx students, especially for those who are fluent in informal English but not in the Standard American English required to access credit-level courses, remedial courses could serve as English language courses (Perin, 2013; Razfar, 2011).

Beside racial/ethnic and low SES minority students, low performing students in high school are overrepresented in developmental education programs. At the

¹⁶ White community college students take an average of 2.4 courses, and Latinos take an average of 4 courses (NCES, 2016-405).

national level, NCES, using the Beginning Postsecondary Students 2004-2009 data, a nationally representative six-year sample of college students beginning college in 2003-2004, notes that 75% of students who enrolled at community colleges and were ‘weakly prepared’¹⁷ in high school required remediation , whereas only 48% of those who were ‘strongly prepared’ required it (NCES 2016-405). Although this disparity may be a result of different tracks in high schools, it is a clear indication that there is immense variation in the preparedness levels with which students arrive at community colleges. Gandara, Alvarado, Driscoll, Orfield, and the University of California (2012) state in their study of all California community college first-year students with the intent to transfer to four-year schools that 97 % of racial/ethnic minorities who come from low-performing high schools require remediation.

Finally, country of origin can relate to developmental enrollment, and there are some differences in the student populations of developmental programs at two- and four-year schools. Using data from the Beginning Postsecondary Students 2004-2006 study, a nationally representative sample, Crisp and Nora (2012) found that Mexicans were more likely than other Latinx sub-groups to enroll in developmental courses at community colleges, and Puerto Ricans were more likely to enroll in developmental courses at four-year schools (Crisp & Nora, 2012).

Community College Student Success Landscape

Even though increasing access to higher education is important for both democracy and equity, it is also important to ensure students’ success so that these ideals can be realized. Student success in higher education is commonly measured by

¹⁷ Academic preparation was defined using a composite of high school GPA, highest mathematics course taken in high school, and ACT or SAT test scores (NCES< 2016-405).

three related indicators: persistence, retention, and completion. The first, *completion*, refers to a student obtaining either a college certificate¹⁸ or a college degree (Shapiro et al., 2017). It is usually operationalized as an ordinal variable, ranging from a certificate to advanced degrees. The second, *persistence*, refers to any continuation in college, regardless of the institution attended. It is usually operationalized by students remaining enrolled in college (Choy, 2001) rather than dropping out of college. *Retention* refers to an institutional perspective of students remaining at the same institution from where they first enrolled (NCES, 2011-152). Similar to persistence, retention is usually operationalized as a binary variable.

All three indicators have in common a measure of students' success along their college-going trajectory. For community college students specifically, those who come to community colleges to receive a certain certificate, for example, and who obtain it at the same colleges of entry, have been retained by the institution, persisted in college, and completed the credential. In addition, some students have persisted to and completed college when they earn an associate's degree. If a student's goal is to transfer to a four-year university, acceptance of transfer would be considered persistence because students would still be enrolled at the school of transfer; on the other hand, the student would be said to have completed only if they earned an associate's degree first, and this is an important distinction. Students are persisting as long as they continue to enroll in college, with or without a degree or credential.

When examining student success in community colleges it is important to take a broader scope to discuss all key indicators including completion, persistence,

¹⁸ Certificates are on average equivalent to one-year of full-time study, or half the credits of an associate's degree (<http://mdacc.org/programs-training/credit-or-non-credit/>)

retention, and transfer. This is particularly relevant if the traditional time limits of two- or four-years – those corresponding to the type of institution and time-to-degree for full-time students – are placed on students to deem them successful or not. Further, NCES in reporting college student success labels students to have failed to be successful if they do not complete degrees in three years at community colleges or six years at four-year schools. As such, these reports discount students who are still enrolled but do not complete degrees in the allotted time. As the literature on college students does not focus on only one outcome, it is important to examine relevant research that relates to student success in college as it pertains to any of the indicators. In the following sections, I draw from these diverse set of indicators to capture the factors related to students' progression through college, both those that have a positive and negative relationship with student success.

Overall student success

Degrees awarded at community colleges have increased since the national expansion of these colleges (as discussed above), and even more pronounced since the beginning of the new millennium. In a study using data from the National Student Clearinghouse, a non-profit organization that collects data on over 90 % of all certificates and degrees awarded in the U.S., the American Association of Community Colleges (AACC) notes that the number of Associate's degrees awarded grew by an average of 4.3 percent per year between 2000 and 2006, by 2.3 percent between 2006 and 2009, and 7.7 percent between 2010 and 2011 (AACC, 2015).

Although previous data show a positive trend, other indicators of student success reveal substantial educational disadvantages. When examining three-year

completion rates for community college students, for example, there is a major disparity between college access and college success. Specifically, of all community college students who enrolled in 2010, only 20 % earned either a certificate or an associate's degree from the institution of initial enrollment three years after enrolling (NCES, 2015). Because completing a community college certificate requires only one year of full-time enrollment, we would expect that more than 20 percent of students would attain one in three years' time.

When reporting on all undergraduates by using nationally representative data from the Beginning Postsecondary Students Longitudinal Study: 2004/09 (BPS: 04/09), Radford, Berkner, Wheelless, and Shepherd (2010) examined whether students were still enrolled in college by the six-year mark. The authors show that 46% of those beginning at two-year schools and 24% of those beginning at four-year schools were no longer enrolled in any institution after six years nor did they obtain a college credential elsewhere. This finding is important as it shows that even when doubling the 3-year timeframe usually used to measure two-year completion, community college students still experience major gaps to their four-year school peers and nearly half still do not persist or complete at all.

Because community college students tend to begin their college careers by taking at least one developmental course, it is important to examine their success rates as well, especially as each developmental course taken adds time to completion and these courses do not offer credits. Indeed, the completion outcomes are worse for students who begin their studies in remedial programs as compared to those who begin in all credit courses. In a study by the non-profit organization Complete College

America (CCA) and the National Governors Association, who collected data on over 10 million undergraduate students at both two- and four-year schools in 31 participating states, it is shown that for community college students, remediation status was negatively related to completion outcomes (see Table 2.7).

Table 2.7

Community College Completion Rates by Certificate/Degree & Remediation Status

	Certificate in 1.5 years	Associate's in 3 years
Remedial	13%	10%
Non-Remedial	23%	14%

(CCA, 2011)

Overall, we know that community college students are less likely to persist than their four-year school peers, and at community colleges, students in developmental courses persist less than their peers who are not required to take these courses.

Another measure of student success commonly used is whether students are retained at the same institution one academic year later (e.g., Lohfink & Paulsen, 2005; Kuh et al., 2008). This crucial snapshot of persistence is even more relevant because this is the year where students are the most likely to drop-out (Fike & Fike, 2008). In 2013, only 59 % of community college students were still enrolled in the college where they started the previous year (NCES, 2015).¹⁹ These results indicate that the first year of college is particularly challenging for students and their persistence from first-to-second-year has important implications for their overall academic success.

One final dimension of college academic success, which also may account for extended time to graduation, is transfer to four-year schools, also known as *vertical*

¹⁹ For comparison, in 2013, only 20% of students from public four-year universities and 5% of from the most selective universities were not retained in the second year (NCES, 2015).

transfer (with *lateral transfer* referring to enrolling in a second two-year school after leaving a first one). While not all community college students intend to transfer, a significant proportion of students do transfer, both vertically and laterally. Of all community college students who entered college for the first time in 2008, about 24% vertically transferred, 15 % laterally transferred without earning a degree from the first institution, and about 4% vertically transferred after earning either a certificate or an Associate's degree by 2014 (National Student Clearinghouse Research Center, 2015). However, vertical transfer also varies by developmental education status. Crisp and Delgado (2014) identified the students in the BPS:04/09 who did indicate transfer to a four-year school and completion of a bachelor's degree was their goal. The researchers also examined variation between these students in terms of whether they began in credit courses and in developmental courses. They found that 44 % of non-developmental students transferred, whereas only 35 % of developmental course students (Crisp & Delgado, 2014).

The major takeaway from these data is that college success is not the norm for community college students. Three-year completion rates are 20 %, and over 40 % drop out of college, whether in their first year or within a six-year period. In addition, only around a quarter of community college students vertically transfer. Given that there is a major disconnect between college entry and college success, it is important to examine how community college subgroups measure on college success and which groups are most at risk for not succeeding.

Differences in student success by race/ethnicity and SES

As indicated above, enrollment of racial/ethnic minority and low-income students in community colleges has steadily increased since the 1970s (Bryant, 2001; Ma & Baum, 2016). However, it is not only important to increase access to higher education, but also is also important to examine how underserved populations are performing on key college success indicators. The major obstacle, and thus opportunity, is how to increase underserved students’ chances for college success starting from the moment they enter their first college classroom. I discuss in this section how these students compare to their peers so that an accurate college success picture can be identified, including gaps among subgroups.

In addition to enrollment increases, community college completion has increased for racial/ethnic minorities since the new millennium (see Table 2.28).

Table 2.8

Completion Rates by Cohort, Degree, and Race/Ethnicity

	Certificate		Associate Degree	
	2002-2003	2014-2015	2002-2003	2014-2015
Black	19%	18%	12%	14%
Latinx	16%	18%	11%	18%
White	58%	53%	68%	58%

(NCES, 2015a)

In spite of the recent increase of particularly Latinx students but also Black students securing college credentials, there remains a racial/ethnic disparity in associate’s degrees. White students are the only group who received more associate’s degrees than certificates in both time periods as data from NCES show. In addition, there is a major community college completion gap between White students, and Black students and Latinx students when examining six-year completion rates. Specifically, using national data from the National Student Clearing House on community college

students from the 2010 cohort, 45 % of White students completed any college credential by 2016, whereas only 33 % of Latinx students and only 26% of Black students completed any credential (Shapiro et al., 2017). Clearly, six-year completion varies by race/ethnicity, particularly in comparing White and Black community college students.

Completion and persistence trends also need to be disaggregated by family income status. The completion rates at community colleges are much bleaker for the lowest-income students (\$30,000 or less per year family income). According to the Community College Research Center (CCRC) at Columbia University (2015), only 14 % of the lowest-income quartile of community college students from the 2003-04 cohort completed an Associate's degree in six years, only 6 % percent completed a certificate, but 13 % completed a Bachelor's degree. Thus, two-thirds of community college students from this cohort did not complete any college credential in six years. As a comparison, of the second lowest-income (\$30,000 - \$64,999) community college students from the same cohort, 18 % completed associate's degrees, 7 % completed certificates, and 16 % completed bachelor's degrees (CCRC, 2015). Clearly there is a positive association between family income and college completion.

Regarding first-to-second year retention and vertical transfer, it is important to first note that there is a dearth of research at the national level on one-year retention by race/ethnicity and income (CCRC, 2015). However, there have been studies on transfer for these subgroups. For instance, using the BPS: 04/09 dataset, Crisp and Nunez (2014), found a 'racial transfer gap' between White students, and Black students and Latinx students. Six years after enrolling in community college, 31% of

Black students and Latinx students²⁰ transferred to a four-year school, compared to 45% of White students. A similar pattern exists when examining transfer by the highest level of parental education, which is one of two factors traditionally used to construct the measure of socioeconomic status²¹. Of the 2004 community college cohort, 14 % of students with either parent having a high school degree or less as the highest education level, transferred to a four-year school five years after initial enrollment as compared to 32% of students with either parent having a Bachelor's degree or higher as the highest education level (NCES, 2012, Table 3-A). There is also a positive association between parents' education level and community college students' likelihood to vertically transfer.

Conclusion

Higher education provides social and economic benefits to the nation, and it also promotes democracy by producing educated citizens. Since their major expansion in the 1940s, community colleges have become a vital part of the American higher education landscape. Community colleges are unique in their roles, the students who attend them, their developmental education programs, and the students who are in these programs. While community colleges face external pressures within states and among private-sector competitors, they also serve a specific function via their open access admissions, which is to provide developmental education to students who enter college with low academic preparation. The level of

²⁰ For the purpose of this study, Black and Latinx students were combined into one subgroup for comparison with White students (Crisp & Nunez, 2014).

²¹ Because low-income students are more likely to enroll in community colleges and high-income students more likely to enroll in four-year schools (U.S. Census, October 1990; U.S. Census, October 2000), reporting success indicators by income at community colleges is more complex than reporting them for all undergraduates; therefore, I am using parental education to better connect student success to family socioeconomic status here.

their students' academic preparation is a major distinction between community colleges and four-year schools, and thus in some ways the two types of institutions are serving different populations.

Developmental courses are more likely to serve low-income and racial/ethnic minorities. While these courses can be viewed as a bridge to a college credential, some argue they may be a barrier (Clotfelter et al., 2015; Hughes, & Scott-Clayton, 2011; Roska & Calcagno, 2010). In addition, a college success gap exists between racial/ethnic minority and low-SES students, and their more privileged peers. Specifically, Black and Latinx students and low-SES students complete college credentials and transfer at lower rates than White students and high-SES students. Therefore, it is of particular importance to delve deeper into the lives and experiences of community college students, especially those in developmental programs and/or those from underserved groups, so that the factors that facilitate their success can be identified and subsequently leveraged to best serve them on their path to securing a college credential.

Chapter 3: Theoretical Framework

Introduction

Access to and enrollment in higher education has significantly increased over time, in large part due to the expansion of community colleges beginning in the late 1940s (Gilbert & Heller, 2013). Since then higher education institutions have shifted from serving mainly middle-to-upper class White men to including women and racial/ethnic minority students as well as students from lower SES backgrounds. One major mechanism for this shift is the open-access admissions policy at community colleges, which has enabled students who previously may not have been able to access higher education to do so. Therefore, it is of primary importance to investigate theories and empiricism that can illuminate factors that lead to their persistence in colleges.

This literature review, divided into two parts, discusses key factors that influence success of racial/ethnic minority and low SES students in community colleges and in higher education in general. The first part of this chapter examines student persistence theories that were developed in the context of four-year school students but are also relevant to community college students. These theories demonstrate that students' backgrounds, coupled with their experiences on campus and while enrolled in college, influence their persistence. The second part of this chapter reviews empirical studies of factors that facilitate student persistence, and how these factors may or may not relate to the unique context of community colleges

as commuter schools. These studies exhibit great diversity concerning community college student persistence in their samples, disciplinary perspectives, and outcomes.

This review of persistence theories and empirical findings will allow the identification of the factors most relevant to student persistence, spanning multiple disciplines, which in turn will guide the estimation portion of this study. Although some of this review focuses on four-year schools, I pay particular attention to factors that apply to community college students as well as the literature focusing directly on community colleges.

Theoretical Models of Student Success

In their review of 2,600 studies conducted in the 1990s, Pascarella and Terenzini (2005) state that two broad groups of theories have been used to examine student success in higher education. The first group is developmental theories, which focus on intra-individual factors, addressing the question of ‘what changes’ in students. These mainly psychological theories argue that individuals change is based on hierarchical human growth development (toward maturity and/or greater complexity) stages over time. The second group of theories, mostly sociological, are college impact models. These theories focus on the environment and the student experience within the institution. These theories attempt to answer the question, ‘how do changes in students occur due to the context in which students are embedded.’²²

Given that the community college as a commuter institution is a unique context for

²² Although theories stemming from psychology may appear distinct from sociological ones, there are important similarities of the two main branches of student success theories, specifically that “the social and cultural norms, the people with whom an individual interacts, and other environmental factors figure with varying degrees of prominence in both families of theories” (Pascarella & Terenzini, 2005, p.19).

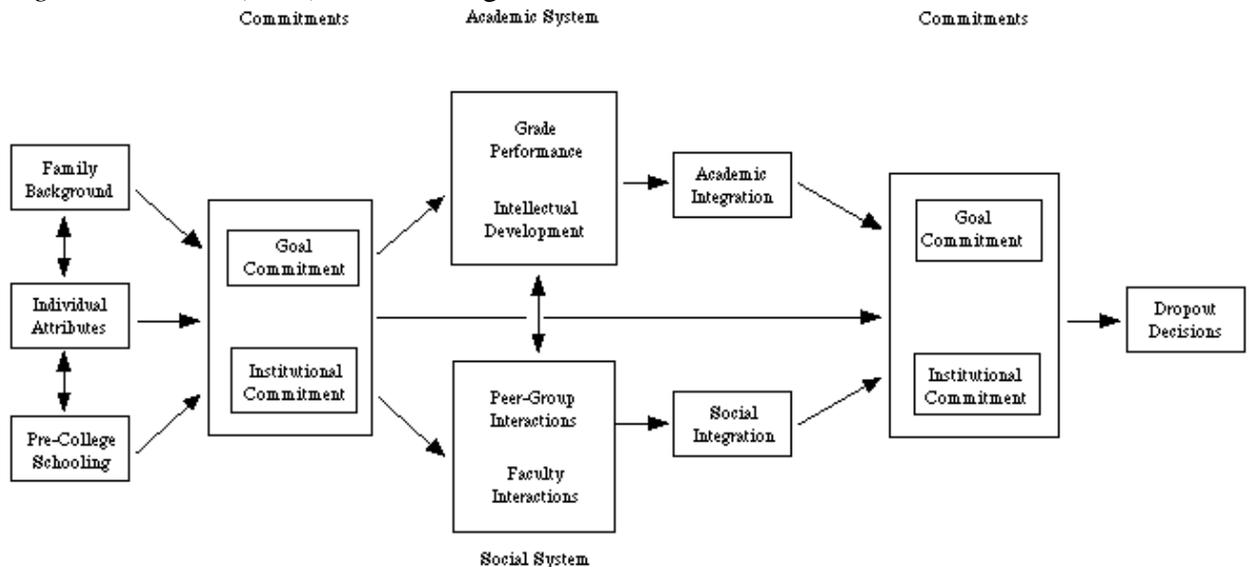
college students, in this section I review the most prominent college impact models that have been applied to student success and thus are most relevant for community college students specifically.

College impact models account for the influence of institutions, environments and organizations. Although these models also conceptualized student background and previous academic experiences as key factors influencing success, they focus on the academic, social, and environmental experiences students have while enrolled (see for example, Tinto's Theory of Student Departure, 1975; and Bean and Metzner's Model of Nontraditional Student Attrition, 1985).

Tinto's Theory of Student Departure (see Figure 2) is based largely on Durkheim's (1961) Theory of Suicide, which states that risk of suicide increases when an individual's value system is not consistent with the values of a society and when she/he is not affiliated with other members within the society (Tinto, 1975). Tinto (1975) argues that students' decision of dropping out of college represents a lack of integration within an institution (Tinto, 1975). This is represented by how well a student is academically and socially integrated. Tinto notes that academic integration involves grades, which are extrinsic, and intellectual development, which is intrinsic and where integration occurs when an individual's intellectual development is congruent with the normative climate of the institution, both of which types of academic integration influence the individual's commitment to the institution and to his/her own educational goals even more so (p. 106). Similarly, social integration occurs among peers and between the individual, and faculty and staff members; when these experiences are aligned with an individual's goals, the

individual's commitment to the institution is strengthened (p. 110). A second group of factors that Tinto considered essential are related to individual attributes. Specifically, an individual assesses the costs and benefits of any activity as compared to its alternatives. As such, an individual will drop out of college if the perceived costs of time and energy spent in staying enrolled outweigh the benefits, which is represented by a student's goal commitment to complete a degree (Tinto, 1975).

Figure 2: Tinto's (1975) Student Integration Model

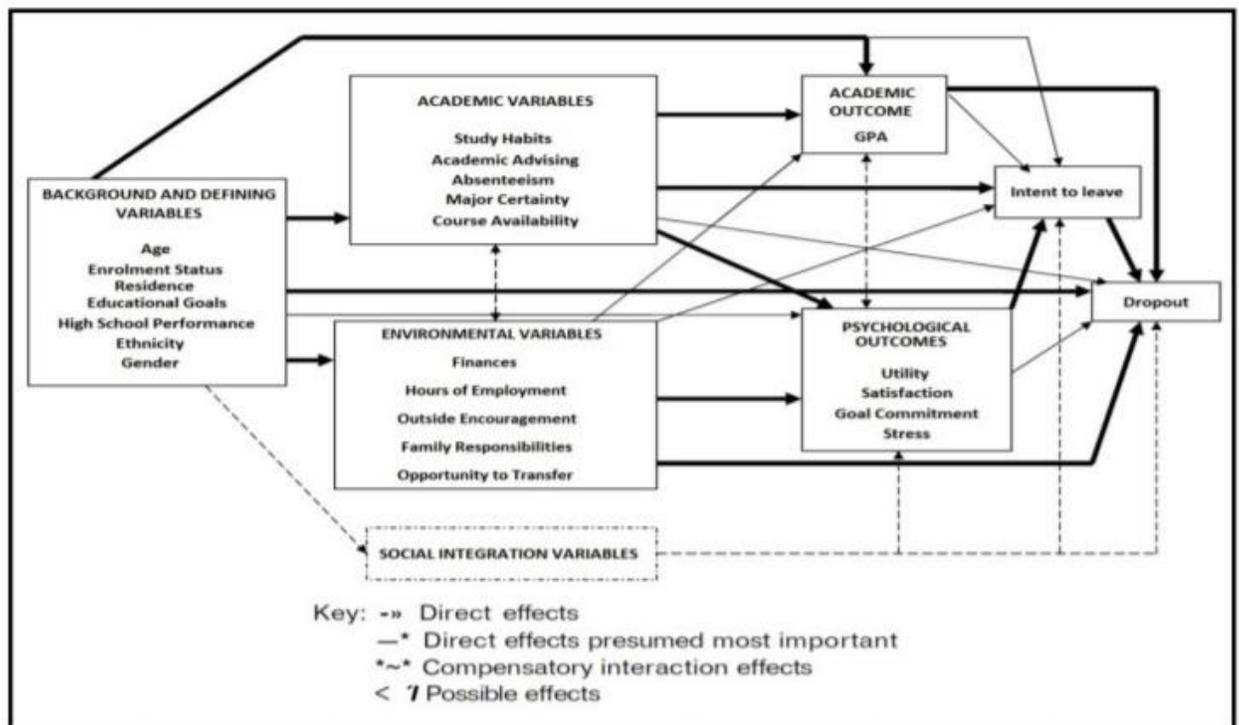


Tinto's original SIM (adapted by Ian McCubbin from Tinto, V. (1975) "Dropout from Higher Education: A Theoretical Synthesis of Recent Research" *Review of Educational Research* Vol.45, No.1, pp.89-125)

Bean and Metzner's Model of Nontraditional Student Attrition (see Figure 3) was developed in part as a response to Tinto's theory's limited relevance for nontraditional students. Bean and Metzner contended that because nontraditional students are qualitatively different from traditional students –they are older, part-time, and commuter students, their social integration at college is by definition lacking since these students are more involved in their external off-campus environments than

the socializing on-campus experiences that traditional college students have, both with peers, in extracurricular activities, and with faculty and staff (Bean & Metzner, 1985). This model contains four main groups of factors that influence a student's decision to drop out: academic performance, intent to leave, background characteristics, and environmental factors. Concurrently, the authors are careful to note that the main distinction between their model and theories such as Tinto's is the replacement of social integration with external factors, but that the other factors thought by Tinto to influence dropout remain in their model (Bean & Metzner, 1985).

Figure 3: Bean and Metzner's (1985) Attrition Model



Source: Bean, J. & Metzner, B. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research*, 55, 485-540.

These two seminal theoretical models of student academic success share common postulates, but also provide different perspectives on college students'

experiences. For instance, Tinto's, and Bean and Metzner's models of academic success point to complex interactions over time, pre-entry student characteristics, and the student and institutional match as key determinants of success (Cabrera et al., 1992). Another important similarity is the nature of individual subjectivity as it applies to certain types of college experiences that are not quantifiable. For instance, Tinto (1975) notes that it is the observer's perception of integration that is important, and similar situations can be perceived differently on an individual level. In Bean and Metzner's (1985) model, this is captured by their examination of the role of psychological factors in that a greater perception of utility, satisfaction, and goal commitment leads to the intention to remain enrolled, whereas a greater perception of stress leads to an intention to drop out. Although Tinto (1975), and Bean and Metzner (1985) propose a similar process and relationship among factors over time, they differ on the inclusion or exclusion of environmental factors influencing persistence. Specifically, the latter scholars posit that off-campus circumstances – including finances, hours of employment, and family responsibilities – directly can influence a student's decision to remain enrolled or to drop out of college. The inclusion of this category of student success factors marks the major distinction Bean and Metzner make between nontraditional students and traditional students who enroll full-time and live on-campus.

These seminal models of college success have been enriched by the influence of different disciplines. In recent years, scholars have argued that finances (e.g., Titus, 2006) need to be incorporated in any model of success as both the cost of tuition and the amount of financial aid awarded has exponentially increased over time (St. John,

Cabrera, Nora & Asker, 2000). Cabrera and colleagues (1992) defined finances as being both objective (the resources a student has) and subjective (a student's perceptions of being able to pay for college-related expenses). They found that these finances in terms of a student's ability to pay for college had indirect effects on both increasing the odds of persistence by increasing the cost-related benefits, and by facilitating the academic and social integration students experienced on campus (St. John, Cabrera, Nora & Asker, 2000). Similarly, St. John, Paulsen, and Starkey (1996) posited that financial aid (e.g., amount of aid received as compared to college costs such as tuition, housing, and living expenses) predisposes students to college selection, and students are more likely to persist when their mental calculations about benefits of the quality of their education outweigh the costs. Thus, these theories argue, that both finances as objective resources and subjective perceptions of these finances strengthen or weaken a student's institutional commitments.

Persistence theories and their relationship to the to the community college context

In recent years, the literature on community college student success has applied traditional four-year persistence models to their students. Scholars in the field have also expanded these models to capture community college students' particular experiences, thereby advancing theory and empiricism for this particular population. The traditional four-year persistence models relate to two-year student persistence in several ways. The most direct connection comes from the student populations studied by these scholars. Bean and Metzner included literature from community colleges in

creating their model in addition to four-year school students²³, particularly as commuter status was listed as a key descriptor of nontraditional students (Bean & Metzner, 1985, p. 495). In addition, Cabrera and colleagues (1992) proposed their model based on empiricism from a four-year school that had a high percentage of commuter students, an attribute that relates to community college students, none of whom live on campus.

Tinto's model also is relevant to explain experiences and outcomes of community college students with modifications concerning the conceptualization of academic and social integration, which scholars posit operate differently at community colleges. Diel-Amen (2011) found that Tinto's constructs of social and academic integration were not two different constructs as both occur within the context of the classroom at community colleges. For example, traditional dimensions of social integration – sports, social activities, and going out with friends – did not apply to community college students' social integration. And because both types of integration occurred in the classroom, the importance of faculty and staff facilitating student integration was exemplified (Diel-Amen, 2011). This idea is supported by Pascarella and Terenzini (2005), who state that the quality of student interactions, as perceived by the student, is shaped by college personnel and institutional structures. Diel-Amen (2011) posits that the psychological, as opposed to behavioral, dimensions of these interactions are different for two- versus four-year students. Karp, Hughes, and O'Gara (2005) expanded Tinto's model by examining the role of information

²³ The literature Bean and Metzner reviewed to propose their model came from books, articles, ERIC documents and dissertations, on three areas of focus: attrition for traditional students at residential schools, descriptive studies about nontraditional students that did not include attrition, and attrition studies about nontraditional students (1985, p. 493).

networks or social ties in transferring knowledge about institutions and their procedures and fostering integration.

Other scholars have drawn from the four-year persistence literature to create theoretical models specifically tailored to explain other indicators of student success at community colleges. Crisp and Nunez (2014) proposed a conceptual model that predicts transfer from two- to four-year schools. Building from Bean and Metzner's model, the authors argued that environmental factors, including work, family responsibilities, financial aid, and enrollment status – being a full-time or part time student, are key factors in explaining vertical transfer among community college students, especially racial/ethnic minorities. They also add to their model institutional-level factors that frame students' on-campus experiences, such as the size of the institution and the percent of both racial/ethnic minority students and faculty. Thus, a major divergence between Crisp and Nunez, and Bean and Metzner, is the inclusion of institutional-level factors in the former's model²⁴. Crisp and Nunez argue that racial/ethnic minorities attend more segregated and less funded community colleges, and thus institutional factors that account for the socio-demographic attributes of both peers and faculty need to be considered for examining success for this student population (2014, p. 297).

Figure 4: Crisp and Nunez's Conceptual Model of Vertical Transfer (Student Level)

²⁴ Crisp and Nunez support this decision based on both a review of more recent literature on student persistence, and the fact that much of the previous perspectives on persistence were developed based on data from the 1980s and 90s, which by nature cannot take into account the major demographic shifts witnessed in the higher education landscape nor the college experiences that may be unique to community college students (2014, p. 296).

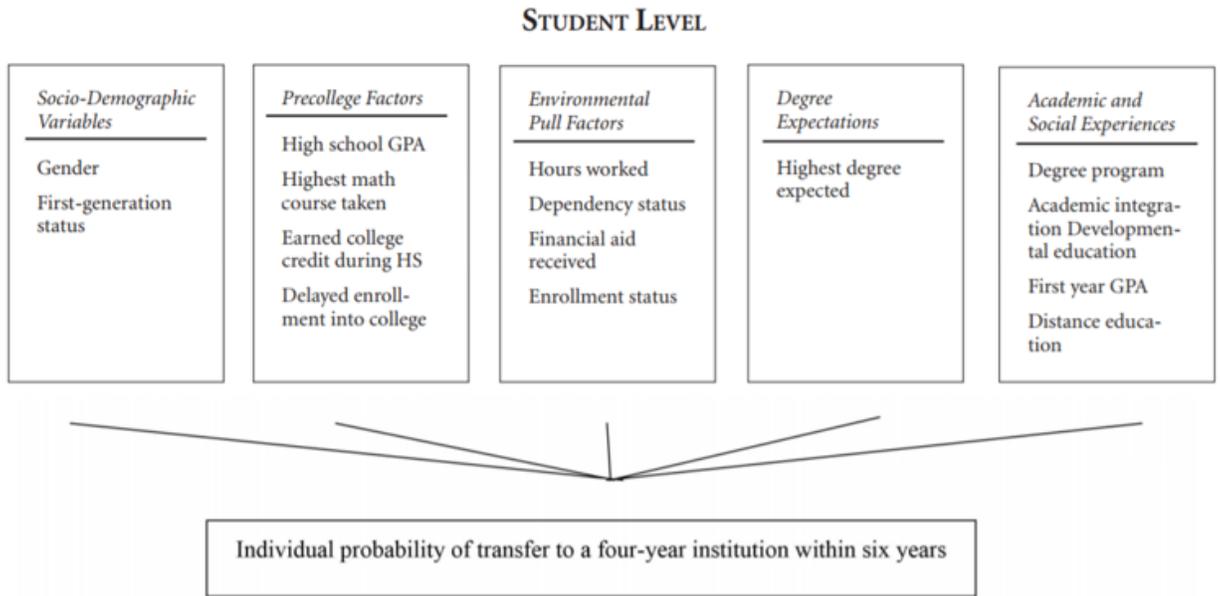
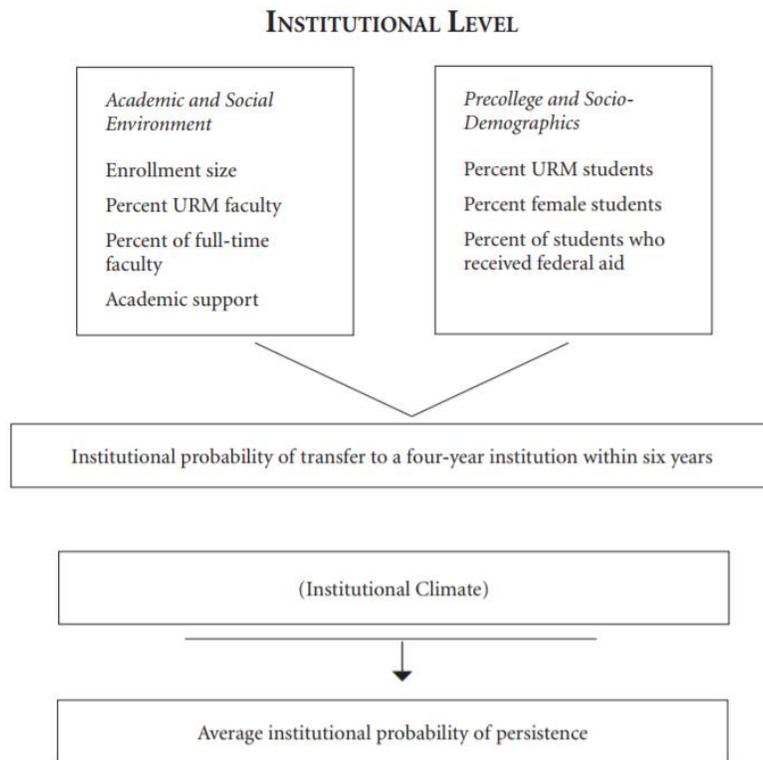


Figure 5: Crisp and Nunez’s Conceptual Model of Vertical Transfer (Institutional Level)



Source: Crisp, G. & Nuñez, A. (2014). Understanding the Racial Transfer Gap: Modeling Underrepresented Minority and Nonminority Students' Pathways from Two-to Four-Year Institutions. *The Review of Higher Education* 37(3), 291-320.

Overall, student success theories, though many were first developed to respond to experiences at four-year schools, have been applied to understand community college student outcomes. In the next section, I summarize findings from empirical studies primarily focused on community college student success. Taken together, the persistence theories and empirical studies will inform the examination of college student persistence on which this research is based.

Factors that Influence Success: Empirical Evidence

Given that only little over half (54 %) of community college students overall, and less than half for those beginning in developmental programs²⁵ obtain a credential in any time period, it is important to review empirical studies that have identified the most important factors related to their academic success. Further, it is important to examine how the relevance of specific factors may vary as a function of race/ethnicity and SES to be able to address persistent educational inequalities in the higher education system. Given that students come from diverse backgrounds, it is important to first identify **pre-college characteristics** that are associated with persistence. Subsequently, it is important to examine different dimensions of the **college experience**, including students' psychological, social, and academic experiences, as well as **contextual factors** such as institutional (e.g., size, urbanization, student body composition) and off-campus environmental ones (e.g., hours worked per week,

²⁵ From the 2003-04 BPS community college cohort, 49 percent of students beginning in developmental courses never completed all developmental courses they attempted, and thus never even persisted out of these programs by 2009 (NCES, 2016-405).

family responsibilities). In the subsequent sections I first examine factors that have been deemed as significant to explain community college student academic success. I also describe whether racial/ethnic and low-income students share each factor, and then examine factors that have been found to be particularly relevant for racial/ethnic minorities and poor students. To accomplish this, I draw primarily from the community college literature, but I also present findings from four-year schools since the latter institutions account for the majority of the college student success studies to date.

Pre-entry academic student characteristics

Students arrive at community colleges with diverse academic experiences. High school GPA, test scores, and high school course taking patterns have been identified as relevant for college student success based on empirical findings. Although pre-entry characteristics traditionally include socio-demographic factors, as discussed in the previous theoretical models of Tinto, and Bean and Metzner, I focus in this section on pre-entry academic factors since my study focuses on race/ethnicity and SES across all success factors.

Academic preparation, usually measured by GPA or test scores, is one major pre-entry factor that is a significant predictor of college success. Using data from the National Educational Longitudinal Study of the high school class of 1992 (NELS: 1988/2000) and examining four-year students' success, Bowen, Chingos, and McPherson (2009) found that high school GPA was a strong predictor of college graduation, a much stronger predictor than test scores from the SAT or ACT. These authors posit that skills, such as time management and good study habits, are the

mechanisms by which this relationship occurs because these habits carry over from high school to college. However, standardized tests have been found to impact persistence, as well. In a study of 20,090 first-time community college students in Florida, Roska and Calcagno (2010) found that not taking the SAT or the College Placement Exam lowered the odds of students transferring to four-year schools four years after initial enrollment. Similarly, a college readiness curriculum in high school – specifically in reading, writing, and math – is connected to community college success in that students in developmental programs for these courses are less likely to persist than their peers who enter college with the academic preparation required for college-level courses in these subjects (Schak et al., 2017).

The prevalence of community college students' pre-entry characteristics, such as high school GPA and high school courses taken vary by race/ethnicity and SES. Latinx and Black students typically lack adequate high school preparation for college-level coursework (NCES 2016-405). Latinx students are less likely to have taken algebra by the 8th grade (Melguizo, 2009), more likely to require remediation in high school, and less likely to be enrolled in a college-oriented high school curriculum (Swail, Cabrera, Lee, & Williams, 2005) when compared to their White peers. Similarly, Palmer and colleagues (2010) note that Black students, especially men, are the least likely to be enrolled in advanced placement courses in high school. Both racial/ethnic groups have also been found to score lower on average on the SATs than their White peers (Walpole et al., 2005). Further, as discussed in Chapter 2, Black and Latinx students are more likely to be required to take developmental education

courses than their White peers (NCES, 2016-405), which is directly connected to a lack of college preparation curriculum in high school.

The evidence of whether these pre-entry characteristics have a stronger relevance to explaining college success of racial/ethnic minority students, when compared with White students and/or students with economic resources, is slim. However, there are a few studies that have shown these moderating effects. Crisp and Nunez (2014) found that taking calculus in high school was positively associated with community college transfer for Black students and Latinos (2.5 times as likely) but not for White students. Also, Long and Kurlaender (2009), using propensity score matching to estimate the odds of completion in community college and data from Ohio, found ACT scores to be predictive of completion but only for the lowest scorers on the test being less likely to persist than other students after controlling for covariates. The authors also found differential effects for Black students and college completion as compared to White students, which they posit was due to initial differences in academic preparation (Long & Kurlaender, 2009).

Psychosocial factors

Psychosocial factors are psychological attributes that are influenced by their social context and in interaction with others (Pascarella & Terenzini, 2005). Robbins and colleagues (2004) note that psychosocial factors are considered in both educational persistence models and motivational theories. In their meta-analysis of 109 studies, these authors identified nine categories of psychosocial factors related to college success: achievement motivation, academic goals, institutional commitment, perceived social support, social involvement, academic self-efficacy, general self-

concept, academic-related skills (e.g., time management, communication, study, problem solving skills), and contextual influences (e.g., financial aid, institution size, institution selectivity) (Robbins et al., 2004). Other scholars such as Allen, Robbins, and Sawyer (2010) suggest a more general framework of these types of factors, calling them instead *noncognitive*: motivation, self-concept, situational judgments (choosing the appropriate action for a given scenario), and successful intelligence. Pascarella and Terenzini (2005) examined factors related to sense of self (e.g. identity, self-esteem, academic self-concept) as well as locus of control and interpersonal relations when examining student academic success. The important takeaway from these varying definitions is that all capture aspects of student experiences and perceptions that are not measured by GPA, test scores, and other traditional indicators of student success.

Empirical studies show that psychosocial factors can influence persistence after students pre-entry characteristics directly are taken into account. In their meta-analysis, Allen, Robbins, and Sawyer found that psychosocial factors (academic goals, institutional commitment, social support, social involvement, academic self-efficacy, and academic-related skills) are predictive of persistence even after controlling for variables like high school GPA/rank and SATs/ACTs (2010). In a similar meta-analysis, using the same studies, Allen and colleagues found that academic self-efficacy was the second strongest predictor of student retention in college, even with comparable effect sizes to SES and high school GPA (Allen et al., 2004). Similarly, in a study of 259 business students in a southeast public university, using the Motivated Strategies for Learning Questionnaire, Campbell (2007) found a

negative correlation between test anxiety and academic performance, the latter of which as Cabrera, Nora, and Castañeda (1992) note, impacts students' intent to persist and thus persistence. Degree completion at two-year schools was also more likely when students expect to continue their education, and completion of an associate's degree increases the likelihood of transferring to a four-year school (Pascarella & Terenzini, 2005).

Psychosocial factors are also significant contributors of retention after transferring from community colleges to four-year schools. In a study examining the factors aiding the retention of 1,130 racially and ethnically diverse transfer students from 2003-2005 (479 of whom were Latino, 267 Asian, and 73 Black), Dennis, Calvillo, and Gonzalez found that factors such as self-efficacy, college commitment, and support of peers, along with personal and career motivation are direct and significant indicators of retention for transfer students (2008).

High self-efficacy, defined as beliefs about an ability to perform that in turn affect students' lives (Bandura, 1994), can influence student's academic success (Pascarella & Terenzini, 2005). In a study of 107 racially diverse sample of first-year students at the City University of New York, Zajacova, Lynch, and Espenshade (2005) found that self-efficacy, or students' perceived ability to handle the academic demands of college, predicted grades -- a key determinant of academic success. Dennis and colleagues also found that high self-efficacy resulted in skills such as time-management and communication abilities that are associated with college success (Dennis, Calvillo, & Gonzalez, 2008). Similarly, degree expectations, which relate to students' academic self-concept, can influence successful transfer for

community college students. Malcom (2013) notes that students who enter two-year schools expecting to obtain a bachelor's degree were more likely to obtain a credential.

Whether students' previous relations with schools as institutions or prior experiences of discrimination and oppression of racial/ethnic minority students have negatively impacted their psychosocial well-being is still a contested topic in the literature. Steele and colleagues, for example, argue that Black students would feel threatened by stereotypes about them in social contexts such as the formal classroom. Stereotype Threat Theory explains that psychosocial factors, particularly self-efficacy and performance expectations, experienced by racial/ethnic minority students are due to the awareness that one's behavior might be viewed through the lens of racial stereotypes (Steele & Aronson, 1995).

The prevalence of psychosocial factors such as self-efficacy by race/ethnicity is one construct that has received some attention in the literature, but there is a dearth of research on the subject particularly on racial/ethnic minorities (Wood, Newman, & Harris, 2015). One study of 475 community college students found that White students and Black students had higher academic self-efficacy than Latinos (Edman & Brazil, 2007). In another study using the Education Longitudinal Study of 2006/2012, Wood, Newman, and Harris (2015) found that Black community college students had higher self-efficacy for English than math, but the authors did not compare these findings to other racial/ethnic groups.

There is some empirical evidence demonstrating that the influence of psychosocial factors on college student academic success may vary by student

race/ethnicity. One study of 96 racially/ethnically diverse community college students (33% Black, 53% Latino, 7% White) found that self-efficacy was predictive of first-year GPA, but locus of control was not (Majer, 2009). In another study of 259 four-year school students, Campbell (2007) found that test anxiety, which influences GPA, impacted Black men more than White ones, which could support Stereotype Threat Theory.

Students' academic goals also influence persistence differently for racial/ethnic groups. For instance, in a study of 457 Mexican four-year students in a Hispanic Serving Institution in the southwest, using structural equation modeling, Ojeda, Flores, and Navarro (2011) found that, college outcome expectations (as measured by the 19-item College Outcome Expectation Questionnaire²⁶; Cronbach's alpha = 0.90), were indirectly associated with academic satisfaction²⁷ (7-item scale; Cronbach's alpha = 0.86) through its influence on goal progress²⁸ (7-item scale; Cronbach's alpha = 0.89), for Mexican students and not for White students.

In a study of 1,360 White, Black, and Latino community college students from 260 institutions, Crisp and Nunez (2014) found that the influence of educational expectations was stronger for Latinos and Black students than for White students. Racial/ethnic minority students who expected to obtain a master's degree were 2 times as likely to transfer to a four-year college, whereas White students were only

²⁶ "A sample item includes 'A college education will give me the kind of lifestyle that I want'" (Ojeda, Flores, & Navarro, 2011, p. 64)

²⁷ "Participants indicated the degree to which they felt satisfied with their academic experience (e.g., "I enjoy the level of intellectual stimulation in my courses")" (Ojeda, Flores, & Navarro, 2011, p. 64).

²⁸ "Participants indicated how much progress they were making toward a variety of academic goals (e.g., "learning and understanding the material in each of your courses")" (Ojeda, Flores, & Navarro, 2011, p. 64).

1.5 times as likely. High expectations for oneself, therefore, can significantly impact racial/ethnic minorities' transfer rates and thus persistence in college.

Academic, social, and socio-academic factors

Academic factors

Traditional academic factors, including first-year GPA, program type (e.g. vocational versus academic), and enrollment patterns (e.g. types of courses taken), have been found to influence college success.

One academic factor associated with transfer is first-year GPA. Using the Beginning Postsecondary Students Longitudinal Study (BPS: 04/09) dataset, Crisp and Nunez (2014) found that first-year GPA was positively associated with the likelihood of students transferring to a four-year school. College math performance has also been found to be a significant predictor of transferring. For instance, Roska and Calcagno's study of 20,090 community college students, found that successfully passing the first college-level math course was a significant predictor of transfer to four-year schools.

The program type in which students are enrolled as well as course taking patterns also can predict student persistence in the form of transfer. This, being enrolled in vocational programs negatively impacts transfer rates (Crisp & Nunez, 2014; Dougherty, 1992). Similarly, course enrollment patterns can contribute to the likelihood of transfer. Hagedorn, Cabrera, and Prather (2010-2011) collected data from the academic transcripts of over 5,000 community college students in Los Angeles for a period of ten years. They found that after controlling for beginning

math level and GPA, students who took math and science courses were more likely to be successful in transferring.

Social factors

In addition, social factors can overlap with academic ones, such as peer-to-peer relationships and student-to-faculty relationships that occur most often within the context of the classroom, as well as interactions with other students informally and other college personnel in formal contexts on campus. It is important to note that while these experiences are framed by the institutions, the students' perceptions of them relates to their college success. Although community college students do not live on campus and have the same types of social experiences as their four-year school peers, peer relationships are still important in the community college persistence literature. In a study of 239 (45% Latino 16% Black 15% White 10% Asian) community college students in California, Lundberg (2014) found that both peer teaching and participation in student organization were significant predictors of scales measuring personal development (measures of learning related to personal values, health habits, physical fitness), intellectual development (gains in writing, developing the ability to learn on one's own, and presenting information clearly in speech), general education learning (around art, globalization, measurement and statistics), and that discussing ideas with diverse peers was significantly associated with general education grades. This study points to social factors, peer teaching and participating in student organizations, that indirectly influence persistence via both psychosocial factors and academic factors.

Also, the presence or absence of learning communities at two-year institutions can contribute to each institution's retention and transfer rates. By fostering social interaction between students and faculty, and among students, and directly fostering social and academic integration, Montero-Hernandez and Cerven (2013) note that learning communities indirectly foster positive outcomes on persistence, completion, and transfer. This is particularly important for community colleges, where social integration is weaker because students rarely live on campus and academic integration is weaker because many two-year schools have open admissions policies; open-admissions can negatively impact academic rigor since students enter college without a certain standard of academic readiness (Dougherty, 1992).

Socio-academic factors

It is important to note that at community colleges, particularly because they are commuter schools, social experiences most often occur within the context of academics, whether inside or out of the classroom, and thus the two constructs discussed by both Tinto, and Bean and Metzner, academic integration and social integration, should be combined when examining the college success of community college students (Deil-Amen, 2011).

Given that community college students do not experience social integration in the same way as their residential four-year peers, the role of college faculty and staff as they interact with students is of particular importance in that college personnel frame many of students' interactions on campus. In Deil-Amen's (2011) qualitative study of data from 125 student and 113 faculty at fourteen two-year schools, one of the major findings was that almost all students stated that interactions with

institutional agents (e.g., faculty, staff, advisors) were a primary factor affecting their integration, and the classroom was the context for the majority of this type of integration as student-faculty interactions occur in this context more than any other.

Because integration impacts college success, organizational structures that fostered interactions between students and faculty not only inside but also outside of class, student perceptions of interactions with faculty, and student interactions with each other, particularly about academic matters, were also important and all contributed to a more integrative conceptualization of social and academic student experiences (Deil-Amen, 2011).

Socio-academic factors and race/ethnicity

Success in courses and GPA are connected to students' success. Because GPA has been found to be predictive of community college student persistence, it is important to examine grades by race/ethnicity. In a study of five community colleges in Florida and examining the 2002-2004 cohorts, Greene, Marti, and McClenney (2008) found that Black students had lower course grades and were less likely than White students to pass courses, and Latinos had lower course grades, but were as likely as White students to pass courses.

Other academic factors, such as courses and programs aimed at first-generation racial/ethnic minority students, can facilitate their persistence (Hsiao, 1992; Fike & Fike, 2008). For first-generation Latino students (first in family to attend college), orientations and college success courses have been found support their successful transition to college by teaching students how to navigate the

collegiate environment and access campus resources, as compared to first-generation students who did not participate in these programs (Perez & Ceja, 2010).

Further, interactions with Latino college personnel has been found to influence persistence for Latino students (Perez & Ceja, 2010).

The roles of institutional agents – college personnel such as advisors, staff, and faculty – seem particularly salient for racial/ethnic minority students who may struggle with developing a sense of belonging in the collegiate environment (Hurtado & Carter, 1997). In a qualitative case study examining the experiences of five Latino students who successfully transferred from community colleges to four-year institutions, Bensimon and Dowd (2009) found that the student who developed a close relationship with college personnel (e.g., instructors and counselors) was the only one to transfer to the most selective institution he was eligible for. This student regarded several faculty and staff members as people who affirmed his aspirations, fostered a sense of integration into the environment, and helped him navigate the transfer system to apply and enroll in a selective institution. This is in contrast to his peers who, despite also being eligible to transfer to a selective institution based on completion of a specialized curriculum, transferred to a less selective institution. The absence of institutional agents was evident in their narratives (Bensimon & Dowd, 2009). Similarly, sense of belonging at community colleges has been found to influence persistence for Black men (Wood & Williams, 2013).

Institutional agents, specifically advisors, have been found to be even more impactful on students in developmental courses. In a study of 112 community colleges in California, for instance, Bahr (2008) found that students in remedial

courses (math and English) benefited more from advising than non-developmental students on persistence. Similarly, mentoring programs can enhance Black students' persistence. Participating in formalized support systems that allow for interaction with faculty, both formally and informally, has been found in the literature to increase the retention of Black students (LaVant, Anderson, & Tiggs, 1997). Other studies further support the significant role faculty have regarding transfer by outcomes. Melguizo (2007) supported this notion by emphasizing the importance of faculty involvement in the transfer process itself. Melguizo's study focused specifically on the transfer pathways Latino and Black students used to gain success in the transfer process. Overwhelmingly, racial/ethnic minority students who were more connected to faculty members not only followed a more academic curriculum, but they were more likely to transfer and gain admission to California's more competitive state institutions, including Berkeley and UCLA (Melguizo, 2007).

Developmental education and race/ethnicity

Another academic factor that is particularly salient for both racial/ethnic minorities and low-income students, as discussed in Chapter 2, is the requirement for developmental, or remedial, coursework. However, findings about the relationship between developmental education and race/ethnicity are not without contradiction. Success in such courses has been found to be a critical determinant in the transfer process for Latinos. Students that are able to establish success in remedial courses (math and English) find significant success in transferring and being prepared to attend four-year institutions (Crisp, 2010). In contrast, Gandara et al. (2012), in their case study of four community colleges in California, found that Black and Latino

students taking developmental courses had lower odds of transferring as compared to Black students and Latinos who did not enroll in these courses. Similarly, in a study of all 23 community colleges in Virginia, Wolfe (2014) found that non-developmental status was found to be positively associated with fall-to-fall persistence.

As mentioned earlier in this chapter, caution should be exercised when examining the correlation between developmental education and persistence. Melguizo, Bos, and Pranter (2011) note that there is conflicting evidence on the impact of developmental education, which is largely due to the methodology employed to examine this association. In their review of the literature, Melguizo and colleagues found that descriptive studies (see, for example, James, Morrow, & Perry, 2002) often found negative associations between developmental education and persistence or transfer, studies using propensity score matching (see, for example, Attewell, Lavin, Domina, & Levey, 2006) found no negative effects of developmental education on community college credentials but negative effects on obtaining bachelor's degrees, and regression discontinuity designs (see, for example, Calcagno & Long, 2008; Martorell & McFarlin, 2007) found either no or positive effects of math remediation on persistence.

Institutional factors

In addition to student-level factors around student experiences and perceptions influencing persistence, there are institutional-level factors – including urbanicity, size of institution, instructional expenditures, percent of full-time faculty – that require careful consideration. In a study using the 2002-2003 IPEDS Graduation Rate Survey dataset, a nationally representative sample of institutional data, Bailey

and colleagues examined the three-year graduation rate of first-time full-time community college students. They found the following institutional characteristics to be significant factors on these students graduating: urban colleges as compared to suburban ones had 3.5 % lower graduation rates; larger community colleges, particularly those with more than 2,500 full-time students, have 9 to 14 % lower graduation rates than do smaller colleges; higher expenditures on instruction are associated with higher completion rates (Bailey et al., 2005). Although these findings identify associations between institutional characteristics and completion at the same institution within three years, as mentioned earlier, completion is only one approximation of persistence and it also does not account for what happened to students after three years. Indeed, in a study using data from the National Student Clearing House, which captures data on 91 % of all 2- and 4- year undergraduates, Porchea and colleagues (2010) found that for the 2003-2004 cohort, both institutional size and lower percent of full-time faculty²⁹ were positively associated with transfer to a four-year school without attaining an associate's degree first five years later. In other words, the students from this study were not retained at their first institution nor did they complete there, but they did persist at four-year schools.

Another important dimension of faculty composition, and one that relates racial/ethnic minority students' persistence, concerns faculty diversity, although findings from studies examining this relationship are inconsistent. In a study of 1,360 students from the BPS 2004:2009, Crisp and Nunez (2014) using hierarchical

²⁹ Levin (2013) notes that in 2011, around 70 percent of community college faculty were part-time; whereas full-time faculty are aligned with their departments and their institutions, part-time faculty are mostly aligned only with their departments and are not connected to the administration like full-time faculty.

generalized linear modeling found that higher percentages of racial/ethnic faculty is associated to lower odds of White students transferring but did not significantly predict transfer rates for Black or Latino students after controlling for student-level variables (precollege factors, environmental factors, degree expectations, and student experiences in college). In another study of the 50 community colleges in Texas, Klement (2012) found that the percent of Latino faculty was the strongest factor in accounting for the transfer rates of Latino students to four-year schools, after controlling for Hispanic population of each community college campus locale, Hispanic community college student college readiness as indicated by Texas Success Indicator scores, and the percent of Hispanic faculty at each community college. Findings from these two studies show mixed results, which could be due to the sampling frame used in each, respectively, and the difference in covariates of which the former study was more comprehensive than the latter. Similar mixed results can be found in examining the relationship between the percent of minority students enrolled and community college student persistence.

A final institutional factor relates to the potential influence of demographics of the student body on persistence. At four-year schools, Historically Black Colleges and Universities (HBCUs), as opposed to traditionally White institutions (TWIs), have fostered a strong sense of community and belonging for Black students (Fries-Britt & Turner, 2002). Black students at TWIs have found limited social outlets and perceive the campus to be geared toward White students (Fries-Britt & Turner, 2002). Additionally, Black students at TWIs are found to be less satisfied with the university than their White counterparts due to perceived hostile environments (Nettles, Theony,

& Gosman, 1986). However, these findings contrast with findings on community college students in California, which point to lower persistence for students at higher racial/ethnic minority community colleges. For example, in a report for the University of California, Los Angeles's Civil Rights Project, Gandara et al. note that Black students and Latinos transferred at lower rates than White students in California, and also that among Black students and Latinos, those at high-concentration minority community colleges also transferred at lower rates than their Black and Latino peers at suburban two-year schools (2012). A similar finding is evident in Baliey and colleagues' study of the IPEDS Graduation Rate Survey dataset discussed above; they found that after controlling for college characteristics, higher percentages of minority students was associated with lower completion rates for all first-time full-time community college students (Baliey et al., 2005). However, other researchers have found the inverse to be true. For instance, in their study discussed above, Porchea and colleagues (2010) found that higher percentages of minority students enrolled was associated with community college students still being enrolled but not dropping out, i.e. persisting. As research shows that racial/ethnic makeup of the student body can influence persistence, it is an important factor to consider.

Environmental factors

Environmental factors relate to students' realities off campus. The majority of community college students work and commute to school (AACC, 2015), and three out of five community college students are enrolled part-time (AACC, 2014), thereby extending the time that a college credential can be obtained. Many also have additional family responsibilities. These added dimensions make affording college

and comparing its benefits to its financial costs more complex since this represents a major shift from the traditional college going experience of students being full-time and living on campus. Further, many community college students are sensitive to the labor market: if the odds to be hired for a certain job worsen, if a credential becomes less valued, or if less training is actually needed than completing a full credential, there is a higher risk for dropout (Stuart, Rios-Aguilar, & Deil-Amen, 2014). It is therefore important to examine empirical studies that show how environmental factors off-campus can influence students' persistence on-campus.

Specifically, finances, hours of employment, outside encouragement, family responsibilities, and opportunities to transfer have all been found to have direct effects on dropout (Bean & Metzner, 1985). Subsequently, such environmental pull factors are thought to negatively impact a student's tenacity to continue a college education (Crisp, 2010). In a study of 1,360 community college students from 260 institutions, all of whom indicated their goal was to transfer and complete a bachelor's degree, Crisp and Nunez (2014) found that working more than twenty hours per week negatively predicted student transfer for students from all racial/ethnic groups. Similarly, Titus (2006) using data from the Beginning Postsecondary database and the Integrated Postsecondary Education Data System database found that unmet financial needs, hours worked per week, and working off-campus negatively predicted persistence.

There are external financial factors that influence students' persistence, particularly financial responsibilities and financial aid as they relate to affording college. Employment status also relates to students' financial responsibilities from the

perspective of family income contribution. The Pell Institute for the Study of Opportunity in Higher Education (2012) asserts that many low-income students, defined as those receiving Pell Grants, send money home to their families while they are at four-year schools. In attempting to transfer to a four-year school, other low-SES students with similar obligations could face difficulty concerning how they generate their finances and where they are expected to contribute their finances. The amount of financial aid received also relates to students' persistence, especially in the first year of college, as we know it is this year that has the most student attrition. Financial aid, in fact, has been found to decrease first-year attrition. Specifically, in a study in Wisconsin on the effects of financial aid on persistence, Goldrick-Rab and colleges, using an instrumental variables research design, found significant increases in second-year enrollment based on the receipt of financial aid in the first year (2012). Clearly, the receipt of more aid would lessen the financial burden on students to afford college fees.

The prevalence of financial environmental factors can vary by race/ethnicity. One obstacle concerns how students view financial aid. For instance, in a qualitative study of 230 Black or Latino high school juniors and seniors, as well as 87 Black or Latino parents, McDonough and Calderone (2006) found that Latino families were reluctant to take out loans to finance their children's higher education. This can consequently impact the financial need Latino students have while they are at two-year schools. Latino students' roles in the family and how the family conceptualizes college costs, therefore, can determine the amount of off-campus financial responsibilities that students may have. Another aspect of students' finances is their

potential effect on students' enrollment patterns. Using data from the National Education Longitudinal Study and the Postsecondary Education Transcript Studies, Wang (2012) found that Latino community college students as compared to White students were at a disadvantage in their transfer rates but that full-time and continuous enrollment mediated the negative effects of this disadvantage. However, in their study discussed above on factors influencing transfer for White community college students as compared to Black and Latino students, Crisp and Nunez (2014) found that exclusive full-time enrollment had no effect on transfer for Black students and Latinos, but in fact had a negative effect on transfer for White students. In another study using the BPS: 2004/06, Crisp and Nora (2010) found that hours worked per week was negatively associated with Latino community college student persistence from the first to the second year, and enrollment intensity was positively associated with persistence. Given the mixed findings from these studies, the main takeaway concerning students' off-campus realities may relate more to SES than race/ethnicity; indeed, if working more than 20 hours per week negatively affects persistence for all racial groups (Crisp & Nunez, 2014) and if how much students need to work is inversely related to their socioeconomic status (Terenzini, Cabrera, & Bernal, 2001), we would expect financial strains on students with the least financial means.

Conclusion: Theoretical Models of Community College Persistence Trajectories

The literature from both four- and two-year schools on student persistence points to many significant factors. Students at the latter type of institution, however, are often different in terms of pre-entry characteristics, and because of the unique

context of community colleges as commuter schools, their experiences both on- and off-campus are also often different. It is therefore of primary importance to examine theoretical models that reflect the reality for community college students today. Two such models, which also capture the factors facilitating community college student persistence as identified from empirical studies, are Bean and Metzner's model and Crisp and Nunez's model. There are many similarities between the two models, with few differences: Bean and Metzner's model does not account for institutional-level factors, and Crisp and Nunez's model does not account for psychological factors. However, using the two models together, without excluding either category of factors, supports not only the empiricism on community college persistence but also other major student persistence theories such as those developed by Tinto, Cabrera and colleagues, and St. John and colleagues.

The one caveat between the two models for the purpose of my study is that Crisp and Nunez's model is more current, and these scholars created their model specifically with community college students, racial/ethnic minorities, and students in developmental courses in mind. As such, adding the psychological constructs from Bean and Metzner's model to Crisp and Nunez's achieves a more comprehensive picture of student persistence as it exists today, even though the latter model was designed specifically for the outcome of transfer and not the more general outcome of persistence in all its forms.

Another opportunity in theoretically framing this research comes from not only combining these two models but also going a step further by better addressing the intersection between developmental theories and college impact models. Indeed,

Rodgers (1990) argues that “the essence of the ecological perspective [college impact models, for example] is a belief that human behavior results from the *interaction* of the *individual* and the *campus environment*” (p. 250). He also states that in integrating student development and campus ecology principles, “*both* the person and the environment are assessed, not just one or the other, and *both* are evaluated in terms of *interaction* as defined by the *same developmental theories*” (p. 251). The implication of this point, as well as both the combining of the two college impact models above and one of the main categories of the factors affecting persistence in the literature, for this research is to examine how racial/ethnic minority status and the interaction in developmental courses affects students’ psychosocial development, and then to examine how this might influence their persistence.

The combination of these two categories of theories supports revising Crisp and Nunez’s model with the addition of psychosocial factors, as demonstrated in Figure 6.

*Figure 6: Conceptual Model of Student Persistence – Integrating Crisp and Nunez’s (2014) and Bean and Metzner’s (1985) Theoretical Frameworks*³⁰

³⁰ Plain text includes items from Crisp and Nunez (2014), and italics includes items from Bean and Metzner (1985); the institutional level variables from Crisp and Nunez’s original model remain the same in this conceptual model.

Student Level					
<u>Pre-entry characteristics</u>		<u>Environmental Pull Factors</u>	<u>Degree Expectations</u>	<u>Academic and Social Factors</u>	<u>Psychological Factors</u>
<u>Socio-Demographic Variables</u> Gender First-generation status <i>Age</i> <i>Ethnicity</i>	<u>Precollege Factors</u> High school GPA Highest math taken Earned college credit in HS Delayed enrollment to college	Hours worked Dependency status Financial aid received Enrollment status	Highest degree expected	Degree program Academic integration Developmental education First year GPA Distance learning	<i>Utility Satisfaction</i> <i>Goal commitment</i> <i>Stress</i>



Community College Student Persistence
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Together with the other categories in their model, which are also supported by the community college literature, this new theoretical framework serves to guide my study. Specifically, I use nationally representative student-level data from the Beginning Postsecondary Students 2004-09 (BPS) dataset and combine it with nationally representative institutional-level data from the Integrated Postsecondary Education Data System dataset for the entry year of 2004 (to correspond with the BPS cohort beginning in 2004), and examine student entry characterizes, psychosocial factors, social factors, academic factors, institutional factors, and environmental factors as they relate to community college student persistence. Most important, I

emphasize how the relationship between the categories of factors and student persistence might be similar or different based on the race/ethnicity of students. Doing so will empower policymakers at higher education institutions to more effectively serve their diverse students by ensuring equal opportunity for academic success exists on their campuses.

Chapter 4: Methods

Introduction

The following chapter describes the methodology used in this project. I first state the main research questions and hypotheses that guide the study. Then, I describe the research design, datasets and samples, which includes the procedures for merging the data and the analytical sample (sample used for conducting the analyses). Finally, I discuss the variables and procedures, and describe the statistical analyses that I conducted for this study.

Research Questions and Hypotheses

1. To what extent do community college students' pre-entry characteristics vary as a function of race/ethnicity?
 - a. Hypothesis 1: Based on the literature, I expect racial/ethnic minority students to come from lower SES families, and to have lower high school outcomes (GPA, math, SAT/ACT) than White students (Ma & Baum, 2016).
2. To what extent do community college students' off-campus environments vary as a function of race/ethnicity?
 - a. Hypothesis 2: Based on the literature, I expect racial/ethnic minority students to have more difficult financial and enrollment situations (working more, enrolling part-time more, borrowing more money, taking more semesters off) than their White peers (Terenzini, Cabrera, & Bernal, 2001).

3. To what extent do community college students' on-campus experiences and environments (students psychosocial attributes; socio-academic experiences, including participation in developmental courses; institutional and structural environments) vary as a function of race/ethnicity?
 - a. Hypothesis 3: Based on the literature, I expect racial/ethnic minority students to have higher measures of psychosocial factors (degree expectations, and importance of being leaders and financially well-off), lower academic factors (GPA, academic integration) higher levels of developmental education enrollment, and attend larger, more diverse colleges than their White peers (Wood, Newman, & Harris, 2015; Greene, Marti, & McClenney, 2008; Baliey et al., 2005).
4. What is the association between persistence factors (pre-entry characteristics, off-campus experiences, and on-campus experiences and environments) and student persistence? ³¹
 - a. To what extent do the associations among these variables vary as a function of race/ethnicity.

Hypothesis 4a: I expect all variables to predict persistence since all variables in my revised conceptual model have been found to be associated with persistence.

Hypothesis 4b: I hypothesize that developmental education will have more of a negative effect on Black and Latino students than their White peers, high school math will have more of a positive effect on Black and Latino students, and that higher proportions of minority students and faculty will lead to higher

³¹ The regression model for RQ4 is specified in the Statistical Analyses section of this chapter.

persistence of Black and Latino students (Crisp & Nunez, 2014; Gandara et al., 2012; Klement, 2012; Porchea et al., 2010)

Research Design: Secondary Data Analysis

I utilized two data sets collected by the U.S. Department of Education's National Center for Education Statistics' (NCES): BPS (Beginning Postsecondary Students Longitudinal Study 2004:09) and IPEDS (Integrated Postsecondary Education Data System 2003). From the BPS:04/09, I utilized important student-level variables as well as some institutional-level variables that were in the dataset. I merged the BPS with the IPEDS for the same Fall semester of 2003 to add key institutional characteristics not captured in the BPS.

NCES has recently begun a second data collection for the BPS, but this dataset is not available yet. Therefore, the BPS:04/09, which spans six years (from Fall 2003 to Spring 2009), is the appropriate dataset to use for this study.

National Datasets

Beginning Postsecondary Students Longitudinal Study

The BPS:04/09 collected a nationally representative sample of 18,640 first-time college students³² in 2004, who were followed through 2009. The sampling frame of the study included students who were eligible for the 2003-04 National Postsecondary Student Aid Study (NPSAS:04).³³ The NPSAS:04 sampling frame included all postsecondary institutions in the U.S. aside from those offering only

³² The sample was reduced to 16,680 by the end of the data collection in 2009

³³ The NPSAS:04 represents all 19 million undergraduates, but the BPS:04/09 represents the 4 million who were first-time beginners in 2003-04 (Radford, Berkner, Wheelless, & Shepherd, 2010).

courses but not programs, the latter of which last 300 clock hours³⁴ or more (NCES, 2012-246, p. 5). The sample of students was then drawn from the NPSAS:04 institutional sample if they met three criteria: they were enrolled in an academic program, were taking at least one credit course that would be applied to a degree, or were in a vocational program that led to a degree, certificate, or other formal award (NCES, 2012-246, p. 5). The BPS:04/09 sample of students excluded those who were enrolled simultaneously in a GED or other high school program.

The BPS:04/09 study compiled multiple data sources in addition to the NPSAS:04, including student interviews, student records, Integrated Postsecondary Education Data System, Central Processing System, National Student Loan Data System, SAT, ACT, National Student Clearing House, student transcripts, and college catalogues (Radford, Berkner, Wheelless, & Shepherd, 2010, p. B-2).³⁵ NCES scholars Radford et al. (2010) note the waves of data collection for the student interviews:

The first-time beginners in the BPS:04/09 study were interviewed three times: in 2004, at the end of their first year in postsecondary education; in 2006, 3 years after they had started in postsecondary education; and in 2009, 6 years after they had started. In 2004, they were interviewed about a variety of subjects, including their academic and social experiences during the first year, their work while enrolled, their education plans and long-term goals, their demographic characteristics, and their family responsibilities and background. Between March and September of 2006, they were interviewed again, with a focus on their enrollment patterns since 2004, including any transfers, stopout periods, attendance intensity, and completion of certificates and degrees. Those who were no longer enrolled were asked about their employment experiences. The 2009 interview, conducted between February and October of

³⁴ Refers to in-class time, or ‘contact hours’; one credit is equivalent to 15-16 contact hours per semester.

³⁵ The BPS does contain institutional variables as they relate to students, such as enrollment size. However, since there were no faculty variables in the BPS, it was necessary to merge the BPS with the IPEDS to capture faculty demographics.

2009, focused on the degree completion of those still enrolled after 2006, graduate school enrollment of those who had completed bachelor's degrees, and employment of those no longer enrolled (pp. 1-2).

I describe the BPS variables in Tables 4.1-4.3.

Integrated Postsecondary Education Data System

Data for my research also come from NCES's Integrated Postsecondary Education Data System (IPEDS) for the 2003-2004 academic year, the corresponding year of entry into higher education for BPS students. NCES notes:

IPEDS is a system of interrelated surveys conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES). IPEDS gathers information from every college, university, and technical and vocational institution that participates in the federal student financial aid programs. The Higher Education Act of 1965, as amended, requires that institutions that participate in federal student aid programs report data on enrollments, program completions, graduation rates, faculty and staff, finances, institutional prices, and student financial aid (NCES Handbook of Survey Methods, 2017, p. 1).

In 2003-04 NCES collected data from 7,030 institutions of higher education.

The study collected information on institutional characteristics; enrollment; completions; graduation rates and outcomes; admissions; student financial aid; human resources; finance; and academic libraries. However, because the BPS contain the student-level variables needed, only variables on faculty and staff from the IPEDS at the institutional level were used in this study. I describe the IPEDS variables in Table 4.3.

Dissertation Sample

Of the 16,680 students in the BPS:04/09, 5,549 attended community colleges as their first institution of enrollment.³⁶ From the sample of students attending community colleges, I excluded races/ethnicities other than White, Black, and Latinx³⁷, reducing the sample to 5,048 students. Given the equity focus on this dissertation, I examined Black and Latinx students' persistence rates and compared them to White students (the reference group in this analysis). Next, I merged the BPS reduced sample with the IPEDS data using institution IDs. The first stage involved merging the BPS student data with the institution IDs in a second version of the BPS, which was needed to merge the BPS with IPEDS. The first merge resulted in 648 using only cases and 4,374 matched cases. The second merge (of the two BPS datasets with the IPEDS dataset) resulted in 811 using only cases and 4,211 matched cases. These merges resulted in 26 cases where students did not have an associated institution ID. Therefore, after dropping these cases, the sample was reduced to 5,022 students³⁸, who attended 869 different institutions.³⁹ However, since I needed both a student and institution ID for each student for the hierarchical linear modeling (HLM) regression analyses, I further reduced the sample to 4,374, or the number of cases with both IDs.

Variables

³⁶ According to NCES (2006-180), there were at least 10 sample students per institution, with no more than 50 per institution (p. 15).

³⁷ The Ns for the dropped cases are: Asian (213), American Indian or Alaskan Native (42), Native Hawaiian or other Pacific Islander (17), Other (82), and More than One Race (147).

³⁹ The institution totals were ascertained by using the following command: collapse id (count) wht blk hsp, by (mtinstid)

Most of the variables included in this study come from the BPS: 04/09, including the dependent variable (see Table 4.1), independent variables (see Tables 4.2 & 4.3), and control variables (see Table 4.3). From the IPEDS data, I utilized institution IDs to create a variable for the *percent racial/ethnic minority faculty*, which corresponded to the same students in the same year. A description of the dependent, independent, and control variables follow. Then, I include descriptive statistics of my sample and variables, including means, standard deviations, and percentage of missing cases.

Dependent variable

The dependent variable for this research is persistence from 2003-2004 to 2009. Persistence was recoded as a dichotomous (binary) variable, with no enrollment and no degree equal to zero. To create this variable, I combined different possible college outcomes aside from dropping out of college without any type of college credential, including “no enrollment but attained an associate’s (AA) degree, no enrollment but attained a certificate, enrolled but no degree, enrolled and attained an AA, enrolled and attained a certificate, transferred to a 2-year or less school, transferred to a 4-year school without an AA, and transferred to a 4-year school with an AA.”⁴⁰ Table 4.1 provides the persistence variable description and operationalization.

Table 4.1

Dependent Variable and Its Description

Variable	Description	Operationalization
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⁴⁰ This BPS variable was created in 2009 to include all possible student outcomes from 2003-04 to 2009.

<p><i>Persistence from 2003-04 to 2009</i></p>	<p>Indicates the highest degree attained, or if no degree was attained, the level of the institution where the respondent was enrolled in spring 2009. Respondents were considered to be enrolled through spring 2009 if they were still enrolled anywhere after January 2009.⁴¹</p>	<p>Categorical variable operationalized using a dummy variable: 0 = Not enrolled, no degree. 1 = Not enrolled, attained AA; Not enrolled, attained certificate; Enrolled, no degree; Enrolled, attained AA; Enrolled, attained certificate; Transferred to 2-year or less; Transferred to 4-year without AA; Transferred to 4-year with AA</p>
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Independent variables

The independent variables for this research stem from my proposed conceptual model. As seen in Table 4.2, the independent variables represent the four dimensions of influence identified by Crisp and Nunez’s (2014) and Bean and Metzner’s (1985) theoretical perspectives: pre-entry characteristics, environmental factors, psychosocial factors, and socio-academic factors. The three later factors capture student experiences while they are enrolled in college.

Table 4.2

⁴¹ Variable descriptions’ source: Radford, Berkner, Wheelless, & Shepherd (2010).

Independent Variables and their Descriptions

Variable	Theory⁴²	Description	Operationalization
Pre-entry characteristics			
Race/ethnicity:	Bean & Metzner Ethnicity	Indicates the student's race/ethnicity with Hispanic or Latinx origin as a separate category. Race/ethnicity data were collected separately and combined for reporting purposes. All of the race categories exclude Hispanic origin unless specified. ¹	Categorical variable operationalized utilizing dummies. 1 if Black, or Latinx; White is the reference group (x = 0)
Gender:	Bean & Metzner Gender	Indicates the respondent's sex when asked in 2003.	1 if women; men are the reference group (x = 0).
Age first year enrolled, 2003–04:	Bean & Metzner Age	Indicates the student's age on December 31, 2003 ¹ .	Continuous variable measured in years.
High school GPA:	Bean & Metzner	Indicates the high school grade point	Ordinal variable with 7 values ranging from 0.5-4.0

⁴² I include the construct from each model as they were originally stated by the authors.

	High school performance	average on the standardized test date, according to self-report on test questionnaire ² .	
Highest level of high school mathematics (pre-calculus ⁴³ & calculus):	Bean & Metzner High school performance	Indicates if calculus or pre-calculus was the highest level of math the respondent completed or planned to take, according to self-report on standardized test questionnaire and the student interview ² .	Categorical variable operationalized utilizing dummies. 1 if Calculus and 1 if Pre-Calculus; Algebra 2 & Trigonometry/Algebra 2 are the reference group (x = 0)
Environmental pull factors			
Hours worked per week in 2003-04:	Bean & Metzner Hours of employment & hours worked	Indicates the average hours the respondent worked per week during the first year of enrollment at school ⁴⁴ .	Continuous variable ranging from 0-60.
Financial aid 2003/04:	Crisp & Nunez Financial aid received	Indicates the total amount of aid received by respondent during	Continuous variable ranging from 0-32,270.

⁴³ Due to the low total enrollment in calculus, I also included a dummy variable for pre-calculus in the regression models (reference group = any math classes lower than pre-calculus).

⁴⁴ Variable descriptions' source: NCES. PowerStats: BPS:09.

		the 2003-2004 academic year.	
Attendance intensity through 2009:	Crisp & Nunez Enrollment status	Indicates the respondent's pattern of full-time enrollment at all postsecondary institutions between July 2003 and June 2009 ^{1,45} .	Categorical variable operationalized utilizing a dummy variable. 1 if Full-time; part-time or mixed enrollment is the combined reference group (x = 0).
Stop-outs at any institution through 2009:	Crisp & Nunez Enrollment status	Whether the student stopped out for a semester or more (A stop-out is defined as a period of time in which the student has a gap in enrollment. For the purposes of this variable, the gap must last more than 4 months to be counted as a stopout). ²	Categorical variable operationalized utilizing a dummy variable. 1 if any stopouts; no stopouts is the reference group (x = 0).
Psychosocial factors			
Importance 2004: Being	Bean & Metzner	Indicates whether being a community leader	1 if yes.

⁴⁵ Full-time attendance generally means enrollment in 12 or more credit hours per term or 24 credit hours per academic year (Radford, Berkner, Wheelless, & Shepherd, 2010).

community leader:	Stress	was an important personal goal for the respondent in 2004. ²	
Importance 2004: Being financially well off:	Bean & Metzner Stress	Indicates whether being financially well off was an important personal goal for the respondent in 2004 ² .	1 if yes.
Importance 2004: Influence political structure:	Bean & Metzner Stress	Indicates whether influencing the political structure was an important personal goal for the respondent in 2004 ² .	1 if yes.
Importance 2004: Steady work: ⁴⁶	Bean & Metzner Stress	Indicates whether having steady work was an important personal goal for the respondent in 2004 ² .	1 if yes.
Socio-academic factors			
Social integration in 2004:	Bean & Metzner Social	This variable indexes the overall level of social integration the	NCES scale with values 1-7.

⁴⁶ Savi (2011) demonstrated that the four variables I include here in this stem of questions can be conceptualized as “self-efficacy”. I equate this with Bean & Metzner’s (1985) construct of ‘stress’; Weng, Cheong, & Cheong (2015) show that higher self-efficacy leads to lower stress.

	integration	respondent experienced at the NPSAS institution during the 2003-2004 academic year ^{2,47} .	
Academic integration in 2004:	Crisp & Nunez Academic integration	This variable indexes the overall level of academic integration the respondent experienced at the first institution he/she attended during the 2003-2004 academic year ^{2,48} .	NCES scale with values 1-7.
Grade point average 2004:	Bean & Metzner GPA & first-year GPA	Indicates the respondent's cumulative Grade Point Average (GPA) for the 2003-2004 academic year ² .	Continuous variable ranging from 0-400.

⁴⁷ It is derived based on the average of the responses indicating how often they had done the following: attended fine arts activities, participated in intramural or varsity sports, or participated in school clubs.

⁴⁸ This variable is derived from the average of the responses indicating how often he/she did the following: participated in study groups, had social contact with faculty, met with an academic advisor, or talked with faculty about academic matters outside of class.

Number of remedial courses taken through 2009:	Crisp & Nunez Developmental education	Total number of remedial courses taken ^{2,49} .	Continuous variable ranging from 0-35.
Highest degree ever expected to complete, 2003–04:	Crisp & Nunez Highest degree expected	When asked in 2003–04, the highest level of education that the student ever expected to complete. ¹	Ordinal variable ranging from 1-8 (no degree or certificate, certificate, associate’s, bachelor’s, post-BA or post-master certificate, master’s, doctoral, first-professional degree)

Control variables

The control variables for this study, as displayed in Table 4.3, capture two important dimensions of community college student persistence, pre-entry characteristics and institutional environments⁵⁰, both of which are measured when a student first enters college, and both of which have been found to influence persistence. Additional pre-entry characteristics that capture dimensions of students’ attributes are nativity, family income, and the highest education achieved by a parent.

I also control for students’ prior education in high school, such as whether or not

⁴⁹ The designation of a remedial course was made through the use of CCM:2010 course codes. Courses were coded as remedial based on a transcript notation indicating that the course was remedial, the course numbering system, the course description, and/or the number of credits awarded for the course (NCES, PowerStats, BPS:2004/2009).

⁵⁰ While the institutional factors used as control variables stem from the institution-level of Crisp & Nunez’s (2014) model, the pre-entry characteristics I use as controls are absent from my proposed conceptual model presented in Chapter 3, but are relevant to include based on the additional literature I discussed in the same chapter.

students took the ACT or SAT. Institutional and structural characteristics capture elements of the context in which students do or do not persist, specifically their communities outside their colleges and the attributes of the colleges themselves. These factors include the degree of urbanization where community colleges are located, enrollment size, percent of racial/ethnic minority students enrolled, percent of racial/ethnic minority faculty, and percent of students who receive federal aid. By controlling for these factors, or keeping these variables constant, the main independent variables of this study can be more closely examined without the influence of students' backgrounds or the larger structural and institutional context into which they begin their college careers. Further, given that the controls in this research are factors that are external to students' college experiences, it is important to focus on internal factors that have potential for direct change from college administrators interested in increasing the persistence of their students.

Table 4.3

Control Variables and Their Descriptions

Variable	Theory⁵¹	Description	Operationalization
Pre-entry characteristics			
Nativity:	Empiricism	1 if born in the U.S.	
Adjusted gross income in 2003-04:	Tinto Family background	Indicates the respondent's Adjusted Gross Income 2003-04 ^{1, 52} .	Categorical variable ranging from 0- 497,686.

⁵¹ SES is absent from my combination of Crisp & Nunez's and Bean & Metzner's models. While Tinto's model has been criticized for not applying to racial/ethnic minorities (Crisp & Nunez, 2014), measures of SES have been found in the literature to influence community college student persistence, so I include the two SES variables (income & parent's education) as a controls. Also, for measures that do not fit well in my proposed conceptual framework, I use 'empiricism'.

Highest education of parents, 2003–04:	Tinto Family background	When asked in 2003–04, the highest level of education completed by the student’s mother or father, whoever had the highest level ¹ .	Ordinal variable ranging from 1-8 (no high school, high school, vocational/technical, less than 2 years of college, associate’s degree, 2 or more years of college but no degree, bachelor’s degree, master’s degree or higher).
ACT or SAT scores:	Empiricism (a dimension of high school experiences but not required by high schools)	Indicates whether the respondent took the SAT I or ACT college entrance exam ² .	Categorical variable operationalized utilizing dummies. 1 if Took only the SAT, Took only the ACT, Took both the SAT and ACT; Did not take either the SAT or ACT is the reference group (x = 0).
Institutional/Structural characteristics			
Urbanization of college 2003-04:	Crisp & Nunez Enrollment size	Indicates the degree of urbanization in which respondent's first institution is located ² .	Categorical variable operationalized utilizing dummies. 1 if large city, Urban fringe of large city. Mid-size city, Urban fringe of mid-size city, Large town,

⁵² For dependent students this is the AGI for the parents; for independent students, this is the AGI for the respondent (and spouse).

			Small town, or Rural; Large city is the reference group (x = 0)
Enrollment size 2003-04:	Crisp & Nunez Enrollment size	Indicates the total enrollment during fall 2003 for the first institution the respondent attended ² .	Continuous variable ranging from 20-47,952.
Percent minority enrolled 2003-04:	Crisp & Nunez Percent URM ⁵³ students	Indicates the percent of total undergraduate enrollment at the institution that were minority students during the 2003-2004 academic year. Minority students include those who are Black, non-Hispanic, Hispanic, Asian/Pacific Islander, or American Indian/Alaskan Native ² .	Continuous variable ranging from 0-100.
Percent White⁵⁴ faculty:	Crisp & Nunez Percent URM	Race/ethnicity of faculty in the Fall of 2003.	Continuous variable ranging from 0-100

⁵³ Crisp & Nunez (2014) use this term for Black and Latinx students (Underrepresented Minorities)

⁵⁴ Variables from the Fall 2003 IPEDS Staff dataset.

	faculty		
Percent students receive federal aid:	Crisp & Nunez Percent of students who received federal aid	Percent received federal grants at institution 2003-04. ²	Continuous variable ranging from 0-100

Student Sample Descriptive Statistics

Table 4.4 provides descriptive statistics for key variables used in the quantitative analysis, including the means and standard deviations of the variables, their minimum and maximum values, and the percent missing from the community college sample of 5,549 students.⁵⁵

Table 4.4

Student Sample Descriptive Statistics

Variable	Mean or %	SD	Min/Max	% Missing
Key analytical variables				
<i>Persistence by 2009</i>	.66	.474		0
<i>Race/ethnicity</i>	White	3,443	68.56	0
	Black	852	16.97	
	Latinx	727	14.48	

⁵⁵ The descriptive statistics in this table come from the original BPS of community college students only.

<i>Gender (women)</i>	.582	.493	0, 1	0
<i>Family income</i>	44484.8	42478.3	0, 497686	
<i>Age</i>	22.599	8.180	15, 72	0
<i>Highest education of parents</i>	4.236	2.408	1, 8	2.51
<i>ACT/SAT scores</i>	.718	.450	0, 1	22.94
<i>High school GPA</i>	3.462	0.628	0, 4	29.77
<i>Highest level of high school mathematics: calculus</i>	.056	.229	0, 1	22.94
<i>U.S. born</i>	.920	.272	0, 1	0
Psychosocial factors				
Importance 2006: Being community leader: IMPT06B	.418	.493	0, 1	0
Importance 2006: Being financially well off: IMPT06C	.775	.417	0, 1	0
Importance 2006:	.232	.422	0, 1	0

Influence political structure: IMPT06E				
Importance 2006: Steady work: IMPT06I	.881	.324	0, 1	0
Socio-academic factors				
<i>Social integration in 2004</i>	18.532	35.189	0, 200	0
<i>Academic integration in 2004</i>	58.453	42.563	0, 200	0
<i>GPA 2004</i>	287.591	85.029	0, 400	0
<i>Remedial course taken</i>	.3172	.465	0, 1	0
Institutional/Structural characteristics				
<i>Urban Institution</i>	.433	.496	0, 1	1.73
<i>Percent minority enrolled 2003-04</i>	30.258	22.377	2.12, 100	3.23
<i>Percent students receive federal grants</i>	37.043	17.361	0, 100	0

<i>Percent White faculty</i>	.842	.1468	0, 1	16.15
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Correlations of Variables by Theoretical Construct

I discuss in the following section the Pearson product-moment correlation coefficient of variables by theoretical construct, including whether or not these correlations are significant based on a post-estimation analysis command (alpha <= 0.05). I include both the strength (0.01-0.39=weak, 0.4-0.69=moderate, and 0.7-0.99=strong) and the direction (positive or negative) of these correlations (Akoglu, 2018).⁵⁶

Pre-entry characteristics

Table 4.5 contains the correlations for pre-entry characteristics. Five variables are statistically significantly and positively correlated with respondent’s income: parent’s education, taking calculus in high school, taking pre-calculus, taking the SAT and/or ACT, and being US born. Conversely, being a woman and increased age are both statistically significantly negatively correlated with income. High school GPA is positively correlated with calculus, pre-calculus, taking the SAT/ACT, and being a woman. Increased age is also negatively correlated with high school GPA.

Calculus is positively correlated with taking the SAT and/or ACT, but is negatively correlated with being US born, being a woman, and increased age. Thus, immigrant students, men, and younger students were more likely to take calculus. For

⁵⁶ Akoglu (2018) argued that the cut-off points to determine the strength of associations are discipline-specific. In his article he reported cut-off points commonly used in psychology, political science, and medicine. Since my study is most similar to psychology studies, I am using the definition utilized in this discipline.

pre-calculus, the same pattern emerged for the negative correlation with being a woman and age, but there was a positive correlation between pre-calculus and being US born, in addition to a positive correlation with taking the SAT/ACT. Taking these standardized exams was positively correlated with being US born and being a woman, so these groups were more likely to take them. Similar to the two types of calculus courses, age was also negatively correlated with taking the SAT/ACT. Finally, being a woman was negatively correlated with age, meaning that the older students were more likely to be a man. The variables in this category that are significantly correlated are all considered to be weak (ranging from 0.022-0.254).

Table 4.5

Pre-entry Characteristics: Correlations and Descriptive Statistics (N= 3,057)⁵⁷

Variables	Income	HS GPA	Parent education	Calculus	Pre-calculus	Took ACT/SAT	US born	Female	Age
Income	1.000								
HS GPA	.017	1.000							
Parent education	.262*	.032	1.000						
Calculus	.057*	.140*	.038*	1.000					
Pre-calculus	.078*	.134*	.059*	N/A ⁵⁸	1.000				

⁵⁷ The high school variables were based on self-reporting by students; the sample for this analysis is smaller due to students skipping these questions.

⁵⁸ The two calculus variables come from the same question, so I exclude the correlation between them.

s									
Took ACT/S AT	.096*	.186*	.109*	.140*	.225*	1.000			
US born	.080*	.014	.027	-.026*	.028*	.049*	1.000		
Female	-.129*	.082*	-.095*	-.037*	-.022	.038*	-.026	1.000	
Age	-.106*	-.080*	-.033*	-.032*	-.068*	-.163*	-.034	-.054*	1.000

Off-campus environments

Table 4.6 shows the correlations of off-campus environmental variables. First, hours worked per week was statistically significantly negatively correlated with total financial aid received and being a full-time student. As students worked more hours, they borrowed less and enrolled as less than full-time. Taking a semester off was positively correlated with hours worked per week, so the more hours students worked, the more likely they were to take a semester off. Next, total financial aid received was negatively correlated with taking a semester off; students that had the financial means via financial aid to remain in school were less likely to take a semester off from school. The one moderate correlation in this category of variables was between total financial aid received and being full-time. This was a positive correlation, meaning that students were more likely to enroll full-time with more aid. Finally, being full-time was negatively correlated with taking a semester off. The variables in this

category that are significantly correlated were found to be weak correlations (ranging from 0.030-0.181) excluding one moderate correlation (0.330).

Table 4.6

Off-campus Environments: Correlations and Descriptive Statistics (N=4,374)

Variables		Hours per week	Total aid	Stopout	Full-time
Hours per week		1.000			
Total aid		-.181*	1.000		
Stopout		.111*	-.058*	1.000	
Full-time		-.180*	.329*	-.061*	1.000

On-campus psychosocial experiences

Table 4.7 contains the correlations of psychosocial variables. First, importance of being a community leader was positively and weakly correlated with being financially well off, having steady work, social integration, and highest degree expected. Influencing the political structure was positively and moderately correlated with being a community leader. Second, being financially well off was positively correlated with influencing politics, having steady work, and highest degree expected, but was negatively correlated with social integration. For this latter correlation, students who placed a higher value on being financially well off experienced lower levels of social integration on campus. Third, influencing the political structure was positively correlated having steady work, social integration, and highest degree expected. Fourth, and conversely, having steady work was negatively correlated with both social integration and highest degree expected. Finally, social integration was

positively correlated with highest degree expected, meaning students who were more socially integrated had higher degree expectations for themselves. The variables in this category that are significantly correlated were found to be weak correlations (ranging from 0.057-0.160) excluding one moderate correlation (0.359).

Table 4.7

On-campus Psychosocial Experiences: Correlations and Descriptive Statistics

(N=4,374)

Variables	Community leader	Financially well off	Influencing politics	Having steady work	Social integration	Highest degree
Community leader	1.000					
Financially well off	.151*	1.000				
Influencing politics	.359*	.114*	1.000			
Having steady work	.129*	.145*	.098*	1.000		
Social integration	.125*	-.033*	.088*	-.048*	1.000	
Highest degree	.125*	.032*	.106*	-.029	.124*	1.000

On-campus socio-academic experiences

Table 4.8 shows the correlations of socio-academic variables. First, college GPA was negatively correlated with taking a remedial course, meaning that students who did not take one were more likely to have a higher GPA. Second, and conversely, academic integration was positively correlated with taking a remedial course; remedial students were more likely to be more academically integrated. The two sets of variables in this category that are significantly correlated were found to be weak correlations (ranging from 0.063-0.096).

Table 4.8

On-campus Socio-Academic Experiences: Correlations and Descriptive Statistics

(N=4,374)

Variables	GPA	Academic integration	Took remedial
GPA	1.000		
Academic integration	.022	1.000	
Took remedial	-.062*	.096*	1.000

On-campus institutional environments

Table 5.9 contains correlations for institutional variables. First, enrollment size was moderately and positively correlated with the percent of minority students enrolled and the urbanicity of the school, meaning that larger community colleges were more likely to have a higher proportion of racial/ethnic minority students and more likely to be located in urban areas. Conversely, the percent of students receiving federal aid and the percent of White faculty were both weakly and negatively

correlated with enrollment size. Next, there was a weak and positive correlation between percent minority students and percent receiving federal aid, and a moderate and positive correlation between percent minority enrolled and urbanicity of the school. In addition, there was a strong and negative correlation between percent minority enrolled and percent of White faculty, meaning that schools with higher proportions of racial/ethnic minorities also had higher proportions of non-White faculty. Third, the percent of students receiving federal aid was weakly and negatively correlated with the percent of White faculty and the urbanicity of the school, meaning that students receiving more federal aid were likely to attend schools with a lower proportion of White faculty and schools outside urban areas. Last, the percent of White faculty was moderately and negatively correlated with urbanicity, meaning schools outside urban areas were more likely to have higher proportions of White faculty compared to other racial/ethnic faculty. The variables in this category that are significantly correlated were found to be weak, moderate, and strong correlations (ranging from 0.151-0.738).

Table 4.9

On-campus Institutional Environment: Correlations and Descriptive Statistics

(N=4,093)⁵⁹

Variables	Enrollment size	Percent minority	Percent receiving federal aid	Percent white faculty	Urban
Enrollment size	1.000				

⁵⁹ Due to the N for percent of White faculty from the merging procedures and from collapsing the variables, the total N for this category was reduced to this number.

Percent minority	.338*	1.000			
Percent receiving federal aid	-.162*	.285*	1.000		
Percent white faculty	-.270*	-.738*	-.245*	1.000	
Urban	.399*	.380*	-.151*	-.323*	1.000

Statistical Analyses

The main outcome of this study is persistence by the spring of 2009, which is a dichotomous variable spanning from the fall of 2003 until the spring of 2009, and measures three general student outcomes: drop-out, still enrolled, or completed certificate/degree by 2009.⁶⁰

In the first stage of analysis to answer Research Questions 1-3, I provide descriptive statistics for racial/ethnic groups across key variables, and use one-way ANOVA (Analysis of Variance), to identify significant differences among student groups for each variable. ANOVA is the appropriate analysis because it is used to “compare two or more means [mean of each Dependent Variable for each racial/ethnic group] to see if there are any statistically significant differences among them” (Tabacjnick & Fidell, 2013, p. 37). I used a Bonferroni post-estimation command to estimate significant differences between two of the racial/ethnic groups.

⁶⁰ See Table 4.1 for the specific choices of this variable as well as its operationalization

This correction reduces the likelihood of a Type I Error (rejection of a true null hypothesis) (Tabacjnick & Fidell, 2013, p. 270).

Next, to answer Research Question 4, I estimate the association between the three categories of factors and student persistence using hierarchical linear modeling (HLM). HLM takes into account the nested structure of the data, which for this study is students, and students within institutions (2 levels). “When the variance of the residual errors is correlated between individual observations as a result of these nested structures, traditional logistic regression [or Ordinary Least Squares] is inappropriate” (Khan & Shaw, 2011, p. 93). In other words, students within the same community college would likely be more similar than if a student sample were randomly drawn. Thus, “a multilevel model permits prediction of individual scores adjusted for group differences as well as prediction of group scores adjusted for individual differences within groups” (Tabachnick & Fidell, 2013, p. 787). Logistic regression, within the HLM framework, subsequently accounts for the dichotomous dependent variable since there is not a linear distribution for binary variables. Logistic regression uses a logarithmic transformation on the outcome variable to model a nonlinear association in a linear way. “The logistic function is used to predict such a probability, [and] it describes the relationship between a predictor variable X_i (or a series of predictor variables) and the conditional probability that an outcome variable Y_i equals one” (persisting) (Sommet & Morselli, 2017). Regression coefficients are reported in the models as log odds.

The standard equation for logistic regression within a Random Intercept Model is as follows:

Equation 1: Level 1 – Community College Students

$$\text{Log}(P_{ij}/1-P_{ij}) = B_0 + B_1*(X1^{\text{Pre-entry characteristics}}) + B_2*(X2^{\text{other factor}}) + B_3*(X3^{\text{other factor}}) + B_4*(X4^{\text{other factor}}) + B_5*(X5^{\text{control variables}})$$

Where:

- the x 's are independent variables (or covariates), and the β 's are regression coefficients. For a given covariate x , its coefficient β is the log odds ratio corresponding to a 1-unit difference in x . Exponentiating (e^β) gives the odds ratio.

Equation 2: Level 2 – Community College Institutions

$$B_0 = \gamma_{00} + \gamma_{01}(W1^{\text{institutional factor}}) + \gamma_{02}(W2^{\text{institutional controls}}) + u_0$$

Where:

- the w 's are the institutional (community level covariates).

To answer Research Question 4, I build a total of six models, regressing sets of variables on persistence within the HLM logistic regression framework. The first model includes only the dependent variable and the constant to calculate for the Intra Correlation Coefficient (ICC). The ICC estimates how strongly values from the same cluster (or level-2 units) relate to each other; an ICC near zero indicates dissimilarity among values from the same cluster, whereas an ICC near 1 indicates high similarity of values from the same cluster (Liljequist, Elfving, & Roaldsen, 2019). Next, I add pre-entry characteristics, the third adds psychosocial factors, the fourth adds socio-academic factors, the fifth adds environmental pull factors, and the final model adds institutional and structural factors. As discussed in Appendix A, the order of the variables is based on Crisp and Nunez (2014) and Crisp and Nora (2010). Using

multiple models, it is possible to control for student-level factors before they enter college, as well as for on- and off-campus factors while they either persist or drop out of college, and identify which factors influence community college students' persistence.

Supplementary Analysis

The statistical analysis for this dissertation was conducted in two stages. In the first stage, I focused on the main research questions as I stated in the previous section. In stage two, I conducted an exploratory analysis focusing on gender and developmental education because gender, but not race/ethnicity, was a significant predictor on persistence when first estimated in the models. During the analysis, a gendered pattern emerged. Even though this analysis does not respond to any given research question, it provides useful direction for future research in higher education. To facilitate the flow of this dissertation, this analysis is reported in the appendices (Appendix A & B) but are weaved into the main discussion of the dissertation.

Conclusion

Guided by Crisp and Nunez (2014) and Bean and Metzner (1985), and using not only student-level but also institution-level data (BPS & IPEDS), this research aims at adding to the theory on community college student persistence. In the following chapter, I investigate how known persistence factors vary by race/ethnicity as well as which factors are associated with persistence. The main goal of these results is to better equip community college leaders to best position their students for success.

Chapter 5: Results

Introduction

This chapter contains the findings of this research. In detailing the quantitative research results, I discussed how pre-entry characteristics, off-campus environments, and on-campus experiences and environments (psychosocial, socio-academic, institutional) vary for White, Black, and Latinx community college students. Next, I presented and interpreted findings concerning the association between these factors (pre-entry characteristics, off-campus, psychosocial, socio-academic, institutional) and community college student persistence.

Research Question 1

1. To what extent do community college students' pre-entry characteristics (socio-demographics and high school outcomes) vary as a function of race/ethnicity?

Hypothesis 1a: Based on the literature, I expect racial/ethnic minority students to come from lower SES families (income and parent's education), and student nativity than White students (e.g., Ma & Baum, 2016).

Hypothesis 1b: Based on the literature, I expect racial/ethnic minority students to have lower high school outcomes than White students (e.g., NCES 2016-405).

To examine community college students' pre-entry characteristics, I analyzed

student socio-demographics and high school outcomes: 1. income, 2. parent's education, 3. student nativity, 4. gender, 5. age, 6. high school GPA, 7. high school math, 8. took the SAT and/or ACT. To test my hypothesis, I used ANOVA in estimating differences among racial/ethnic subgroups.

Consistent with hypothesis 1a, there were statistically significant differences in socioeconomic status (SES) among the three racial/ethnic groups. Both measures of SES, income and parent's education, indicated that White students were economically advantaged when compared to their Black and Latinx counterparts. On average, White community college students came from higher income families (\$52K) than Latinx students (\$36K), who came from higher income families than Black students (\$25K) (see Table 5.1). Parents' education showed a similar pattern. On average, White students had parents with a higher level of education than both Black and Latinx students. However, Black students' parents had a higher education level than the parents of Latinx students. Effect sizes (Hedge's g) for income showed that the differences between racial/ethnic subgroups were small to moderate (ranging from .25 SD between Black and Latinx students to .58 SD between White and Black students), and for parent's education they were small (ranging from .15 SD between White and Black students to .37 SD between White and Latinx students).

Results also indicated differences in nativity among the three racial/ethnic groups. As expected, fewer Latinx students were born in the U.S., as compared to Black and White students. On average, 73% of Latinx students were born in the U.S., whereas this percentage decreased for Black (89%) and White (97%) students, respectively. Gender differences were also observed between Black and White

students, with more Black students being women (64%) as compared to White students (56%). The nativity differences between racial/ethnic subgroups were moderate to large (ranging from .41 SD between White and Black students to 1.02 SD between White and Latinx students). In contrast, the gender difference was small (.13 SD between White and Black students). As expected, based on the sampling frame for the BPS discussed in Chapter 4, there were no differences on students' age across racial/ethnic groups.

Table 5.1

Means, Standard Deviations, and Mean Differences of Pre-entry Characteristics by Race/Ethnicity

	White	Black	Latinx	F statistic	Significant differences
<i>Socio-demographics</i>					
Income (N=4,374)	51514.05 (43906.27)	25415.01 (29505.27)	35966.51 (39333.59)	F(2,4371)= 135.31, p=0.000	1, 2, 3
Parents' education (N=4,265)	4.46 (2.38)	4.04 (2.39)	3.61 (2.41)	F(2,4262)= 36.04, p=0.000	1, 2, 3
US born (N=4,374)	.97 (.17)	.89 (.31)	.73 (.45)	F(2,4371)= 247.35, p=0.000	1, 2, 3
Female (N=4,374)	.56 (.50)	.64 (.48)	.59 (.49)	F(2,4371)= 7.16, p=0.001	1
Age (N=4,374)	22.45 (8.23)	22.59 (7.53)	22.04 (7.75)	F(2,4371)= 0.88, p=0.414	
<i>High school outcomes</i>					

High school GPA (N=3,114)	3.50 (.63)	3.35 (.65)	3.50 (.57)	F(2,3111)= 11.69, p=.000	1, 3
High school Calculus (N=3,411)	.06 (.24)	.04 (.20)	.07 (.26)	F(2,3408)= 2.57, p=0.077	
High school Pre-Calculus (N=3,411)	.16 (.36)	.10 (.30)	.12 (.32)	F(2,3408)= 8.21, p=0.000	1, 2
Took SAT and/or ACT (N=3,411)	.72 (.44)	.72 (.45)	.68 (.47)	F(2,3408)= 4.11, p=0.016	2

*Means are reported with standard deviations in parentheses. Between group differences significant at .05 level (or lower) are specified as: 1. White and Black; 2. White and Latinx; and 3. Black and Latinx. Post-hoc analyses for mean differences between two groups was conducted using the Bonferroni post-estimation command.

Concerning hypothesis 1b, there were some differences among racial/ethnic groups regarding high school academic outcomes, but not across all three subgroups. On average, White and Latinx students had a higher high school GPA ($M=3.50$ for each group) than Black students ($M=3.35$). While there were no differences by racial group for the percent of students who took calculus in high school, more White students took pre-calculus than Black and Latinx students (16% of White, 10% of Black and 12% of Latinx students). In terms of the magnitude of the differences, effect sizes of GPA were small in both cases (.23 SD between White and Black students, and Black and Latinx students), and small for pre-calculus (ranging from .09 SD between White and Latinx students to .12 SD between White and Black students).

Last, a similar proportion of White (72%) and Black (72%) students took either the SAT or the ACT, whereas fewer Latinx students (68%) did. The only statistically significant difference was between White and Latinx students. Effect sizes were small for the SAT/ACT (.14 SD between White and Latinx students). Overall, there are some important differences in community college students' characteristics before they enter college among racial/ethnic subgroups.

Research Question 2

1. To what extent do community college students' off-campus environments vary as a function of race/ethnicity?
 - a. Hypothesis 2: Based on the literature, I expect racial/ethnic minority students to have more difficult financial situations (working more, enrolling part-time more, borrowing more money, taking more semesters off) than their White peers (Terenzini, Cabrera, & Bernal, 2001).

I used four indicators to examine students' off-campus environments:

1. hours worked per week, 2. total financial aid received, 3. took one or more semesters off, and 4. being enrolled full-time. To test my hypothesis, I used ANOVA in estimating differences among racial/ethnic subgroups.

There were statistically significant differences among the three groups in the percentage for students taking a semester off. By 2009, nearly two-thirds of Black

students (61%) took a semester off⁶¹, just over half of Latinx students did (54%), and fewer than half of White students (47%) did.

Regarding hours worked per week and total financial aid, on average, Black students worked fewer hours than White or Latinx students (18 hours for Black students and 22 hours for White and Latinx students). A similar pattern among total financial aid received in the 2003-04 academic year and racial/ethnic groups emerged. Specifically, Black students on average borrowed more money for their education (\$3,271) than did White students (\$2,321) and Latinx students (\$2,088).

Table 5.2

Means, Standard Deviations, and Mean Differences of Off-campus Environments by Race/Ethnicity

(N=4,374)	White	Black	Latinx	F statistic	Significant differences
Hours worked per week in 2003-04	21.56 (15.61)	18.38 (16.09)	22.12 (16.85)	F(2,4371)= 13.23, p=0.000	1, 3
Total financial aid received in 2003-04	2320.62 (3410.42)	3270.93 (3247.72)	2087.55 (2902.02)	F(2,4371)= 28.43, p=0.000	1, 3
Took semester off	.47 (.50)	.61 (.49)	.54 (.50)	F(2,4371)= 25.97, p=0.000	1, 2, 3
Full-time	.62 (.49)	.63 (.48)	.55 (.50)	F(2,4371)= 6.20,	2, 3

⁶¹ Although this variable spans all waves of data collection, it is still useful even considering many students dropped out before 2009 because this variable has values of zero after students drop out.

enrollment in 2003- 2004				p=0.002	
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*Means are reported with standard deviations in parentheses. Between group differences significant at .05 level (or lower) are specified as: 1. White and Black; 2. White and Latinx; and 3. Black and Latinx. Post-hoc analyses for mean differences between two groups was conducted using the Bonferroni post-estimation command.

Last, both more White (62%) and Black (63%) students were enrolled full-time in their first year in college than Latinx (55%) students.

Effect sizes (Hedge's *g*) showed that the racial/ethnic differences in off-campus environments overall were small for hours worked per week (from .19 SD between White and Black students to .20 SD between Black and Latinx students), and for enrolling full-time (from .17 SD between White and Latinx students to .19 SD between Black and Latinx students). The magnitude of difference was also small for taking a semester off (ranging from .11 SD between Black students and Latinx students to .27 SD between White students and Black students), and for financial aid received (from .27 SD between White and Black students to .36 SD between Black and Latinx students).

Findings from this study partially confirmed hypothesis 2. White students did borrow less than Black students but worked more than Black students; White students also did enroll full-time more than Latinx students. The one difference of which I was correct in my hypothesis was taking a semester off: White students did take fewer semesters off than did their Black and Latinx peers.

Research Question 3

1. To what extent do community college students' on-campus experiences and environments (students psychosocial experiences; socio-academic experiences, including participation in developmental courses; institutional and structural environments) vary as a function of race/ethnicity?

Hypothesis 3a: Based on the literature, I expect racial/ethnic minority students to have higher measures of psychosocial factors (degree expectations, and importance of being leaders and financially well-off) (Wood, Newman, & Harris, 2015).

Hypothesis 3b: Based on the literature, I expect racial/ethnic minority students to have lower measures of academic factors (GPA, academic integration) but higher measures of developmental education enrollment (Greene, Marti, & McClenney, 2008).

Hypothesis 3c: Based on the literature, I expect racial/ethnic minority students to attend larger, more diverse colleges than their White peers (Baliey et al., 2005; McClenney, 2008).

Psychosocial factors

To examine community college students' psychosocial experiences, I used six indicators: 1. being a community leader, 2. being financially well off, 3. influencing the political structure, 4. having steady work, 5. social integration, 6. and highest degree expected. To test my hypothesis, I used ANOVA in estimating differences among racial/ethnic subgroups.

There were significant differences among all three racial/ethnic groups for the goal of being a community leader and the goal of being financially well off. On average, nearly two-thirds of Black students (61%) rated being a community leader as important, whereas fewer than half of both Latinx (47%) and White students did (37%). For the importance of being financially well off, 74% of White, 90% of Black, and 83% of Latinx students said it was important. When asked if influencing the political structure was important, more Black students (34%) agreed with this statement compared to White (21%) and Latinx students (25%), respectively. Concerning educational expectations⁶², White students had lower expectations ($M=4.64$) than both Black ($M=5$, or a post-BA certificate) and Latinx students ($M=5.01$), respectively.

Table 5.3

Means, Standard Deviations, and Mean Differences of On-campus Psychosocial Experiences by Race/Ethnicity

(N=4,374)	White	Black	Latinx	F statistic	Significant differences
Being a community leader	.37 (.48)	.61 (.49)	.47 (.50)	F(2,4371)= 76.80, p=0.000	1, 2, 3
Being financially well off	.74 (.44)	.90 (.30)	.83 (.37)	F(2,4371)= 53.59, p=0.000	1, 2, 3
Influencing	.21 (.41)	.34 (.48)	.25 (.43)	F(2,4371)= 30.20, p=0.000	1, 3

⁶² As a reference to Chapter 4, highest degree expected was measured using an 8-point scale, with 4 equaling a bachelor's degree and 6 equaling a master's degree.

the political structure					
Having steady work	.88 (.32)	.88 (.32)	.88 (.32)	F(2,4371)= 0.02, P=0.980	
Social integration	18.23 (34.91)	20.96 (37.24)	20.05 (36.15)	F(2,4371)= 2.10, p=0.123	
Highest degree expected	4.64 (1.51)	5.00 (1.52)	5.01 (1.49)	F(2,4371)= 23.08, P=0.000	1, 2

*Means are reported with standard deviations in parentheses. Between group differences significant at .05 level (or lower) are specified as: 1. White and Black; 2. White and Latinx; and 3. Black and Latinx. Post-hoc analyses for mean differences between two groups was conducted using the Bonferroni post-estimation command.

Effect sizes (Hedge's *g*) showed that the differences among racial/ethnic groups were small to moderate for being a community leader (ranging from .21 SD between White and Latinx students to .53 SD between White and Black students), and small for being financially well off (ranging from .13 SD between Black and Latinx students to .36 SD between White and Black students), for influencing the political structure (from .23 SD between Black and Latinx students to .34 SD between White and Black students), and for highest degree expected (from .21 SD between White and Black students to .23 SD between White and Latinx students). Findings from my study confirmed hypothesis 3a: White students had lower values for psychosocial experiences than did their Black and Latinx peers.

Socio-academic factors

To examine community college students' socio-academic experiences, I

used three indicators: 1. first year GPA, 2. academic integration, and 3. taking one or more remedial courses. To test my hypothesis, I used ANOVA in estimating differences among racial/ethnic subgroups.

There were statistically significant differences among all three subgroups on college GPA. On average, White students had a higher GPA ($M=2.97$) than Latinx students ($M=2.75$), who had a higher GPA than Black students ($M=2.64$). Concerning the academic integration index, on average, Black students reported the highest integration ($M=66$), followed by White ($M=58$) and then Latinx students ($M=56$). Last, higher proportions of Black and Latinx students took at least one remedial course as compared to White students. Specifically, 29% of White students took one of these courses, whereas 39% of Black and 38% of Latinx students did.

Table 5.4

Means, Standard Deviations, and Mean Differences of On-campus Socio-Academic Experiences by Race/Ethnicity

(N=4,374)	White	Black	Latinx	F statistic	Significant differences
First year GPA	296.72 (82.70)	264.23 (85.91)	275.35 (85.52)	F(2,4371)= 53.00, p=0.000	1, 2, 3
Academic integration	58.07 (41.05)	65.75 (46.07)	56.21 (44.64)	F(2,4371)= 11.30, p=0.000	1, 3
Took at least one remedial course in 2003-04	.29 (.45)	.39 (.49)	.38 (.49)	F(2,4371)= 18.74, p=0.000	1, 2

*Means are reported with standard deviations in parentheses. Between group differences significant at .05 level (or lower) are specified as: 1. White and Black; 2. White and Latinx; and 3. Black and Latinx. Post-hoc analyses for mean differences between two groups was conducted using the Bonferroni post-estimation command.

Effect sizes (Hedge's g) showed that the differences among racial/ethnic groups were small to moderate for first year GPA (ranging from .13 SD between Black and Latinx students to .40 SD between White and Black students), and small for academic integration (from .21 SD between White and Black students to .24 SD between Black and Latinx students), and for remedial courses (.20 SD between White and Black students, and White and Latinx students). Findings from this study partially confirm hypothesis 3b. White students had higher GPAs, but concerning academic integration, White students had lower values of academic integration than Black students, and they did not differ from Latinx students. A lower percentage of White students did take developmental courses than their Black and Latinx peers.

Institutional factors

To examine community college students' institutional environments, I used five indicators: 1. enrollment size, 2. percent of minorities enrolled, 3. percent of students receiving federal aid, 4. percent of White faculty, and 5. urbanicity. To test my hypothesis, I used ANOVA in estimating differences among racial/ethnic subgroups.

There were statistically significant differences among the three groups on the size of community colleges students attended. On average, White students attended smaller schools (7,728 students) than Black (8,574) and especially Latinx students (13,094). A similar pattern emerged when examining the percent of minority students enrolled at community colleges. Specifically, White students attended schools that

were less than one quarter minority (22%), whereas Black students attended schools that were just below half minority (46%), and Latinx students at schools that were half minority (50%). There were also statistically significant differences regarding the percent of peers who received federal aid. White students attended college with a lower proportion of students who received federal aid (35%), as compared to Black (43%) and Latinx students (38%). Differences were also observed among all three racial/ethnic subgroups concerning urbanicity of the community college. For instance, around one-third of White students (38%) attended urban schools, whereas nearly half of Black (49%) and well over half of Latinx students (66%) did. White students also attended schools with higher proportions of White faculty (88%) than did Black and Latinx students (75% for each subgroup).

Table 5.5

Means, Standard Deviations, and Mean Differences of Institutional Environments by Race/Ethnicity

	White	Black	Latinx	F statistic	Significant differences
Enrollment size (N=4,374)	7728.10 (6972.51)	8574.13 (7333.51)	13094.04 (8570.27)	F(2,4371)= 141.12, p=0.000	1, 2, 3
Percent minorities enrolled (N=4,230)	22.29 (16.17)	46.19 (23.71)	49.86 (23.90)	F(2,4227)= 835.71, p=0.000	1, 2, 3
Percent of students	34.83 (15.45)	43.22 (18.81)	37.86 (19.74)	F(2,4371)= 75.95, p=0.000	1, 2, 3

who received federal aid (N=4,374)					
Percent of White faculty (N=4,211)	.88 (.10)	.75 (.22)	.75 (.15)	F(2,4208)= 408.04, p=0.000	1, 2
Urban (N=4,303)	.38 (.49)	.49 (.50)	.66 (.47)	F(2,4300)= 90.58, p=0.000	1, 2, 3

*Means are reported with standard deviations in parentheses. Between group differences significant at .05 level (or lower) are specified as: 1. White and Black; 2. White and Latinx; and 3. Black and Latinx. Post-hoc analyses for mean differences between two groups was conducted using the Bonferroni post-estimation command.

Effect sizes (Hedge's *g*) showed that the differences among racial/ethnic groups were small to large for enrollment size (ranging from .14 SD between White and Black students to .72 SD between White and Latinx students), small to large for percent minority enrolled (ranging from .17 SD between Black and Latinx students to 1.57 SD between White and Latinx students), small to moderate for percent receiving federal aid (ranging from .20 SD between White and Latinx students to .48 SD between White and Black students), large for percent of White faculty (ranging from .96 SD between White and Black students to 1.18 SD between White and Latinx students), and small to moderate for urbanicity (.24 SD between White and Black students to .55 SD between White and Latinx students). Findings from my study confirm hypothesis 3c. Black and Latinx students attended larger, more diverse (by

both student and faculty minority status), and more urban schools than did White students.

Research Question 4

1. What is the association between persistence factors (pre-entry characteristics, off-campus experiences, and on-campus experiences and environments) and student persistence?

Hypothesis 4: Based on the literature, I expect all variables to predict persistence since all variables in my revised conceptual model have been found to be associated with persistence (Crisp & Nunez, 2014; Bean & Metzner, 1985; Tinto, 1975).

In the following section, I presented results from the HLM logistic regression on persistence for the community college sample. The first model includes only the dependent variable and the constant. Next, I added pre-entry characteristics, the third adds psychosocial factors, the fourth adds socio-academic factors, the fifth adds environmental pull factors, and the final model adds institutional and structural factors. The results from these models are presented in Table 5.7 and frame the remainder of this chapter.

Table 5.7

HLM Logistic Regression on Persistence (N=4,374)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Pre-entry characteristics</i>						
Black⁶³		0.051 (0.129)	-0.149 (0.134)	-0.158 (0.133)	-0.026 (0.136)	0.019 (0.150)
Latinx		-0.146	-0.175	-0.198	-0.076	0.026

⁶³ White students are the reference group.

		(0.145)	(0.149)	(0.146)	(0.150)	(0.172)
Income		0.032* (0.014)	0.045** (0.017)	0.043* (0.017)	0.045** (0.017)	0.047** (0.018)
Parent's Ed		0.085*** (0.020)	0.089*** (0.017)	0.082*** (0.020)	0.079*** (0.020)	0.078*** (0.021)
US Born		-0.379 (0.214)	-0.376 (0.219)	-0.333 (0.218)	-0.231 (0.219)	-0.327 (0.221)
Age		-0.147*** (0.035)	-0.127*** (0.036)	-0.124*** (0.218)	-0.163*** (0.036)	-0.159*** (0.037)
Female		0.185* (0.093)	0.131 (0.095)	0.120 (0.096)	0.052 (0.100)	0.072 (0.102)
HS GPA		0.251*** (0.069)	0.296*** (0.071)	0.283*** (0.071)	0.214** (0.072)	0.179* (0.075)
Calculus		0.606** (0.198)	0.676*** (0.207)	0.657*** (0.205)	0.496* (0.204)	0.639** (0.216)
Pre-Calculus		0.432*** (0.135)	0.384** (0.144)	0.364* (0.146)	0.333* (0.148)	0.386** (0.150)
Took SAT and/or ACT		0.010 (0.105)	0.045 (0.107)	0.036 (0.108)	0.022 (0.111)	0.004 (0.113)
<i>Environmental factors</i>						
Hours worked			-0.013*** (0.003)	-0.013*** (0.003)	-0.012*** (0.004)	-0.010** (0.004)
Total financial aid			0.163 (0.102)	0.158 (0.104)	0.125 (0.103)	0.121 (0.106)
Stopouts			1.189*** (0.109)	1.184*** (0.109)	1.305*** (0.106)	1.263*** (0.108)
Full-time			0.336** (0.106)	0.337** (0.107)	0.357*** (0.109)	0.355** (0.114)
<i>Psychosocial factors</i>						
Community leader				-0.125 (0.100)	-0.143 (0.103)	-0.125 (0.107)
Financially well off				-0.052 (0.119)	-0.034 (0.121)	-0.106 (0.123)
Political structure				0.050 (0.122)	0.041 (0.123)	0.034 (0.126)
Steady work				-0.070 (0.154)	-0.108 (0.154)	-0.160 (0.159)
Social integration				-0.000 (0.001)	-0.001 (0.002)	-0.001 (0.002)
Highest degree exp				0.112*** (0.033)	0.090** (0.034)	0.109*** (0.035)
<i>Socio-academic factors</i>						
GPA					0.005*** (0.001)	0.005*** (0.001)
Academic integration					0.002* (0.001)	0.002 (0.001)
Took remedial					-0.103 (0.096)	-0.083 (0.097)
<i>Institutional factors</i>						
Enrollment						-0.000

size						(9.38e-06)
Percent minority						-0.008 (0.004)
Percent federal aid						0.000 (0.004)
Percent White faculty						-1.150 (0.655)
Urbanicity						-0.007 (0.142)
Intercept	1.240*** (0.083)	2.953*** (0.748)	1.781* (0.777)	1.387 (0.809)	0.932 (0.834)	2.201* (1.108)

*Means are reported with standard errors in parentheses. P-values are based on estimations with robust standard errors. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$. NOTE: Stata does not automatically compute R-squared in multilevel models.

The coefficients in Table 5.7 are log odds. The log odds is ascertained by using the formula $\log(p/(1-p))$, where p equals the overall probability of persisting ($\text{persist}=1$). Therefore, in Model 1, the intercept (constant) indicates the estimated log odds of persisting for the whole population of interest, which is 1.240 and is statistically significant ($p \leq .001$). The ICC (intra class correlation) in Model 1 is 0.150, indicating that 15% of the variance in persistence is explained by community colleges (institutional) attributes. In other words, I estimate that institution random effects compose 15% of the total residual variance (Wu, Crespi, & Wong, 2012).

Pre-entry characteristics

As Model 2 indicates, after controlling for covariates, there was no difference in persistence between Black or Latinx students and White students (the reference group).

However, there were significant associations between SES (income and parent's education) and persistence after controlling for covariates. For each unit increase in income and parent's education, the log odds increased by 0.032 ($p \leq .05$)

and 0.085 ($p \leq .001$), respectively. Conversely, age was negatively associated with persistence: for each unit increase in age, the log odds for persisting decreased by 0.147 ($p \leq .001$). Finally, there was a statistically significant association between being a woman and college persistence. The log odds of persisting was 0.185 higher for women than for men ($p \leq .05$).

In addition to student demographics, most of the factors relating to high school experiences were significantly associated with college persistence. Specifically, high school GPA, taking calculus, and taking pre-calculus were all positively associated with persistence and were statistically significant predictors. For each unit increase in high school GPA, the log odds of persisting increased by 2.51 ($p \leq .001$). For calculus and pre-calculus, the log odds was 0.606 ($p \leq .01$) and 0.432 ($p \leq .001$) higher, respectively, than for taking lower high school math classes. These findings are consistent with hypothesis 4, excluding the pre-entry characteristics of nativity and taking the SAT/ACT.

Environmental factors

There were also statistically significant predictors of persistence concerning environmental factors in Model 3 after controlling for covariates. There was one negative association concerning the relationship between hours worked and persistence: for each unit increase in hours worked, there was a decrease in the log odds of persistence by 0.013 ($p \leq .001$). There were also two statistically significant positive associations: for each unit increase in both taking a semester off and being enrolled full-time, there was an increase in the log odds of persistence by 1.189 ($p \leq$

.001) and 0.336 ($p \leq .01$), respectively. These findings are consistent with hypothesis 4, excluding total financial aid borrowed.

Psychosocial factors

After controlling for covariates in Model 4, none of the factors about the importance of goals (being a community leader, being financially well off, influencing the political structure, or having steady work) was significantly associated with persistence, nor was the social integration index. There was, however, one factor that was statistically significant and positively associated with persistence: for each unit increase in highest degree expectations, there was a 0.112 ($p \leq .001$) increase in the log odds of persistence. These findings did not confirm hypothesis, with the exception of highest degree expected.

Socio-academic factors

After controlling for covariates in Model 5, taking a developmental course had no significant association with student persistence. However, college GPA and academic integration both were statistically significant and positively associated with college persistence: for each unit change in GPA and academic integration, the log odds of persistence increased by 0.005 ($p \leq .001$) and 0.002 ($p \leq .05$), respectively. These findings are consistent with hypothesis 4, excluding developmental education.

Institutional factors

After controlling for covariates in Model 6, there were no statistically significant associations between institutional factors (enrollment size, percent minority enrolled, percent receiving federal aid, percent of White faculty, and

urbanicity of the college) and student persistence. However, concerning the relationship between socio-academic factors and persistence, only GPA remained as a statistically significant predictor of persistence; the relationship between academic integration and persistence was explained by controlling for institutional factors. These findings were inconsistent with hypothesis 4.

Conclusion

Results from the descriptive statistics and from the HLM logistic regression point to important factors that vary depending on race/ethnicity. From the descriptive analyses, there were racial/ethnic differences among the factors that have been found to influence persistence in college. Most notably, White students came from higher SES families than Black students and Latinx students. Black students also worked fewer hours per week, borrowed more in student loans, and were more likely to take a semester off than White students and Latinx students. Conversely, Black and Latinx students had higher amounts of psychosocial factors than their White peers. Black students also were more academically integrated than White students and Latinx students, but they had lower college GPAs; Black and Latinx students were more likely to take a remedial course than White students, as well. Concerning institutional contexts, Black and Latinx students attended bigger schools and school with more minorities, more students receiving federal aid, more urban schools, and schools with more minority faculty than did their White peers.

Results from the logistic regression indicate some important statistically significant persistence factors. While there were no differences by race/ethnicity as I had hypothesized, there were many pre-entry characteristics that were associated with

college persistence, namely income, parent's education, age, gender, high school GPA, high school calculus, and high school pre-calculus. Similarly, there were many environmental factors that were significantly associated with persistence, specifically hours worked, taking a semester off, and enrolling full-time. Conversely, highest degree expected was the only psychosocial factor associated with persistence, contrary to my hypothesis. Concerning socio-academic factors, college GPA and academic integration were both significantly associated with persistence. However, there were no institutional factors associated with it, which was the opposite of my hypothesis. These analyses identified many factors that can help explain the reasons why community college students persist in college. In the following chapter, I return to the theory to shed light on these findings, as well as introduce another theory to help explain findings from my supplementary analysis on gender in Appendix B.

Chapter 6: Discussion

Introduction

The purpose of this dissertation was to use quantitative analysis of national-level secondary data to examine racial/ethnic differences of known persistence factors and to examine the extent to which off- and on-campus factors influenced community college student persistence. Specifically, this study made use of longitudinal data representing the community college student population from fall 2003 through spring 2009, representing more than 4,000 students and 800 institutions, and modeling that included numerous statistical controls. Sophisticated modeling during the analysis of this large merged dataset included more than 25 covariates. I used Logistic regression to address the main research questions. Of note, regression approaches identify associations between key variables of interests after controlling for covariates. No causal relations could be inferred utilizing this methodology. Findings suggest that the conceptual model I proposed, based on a combination of theories from Bean and Metzner (1985), and Crisp and Nunez (2014), requires a further theoretical revision, discussed below. Findings from the supplementary analysis also suggest that women and men experience college persistence in similar and different ways (see Table 6.1), which raises new topics and questions that can be explored in future research.

Summary of Findings

The primary objective of this research was to examine racial/ethnic differences of college experiences and contexts as well as identify which factors were associated with college persistence for the entire community college student sample.

Based on my hypotheses for Research Questions 1-3, there are some key results. First, while White students did come from higher SES families than their Black and Latinx peers, there were no differences between White and Black students in taking the SAT/ACT, and there were no differences between White and Latinx students on high school GPA. Second, while White students took fewer semesters off, they did not differ from Latinx students in hours worked per week, nor total financial aid received. White students and Black students also enrolled full-time at the same rate. Third, as hypothesized, Black and Latinx students did have higher levels of self-efficacy and goal commitment than did their White peers. Fourth, while White students had higher college GPAs and enrolled less in developmental education, Black students were significantly more academically integrated than their White and Latinx peers. Finally, White students did attend school that were less diverse: smaller schools, lower percentage of minority students and students receiving federal aid, higher percentage of White faculty, and less urban. Overall, I expected the differences that I found, but I did not expect the variation among subgroups; therefore, only my hypotheses on psychosocial factors and institutional factors were entirely accurate.

My hypothesis for Research Question 4 – that all factors would be significantly associated with student persistence – was also only partly accurate. For pre-entry characteristics, family SES and high school experiences were associated with persistence as predicted, but there were no differences by race/ethnicity nor gender by the final Model. Environmental factors did predict persistence well, excluding total financial aid received. Concerning psychosocial factors, only degree goal commitment was associated with persistence; none of the self-efficacy measures

predicted persistence. Similarly, only college GPA predicted persistence for the socio-academic factors. Last, none of the institutional factors were associated with persistence. In sum, my hypothesis was mostly accurate for pre-entry characteristics and environmental factors, less accurate for psychosocial and socio-academic factors, and completely inaccurate for institutional factors.

As mentioned in Chapter 4, an interesting gender pattern emerged in conducting my regression analyses (Appendices A & B), which led me to revise Research Question 4a. My hypothesis that women and men would experience different relationships in on- and off-campus factors and persistence was partly accurate. A high-level presentation of the results from this analysis follows in Table 6.1, which indicates which theoretical constructs were similar, different, or both similar and different (see Table B in Appendix B) for women and men at community colleges. This also pointed me to consider how another theory, Intersectionality Theory, could help explain these findings – a question to which I return in a following section, “Phase 2 Results and Intersectionality”.

Table 6.1

Regression Results by Gender on Persistence

	Similar	Different	Both
Race/ethnicity		X	
Pre-entry Characteristics			X
Environmental Factors			X
Psychosocial Factors	X		
Socio-academic Factors	X		
Institutional Factors		X	

To interpret the findings from both Phase 1 and Phase 2 of my regression analyses, I returned to the theory on college persistence presented in Chapter 3, specifically the conceptual model I proposed. In doing so, it is possible to examine how well the model fits with the results, and which results are more challenging to explain with the model. Subsequently, to interpret gender results that are different, I interpret dimensions of persistence factors that varied by gender through the lens of intersectionality. I then end the chapter with the limitations of my study, directions for future research, and a discussion on how the persistence factors in my study could be leveraged in practice to increase community college student persistence.

Phase 1 Results and College Persistence Theories

The conceptual model I proposed in Chapter 3 serves well as a lens through which to interpret the findings from my study. It is important to note that the model I proposed was based on student-level factors, and since no institutional factors were found to be associated with persistence, the student-level-only model is appropriate to discuss these findings. While many factors in the model – a combination of Bean and Metzner’s model (1985) and Crisp and Nunez’s model (2014) – were associated with persistence, there remains a need to further revise my conceptual model in light of findings that emerged from the analysis. I first discuss how well the two theories I combined can aid in interpreting findings, and then propose the revision of my conceptual model.

The first theory to interpret my findings is Bean and Metzner’s (1985) Model of Nontraditional Undergraduate Student Attrition. First, the pre-entry characteristics

of high school performance and student age proposed by Bean and Metzner to influence persistence were in line with my findings; however, race/ethnicity and gender were not. Second, Bean and Metzner prioritize academic variables over social ones in influencing dropout, and perhaps due to similarities in their student samples and my community college student sample – which could be labeled ‘nontraditional’ as well – my findings of college GPA and goal commitment via highest degree expected being positively associated with persistence would be expected. Further, three environmental factors in my analysis were significant predictors of persistence: hours worked per week, taking a semester off, and enrolling full-time. The first factor would be expected from Bean and Metzner’s model since they identify this factor specifically. However, interpreting taking a semester off is less straightforward. Because this factor was positively associated with student persistence, perhaps it related to students’ off-campus environments. For example, Bean and Metzner also identify finances and family responsibilities as predictors of persistence. It could be that taking a semester off allowed students to resolve financial and/or familial matters, and once they returned to college, they were better equipped to succeed in their studies. Last, Bean and Metzner do include enrollment status in their model, but they define it as a pre-entry characteristic; nonetheless, this factor was associated with persistence, so this finding would be expected. Overall, their model aids well in interpreting the findings from my study.

The other theory from my conceptual model that aids in interpreting my findings is Crisp and Nunez’s (2014) Conceptual Model of Vertical Transfer. Similar to Bean and Metzner, the socio-demographic factors that fall under the construct of

pre-entry characteristics, specifically gender and being born in the U.S., do not match my findings. However, the association between precollege factors (high school GPA, high school math) would be expected. This model also fits well concerning socio-academic factors, such as highest degree expected and college GPA. Similarly, this model fits well with environmental factors, although with the same caveat concerning taking a semester off: it is not possible to know the exact mechanisms by which this positively influenced student persistence. Taken together to form my own conceptual model, the constructs from Bean and Metzner and from Crisp and Nunez serve well to interpret the majority of my findings; however, the major disconnect centers around students' family backgrounds, specifically family SES. Therefore, it is necessary to return to another theory presented in Chapter 3 – Tinto's model – to best interpret the findings from my study.

As mentioned in Chapter 4, Tinto's model (presented in Chapter 3) has been criticized for not being applicable to racial/ethnic minorities and to a lesser extent to community college students in general (Crisp & Nunez, 2014).⁶⁴ However, Tinto's Theory of Student Departure (1975) adds depth to interpreting my findings that my original conceptual model could not do. While the majority of factors in Tinto's model were not associated with persistence in my analysis, the academic factor of students' college GPA and the goal of highest degree expected were significant predictors of student persistence. Most importantly – and a major drawback of my previous conceptual model in light of my findings – the other category of factors that influenced student persistence is students' backgrounds. For instance, parent education, family income, and student age fall into Tinto's categories of 'family

⁶⁴ Tinto's original sample consisted of White men at four-year schools.

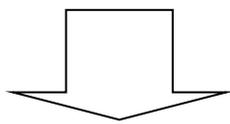
background, individual attributes,’ and therefore would be expected to influence college persistence, as they did in my study.

The theories from Bean and Metzner and from Crisp and Nunez used to frame my research do in fact shed light on my findings. However, there are two important revisions to how well these theories aid in interpreting my findings. First, the factor related to highest degree expected is explicit in Crisp and Nunez’s model, whereas in Bean and Metzner’s it would fall into the construct of goal commitment. Since this was the only significant psychosocial factor, these constructs should be combined. Second and most important, Tinto’s model adds an extremely important dimension of educational attainment in the U.S.: family SES. Instead of combining two theories, my conceptual model would be enhanced by combining all three, which I present in Figure 7 and which best connects to the findings from my community college student sample.

Figure 7: Revised Conceptual Model of Community College Student Persistence⁶⁵

<u>Pre-entry characteristics</u>		<u>Environmental Pull Factors</u>	<u>Degree Expectations</u>	<u>Academic Factors</u>
<u>Socio-Demographic Variables</u> <i>Age</i> Family income Parent’s education	<u>Precollege Factors</u> <i>High school GPA</i> Highest math taken	<i>Hours worked</i> Enrollment status (including stopouts)	Highest degree expected	<i>First year GPA</i>

⁶⁵ Plain text factors stem from Crisp and Nunez (2014), italics text stems from Bean and Metzner (1985), and bold text stems from Tinto (1975).



Community College Student Persistence

In the following section, I turn to the second phase of my analysis and the differences in findings between men and women, and I introduce whether Intersectionality Theory can aid in interpreting these differences.

Phase 2 Results and Intersectionality

While women and men in community college shared some similarities in factors associated with their persistence as evidenced by my Phase 1 analysis, differences emerged relating specifically to factors conceptualized as race/ethnicity, institutional, some pre-entry, and some environmental. The college persistence theories discussed above aid well in interpreting the similarities, but aside from Crisp and Nunez's model, they do not provide a way to interpret the gender differences and intersections of gender and race. Therefore, I propose that Intersectionality Theory is needed to help interpret the unexpected gender/race dynamics found in explaining college persistence.

Intersectionality Theory was introduced in the late 1980s and was focused on the “vexed dynamics” of difference and sameness (Cho, Crenshaw, & McCall, 2013, p. 787). More specifically, “Systems of power (such as race, gender, class, sexuality, ability, age, country of origin, citizenship status, etc.) cannot be understood in isolation from one another; instead, systems of power intersect and co-produce one another to result in unequal material realities, the distinctive social experiences that

characterize them, and intersecting belief systems that construct and legitimate these social arrangements” (Collins, 2012, p. 455). The power relations of racism and sexism are interrelated (Collins, 2015, p. 14); the meanings and effects of race occur only through gender and vice versa (Morris & Perry, 2017, p. 128). From a theoretical perspective, using an intersectionality framework to understand the findings of my research is warranted because it was primarily through the intersection of race/ethnicity and gender that differences among students emerged.

Based on the persistence rates by race/ethnicity presented in Chapter 2, we would expect Black students and Latinx students to persist at lower rates than White students. However, by using the lens of intersectionality to examine subsamples for women and men with HLM logistic regression, it was shown that inequalities in persistence did not follow the same pattern (McCall, 2005, p. 1785). Indeed, in the base models with no controls, Black women did not persist differently than White women, and Latinx men did not persist differently from White men. However, Latinx women and Black men did persist at lower rates than White women and White men, respectively. The major difference between the gendered subsamples – and major finding of the Phase 2 analysis – is that after adding control variables to the regression equations, the initially observed racial/ethnic differences in persistence among women disappeared. In contrast, the finding of Black men persisting at lower rates than White men remained throughout all models until finally institutional-level controls were added. This discrepancy at the intersection of race/ethnicity and gender frames the remainder of this section.

One potential explanation for the lack of a Latinx and White persistence gap concerns psychosocial factors; Latinx students showed higher ratings of the importance of being a community leader, of being financially well off, of influencing the political structure, and of their highest degree expectations (Chapter 5: Table 5.3) than White students. Further, in terms of institutional-level factors, Latinx students attended colleges that were more urban, had both higher percentages of minorities and of students receiving federal aid, and were much larger institutions (Chapter 5: Table 5.5). These differences could present opportunities for Latinx students to achieve a higher sense of belonging to counteract feelings of isolation and alienation (Aleman, 2018, p. 186). Similarly, the lack of a Black-White difference in persistence among women could be explained by peer bonding. Although there were no significant differences between Black students and White students on the social integration index (Chapter 5: Table 5.3), Black students were more academically integrated than White students, and one variable in the academic integration index was student study groups. This supports research by Croom, Beatty, Acker, and Butler (2017), who found that undergraduate Black women were motivated to engage in "sister circle" organizations because they were interested in observing how they co-existed in community, finding role models to provide guidance, and finding a space to discuss and be more of themselves.

The observed differences between Black and White men would be expected. However, the question remains, why did Black men persist at lower rates than White men when the other racial/ethnic subgroups showed no such gender difference? To answer this question, I returned to the theory of Stereotype Threat. As mentioned in

Chapter 3, Stereotype Threat Theory explains that psychosocial factors, particularly self-efficacy and performance expectations, experienced by racial/ethnic minority students are due to the awareness that one's behavior might be viewed through the lens of racial stereotypes (Steele & Aronson, 1995). Concerning Black men specifically, Campbell (2007) found that test anxiety, which influences GPA⁶⁶, impacted Black men more than White men, which could support Stereotype Threat Theory.

Another surprising finding is the significance or lack thereof, of income for persistence. Given that low-income students persist at lower rates than their higher-income peers (see Chapters 2 and 3), we would expect an association between income and persistence. While measurements of social class traditionally include both parents' education⁶⁷ and income, income was only a significant predictor of college persistence in the subsample of women, but not for the subsample of men. One potential explanation for this finding is that if the construct of social class were estimated using a combined variable of parent's education and income, such as a socioeconomic variable, the results may have been different, as parent's education for men was significant in Models 2 and 3, and nearly significant in the final models. Another possible explanation is that the difference in subsample sizes could have influenced the results; there were 700 more women than men⁶⁸. Relatedly, perhaps the relationship between class as measured by income and persistence is in flux; as McCall (2005) notes, "there are relationships among already constituted groups, as

⁶⁶ College GPA was a significant predictor of persistence for the men's subsample.

⁶⁷ Parent's education was significant for both the women's and men's subsamples.

⁶⁸ As discussed in Chapter 5, the women's subsample was 2,537 and the men's subsample was 1,837; there was also a significantly higher number of Black women than White women.

imperfect and ever changing as they are”, and “perhaps inequalities were once large but now they are small, or in one place they are large but in another they are small” (p. 1785). While the literature presented in Chapters 2 and 3 suggest that social class and persistence are associated for all groups, here it was only prevalent for women’s persistence rates. Intersectionality can shed some light on this finding. It is clear the intersection between race/ethnicity and class created a different context in which men persisted as compared to women in that men’s family backgrounds did not influence their persistence. Indeed, another difference between women’s and men’s persistence – financial aid being significant for women but not men – could relate to the interaction between race/ethnicity and class.

There were also unexpected findings related to pre-entry factors, environmental factors, and institutional factors between the two genders. Men’s, but not women’s, persistence was positively associated with high school math and with full-time enrollment, and negatively associated with enrollment size and the percent of White faculty. For the unexpected finding concerning math, perhaps women felt that they were discriminated against in how well they felt they were supposed to achieve in math (Moss-Racusin et al. 2012). Similarly, why men were more sensitive to institutional climates than women is unclear. As mentioned above, we would expect institutional factors to affect persistence as per Crisp and Nunez’s model, but women interpreted their institutional environment differently than men. Concerning full-time enrollment, it is difficult to speculate why this would positively affect men but not women. Perhaps due to the lack of an association between income and men’s persistence, men were less sensitive to their off-campus environments but more

sensitive to their on-campus ones. The coefficients for men's persistence on factors such as college GPA and highest degree expected were higher for men than women, for example. Another explanation is that men were more sensitive to interactions with college personnel, and that being enrolled full-time strengthened these relationships. Concerning institutional factors, enrollment size could have been a more practical explanation, i.e. worse faculty-student and/or advisor-student ratios at larger institutions. Indeed, studies have shown that institutional agents – faculty and advisors – can have an impact on college success (see for example Bahr, 2008; LaVant, Anderson, & Tiggs, 1997; Melguizo, 2007). However, it is unclear why the percent of White faculty negatively influenced men's persistence, particularly as there were more White men in my sample than Black students or Latinx students and thus it would be expected that White faculty would be a positive persistence factor for White men. The intersection of gender and the race/ethnicity of those in power, faculty in this case, can shed light on the fact that men and women reacted in different ways to racial/ethnic difference or sameness between them and their instructors.

Overall, this research produced some surprising results from my research, but ones that can be understood through the lens of intersectionality. After using HLM logistic regression – and therefore controlling for institutional-level factors of 'sameness' – and separating my student subsamples by gender and race/ethnicity, it is clear that subgroups of students did not follow the same pattern in terms of college persistence. Most encouraging of these findings is that aside from a Black-White persistence gap for men, no other differences in persistence among racial/ethnic and gender subgroups were found. In the following section, I discuss the limitations and

future directions of this research, before examining malleable factors that could be leveraged in educational policies and practices to help ensure the highest number of community college students persist in their education.

Limitations of this Study and Future Research

The questions in this research emerged from my experience teaching developmental courses in community colleges for over 10 years. Because the students with whom I worked were labeled ‘pre-credit’, I was most interested in investigating a similar student group at the national level. However, there was a major limitation in the BPS data which inhibited my ability to do so. Specifically, the BPS excluded all students who were not enrolled in a majority of credit courses. Because my own experience at community colleges was in pre-credit programs, it was impossible to investigate student persistence for those who were not academically prepared enough to enroll in credit courses in the fall of 2003. In addition, while I found no significant effect of developmental course status – as well as no significant interaction effects from race/ethnicity and developmental status⁶⁹ – it might appear that there were no differences. However, given the fact that over half of community college students require remediation, the BPS left out a large percentage of community college students who were enrolled in college but not in credit courses. Future researchers interested in the effects of developmental status on persistence should obtain a dataset that includes all community college students, not just those enrolled in a majority of credit courses. Doing so would enable researchers to examine the relationship

⁶⁹ Excluding Model 2 in Appendix A, where a significant interaction effect was present; however, it was not significant through subsequent models.

between beginning college in a majority non-credit academic program and student persistence.

The second limitation centers around the variables absent from the BPS as well as the statistical analysis I chose for predicting student persistence. First, as mentioned in Chapter 1, there was no country of origin variable in the BPS, so it was not possible to disentangle the Asian variable by the different subgroups of Southeast, South, and East Asians. Second, there were limited instructional variables in the BPS data. While the academic and social integration scales were present, it would have been important to include additional academic and social factors to better investigate student persistence. Also, the coefficients I reported were adjusted, so I did not investigate unadjusted associations between these factors and persistence. Last, HLM logistic regression provides associations, but not causality. To achieve the latter, a different method would be required, such as those in the field of Econometrics, to ascertain a causal link between factors and persistence.

The third limitation is inherent to quantitative studies that exclude qualitative data collection and analysis. The advantage of using nationally representative data is that there is an opportunity to establish external validity: using a sample that represents the nation of college students can lead to claims about how to improve their persistence across the country. However, the disadvantage of only using national data is that internal validity is limited. Without investigating the lived experiences of community college students via qualitative research methods, it is difficult to ascertain whether or not estimations can be interpreted as having causal connections or whether unknown extraneous factors are causing these relationships. However, to

gain a comprehensive picture of student persistence, mixed-methods research is superior to either quantitative or qualitative research. While it is possible to ascertain relationships between student experiences and student persistence quantitatively, to understand the mechanisms by which this occurs requires a qualitative component. Fortunately, future researchers can follow the examples of large-scale qualitative studies, such as Diel-Amen's (2011) study of 238 semi-structured interviews of faculty and students at 14 two-year colleges. A study like this, combined with data from the BPS and IPEDS, could provide a more comprehensive understanding of community college student persistence than I was able to achieve in my study.

Future research can also expand additional findings from my study. First, as mentioned, there was a negative significant interaction effect for Latinx and developmental education compared to White students in these courses. In other words, Latinx students did not benefit in the same way as White students from developmental education. Although environmental factors explained the significance level of this interaction, future research can explore this initial divergent pattern of association. Second, future research can explore additional institutional factors as they relate to persistence. While only men experienced a relationship between enrollment size and persistence as discussed in Appendix B, the mechanisms by which this occurred is unclear. In addition, future research can investigate other structural factors that were not present in my study but have been found in the literature to influence persistence, such as student-to-faculty ratio.

Finally, future research should consider conducting a cross-cohort analysis of the 2004-09 BPS and the 2014-17 BPS data. At the beginning of my dissertation, the

newer BPS data waves were not yet released, so I used the older dataset. Now that both these datasets have been released in full, it is possible to compare the two cohorts. This is an exciting opportunity for researchers in that it is possible to measure similarities and differences in factors associated with student persistence over the last 15 years. It would be interesting to know whether the factors I found to influence persistence remain the same and what different factors may contribute to student success today that did not in the past. It would also be interesting to further explore potential relationships between on- and off-campus factors and persistence that may vary by gender between the two cohorts. Overall, by collecting data on pre-credit students, using mixed-methods, and conducting a cross-cohort analysis of the two BPS datasets, researchers moving forward have an opportunity to understand community college student persistence like never before.

Recommendations for Educational Practice

I began this dissertation by discussing the role of one's *innate ability* versus one's *circumstance of birth or position*. While there have been great strides in college access to all socio-demographic groups due to the creation of community colleges and their open-admissions policy, there remains major gaps in student success. Indeed, if the objective in educational policy and practice is to create greater equity among student groups – where students exit community colleges at the same rates and therefore are beginning from the same point in pursuing additional college degrees and/or entering the labor force, then treating all students the same may not be the best mechanism to achieve this. Based on my research, community college student subgroups do not experience college in the same ways, and thus it is important to

meet them where they are, even at the risk of less equality in the policies and practices determined to help them succeed.

It is also important in suggesting recommendations for practice to focus on malleable factors, as other factors, such as income and parent’s education, are much more difficult to ascertain a level of equity among students. Malleable factors, particularly those over which parents and educational institutions have direct control, can be implemented in a shorter timeframe and hopefully with more immediate results, with the caveat again that women and men experience college both similarly and differently and therefore the recommendations for each subgroups should be tailored to factors that help each persist in community college. Table 6.2 presents these malleable factors.

Table 6.2

Malleable Persistence Factors for Educational Practice

	Women	Men	Full Sample
Pre-entry Characteristics			
Age			X
High school GPA	X		X
High school math		X	X
Environmental Factors			
Hours worked			X
Taking a semester off			X
Full-time enrollment		X	X
Psychosocial Factors			
Highest degree expected			X
Socio-academic Factors			
College GPA			X
Institutional Factors			

Enrollment size		X	
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Pre-entry Characteristics

There is one recommendation that applies to all students, and one that applies to each subgroup, respectively. One factor that is fixed but that can be leveraged is student age. For both genders, the older the student was, the lower the student's persistence rate. Therefore, high school students who foresee community colleges as their first destination in higher education should begin college coursework as soon after they graduate high school as possible. Both parents and high school counselors can encourage more immediate college enrollment.

The second recommendation should be viewed carefully through the lens of equality versus equity, the former of which is treating everyone the same and the latter of which is providing the same opportunity for success to everyone. High school GPA predicted college persistence for women, and taking calculus or pre-calculus predicted persistence for men. Therefore, should women be encouraged to raise their GPA and men encouraged to take higher level math courses? From the standpoint of college persistence, the answer would be 'yes'. However, it is important to consider that there are other outcomes beyond college persistence that improve one's life chances. For example, careers in STEM fields can be lucrative, and historically women have been underrepresented in STEM fields. This may be due to bias and discrimination (Moss-Racusin et al. 2012), so encouraging men and not women to take higher level high school math courses will perpetuate this phenomenon. To move toward more equal and equitable outcomes, all genders should

be encouraged to focus on both GPA and math⁷⁰, to persist at higher rates in community colleges and for whatever path students choose after community college.

Environmental Factors

There are recommendations for students of each gender. The more hours students worked, the less likely they were to persist, disregarding gender. As discussed in Chapter 2, higher education budgets from state allocations have been dwindling over time. All students could benefit from receiving more money so that they can work fewer hours. Or even better, tuition at community colleges could be free, as some have argued, so that students could focus entirely on their studies.

Another recommendation concerns an interesting finding: taking a semester off led to more persistence, not less as would be expected. Students probably used the time off to secure more finances to fund their educations. In any case, college counselors can help students learn to balance their work and studies, including a strategic recommendation to take time off if it would help students be more successful in the long-term. Last, being enrolled full-time predicted persistence for men but not women. College counselors could encourage men to enroll full-time when they are enrolled. And if women are enrolling part-time (see, for example, Ceci & Williams, 2011), college counselors can consult with them to help them balance other responsibilities and their studies.

⁷⁰ While my study included calculus and pre-calculus as the highest math taken as per the BPS data, taking other higher math courses such as statistics should be encouraged.

Psychosocial Factors

One factor positively influenced the persistence of students: highest degree expected. This factor is extremely malleable if parents and college personnel encourage students to continue their educations beyond community colleges. As mentioned in Chapter 2, community colleges are much more affordable than four-year schools, so students can save money to help finance subsequent steps in their educations. Further, when they complete community colleges with a degree before transferring, they can enroll in four-year institutions with the maximum of transferable credits, thereby reducing their time to a bachelor's degree. Community colleges can encourage students from an economic standpoint, as well; as discussed in Chapter 2, there is a positive correlation between highest education received and lifetime earnings, so perhaps this fact would help students aim higher, thereby increasing their odds of persisting in college.

Socio-academic Factors

There was also one factor that positively influenced the persistence of students, specifically college GPA. Again, college personnel can stress the importance of maintaining a strong GPA. Recommending academic support services, such as writing centers and tutors, could help achieve this. Also, encouraging students to visit professors during office hours could also ensure they are best positioned to improve their GPAs and are clear on exactly how to accomplish this. Interestingly, if students are struggling with balancing their lives at home, work, and school, perhaps it would be a good recommendation to take a semester off until they have a strategic plan concerning how to keep their GPAs up.

Institutional Factors

This last set of recommendations is more complex than the previous more malleable factors. While there were no significant institutional predictors for women and their persistence, there was one for men; larger schools negatively impacted men's persistence. While suggesting students attend smaller colleges would be the clear recommendation for this finding, this is most likely not practical. If students live in urban areas, they will attend community colleges closest to them⁷¹ and these colleges will most likely be larger. Nonetheless, college counselors can work with students individually to investigate how being enrolled at larger colleges may negatively influence student experiences, and help students strategize how to mitigate these effects.

Conclusion

This research contributes to the current body of knowledge related to community college student persistence. Particularly the study provides a starting point for future research utilizing the next wave of BPS data released by NCES and equally complex statistical analysis. Combined with the IPEDs data and analyzed by accounting for the nested structure of the data, this research presents an opportunity to revise previous student persistence theories by combining three prominent ones. The revised conceptual model presented in this chapter can be applied to a cross-cohort analysis of the two most recent BPS datasets in future research.

⁷¹ And as mentioned in Chapter 2, local community colleges are more affordable for students as compared to attending community colleges outside of the counties in which students live.

By analyzing two different subsamples in the supplementary analysis, this research also affirms that persistence associated factors do vary by both race/ethnicity and gender. Concurrently, the main finding that there was only a White-Black men's persistence gap after controlling for covariates is encouraging in the quest for more educational equity. But it is still not enough to have captured the reasons for all racial/ethnic and gender differences except for one. Future research should explore the experience of Black men at community colleges more thoroughly. This is particularly relevant because the White-Black persistence gap was only resolved after controlling for institutional factors, but these factors are much less malleable based on the practicality of students' lives. Therefore, leveraging other factors that contribute to men's community college student success, especially for Black men, could create more educational equity for this group of college students. In the words of James Baldwin, "Not everything that is faced can be changed. But nothing can be changed until it is faced." It is with this in mind that it is my hope that future higher education research on community college persistence focuses on disparities by race/ethnicity and gender, and becomes resolved to change them.

Appendices

Appendix A: Exploratory Analysis of Interaction Effects and the Role of Gender

I discuss in this section two specific steps I took to explore the relationship among variables, which stemmed from both the front end of my dissertation and from a finding when running preliminary models. Specifically, I discuss tests for interaction effects, and a finding concerning gender in my specific student sample.

Tests for interaction effects

I wanted to pre-test potential interaction effects, particularly to address one of the main constructs in Chapter 3 of the relationship between developmental education, race, and persistence. Therefore, I ran a base model with persistence as the dependent variable and only including race, developmental courses, and interaction effects between race and developmental courses⁷². The results of this analysis (see Table A, Model 1) highlight that in fact there were some important differences between White students and Latinx students. Specifically, the developmental variable had a significant and positive influence on persistence. However, the Latinx and developmental interaction variable was negative. This indicates that the positive influence of developmental education was less pronounced for Latinx students than for White students (the reference group); in other words, Latinx students did not benefit in the same way as White students. Next, I ran Model 2, which consisted of controlling for pre-entry characteristics. The interaction effect for Latinx students and

⁷² I also ran interaction tests for female*developmental and for race*female, but there were no significant coefficients in the base models. However, research has found race*gender interactions on college persistence, which I discuss at the end of Appendix A.

developmental education course taken remained. In Model 3, however, after controlling for off-campus factors, there was no longer a difference on the Latinx/developmental interaction effect. This is an important finding as it was not on-campus factors but environmental ones that accounted for this difference. The interaction effect is in and of itself an important finding, but I conducted this analysis due to the order of theoretical constructs in the regression models. Specifically, in following Crisp and Nunez (2014) and Crisp and Nora (2010), I added socio-academic factors later in my regression analyses, and by this point – due to the addition of pre-entry characteristics and off-campus factors – there is no statistically significant interaction effect when added in Model 4 for the first time. In other words, adding the interaction effect in the progression of my models would show no difference.

Table A

Interaction Tests on Persistence Using HLM Logistic Regression

Variables	Model 1	Model 3
Black	-0.124 (0.116)	-0.177 (0.173)
Latinx	-0.470*** (0.137)	-0.352 (0.178)
Developmental course	0.542** (0.246)	0.377 (0.328)
Black*Dev	-0.067 (0.182)	-0.108 (0.238)
Latinx*Dev	-0.538** (0.193)	-0.474 (0.249)
Income		4.53e-06** (1.73e-06)
HS GPA		0.292*** (0.071)
Parent's education		0.087*** (0.020)

Calculus		0.664** (0.211)
Pre-calculus		0.375** (0.145)
Took SAT or ACT		0.040 (0.106)
US born		-0.388 (0.218)
Age		-0.131*** (0.036)
Female		0.137 (0.096)
Hours worked per week		-0.013*** (0.003)
Total financial aid		0.000 (0.000)
Took semester off		1.189*** (0.108)
Full-time enrollment		0.350*** (0.107)

*Means are reported with standard errors in parentheses. P-values are based on estimations with robust standard errors. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

The role of the gender variable

The second important finding from my initial analyses concerns gender.

Based on the literature, I was surprised there was no difference in the HLM logistic regression model between White students and Black students, and persistence (Table A). After reviewing my descriptive statistics again, I returned the finding of a significantly higher percentage of Black women compared to White women in my student sample (see Table 5.1). While I did not focus on gender as one of the primary variables of interest in Chapter 3, I nonetheless am familiar with some of the literature on the subject. Specifically, research has found interaction effects between race and gender on college persistence and/or college success measures (see, for example, Walpole, Chambers, & Goss, 2014; Gaskins, 2009; Buchanan & Selmon,

2008). Further, this finding alerted me to the need to first explore this phenomenon statistically.

I ran two separate regression models, one for men and one for women. I did in fact find differences between the two subsamples. When I further explored the subsequent regression models, I noticed other differences between the factors that influence men to persist versus women to persist. Therefore, I examined my theoretical and empirical factors known to relate to student persistence for men and for women separately.

Appendix B: Supplementary Analysis by Gender

Introduction

As discussed in Appendix A, I ran tests for interaction effects, and in the process, I determined that due to a significant difference in Model 2 between men and women (but not by race/ethnicity), I needed to further separate my sample and estimate similar models by separately by gender. In other words, there were no racial/ethnic differences when students entered college, but there was a gender difference upon entry. Therefore, in the remainder of this Appendix, I answered a revised version of Research Question 4a to further explore gender differences to serve as an exploratory analysis to guide future research:

- a. To what extent do the associations among these variables vary as a function of *gender*.

HLM Logistic Regression Results by Gender

The results from the HLM logistic regression (presented in Table B at the end of this Chapter) on persistence for women and men separately highlight some important gender-based differences, in addition to differences by race/ethnicity within each subsample. Further, there were both some similarities and differences among the indicators that influenced women to persist as compared to men. In the following section, I presented findings from the logistic regression models in the following order: 1) women, 2) men, 3) women-men comparison.

Association between Race/Ethnicity, Pre-entry Characteristics, and Persistence for Women

Individual predictors for the constructs of race/ethnicity and pre-entry characteristics were examined: one race/ethnicity predictor and four pre-entry predictors were significant in Models 1 and 2, respectively. Results from the regression indicate that Latinx women were less likely to persist at two-year community colleges as compared to White women ($p \leq .05$). However, Black women did not differ significantly from White women in the base model. For Model 2, I controlled for students' pre-entry characteristics, specifically: income, parent's education, student born in the U.S., age, high school GPA, student took calculus in high school, student took pre-calculus in high school, student took the ACT and/or SAT. Interestingly, the significant difference between Latinx women and White women was explained by including pre-entry characteristics; and in fact, in Model 2, Black women persisted at higher rates than White women ($p \leq .05$).

Results from the regression also indicate some important factors being associated with persistence for women. First, students' socioeconomic status, measured by income and parent's education, was positively associated with persistence at community colleges ($p \leq .001$). Whether or not the student was born in the U.S. was not associated with persistence, but student age was, having a negative influence on persistence the older a student gets ($p \leq .01$). Concerning students' high school experiences, only high school GPA was associated with persistence for the women's subsample. This association was positive, with a higher GPA influencing the odds of persisting in college ($p \leq .001$).

Association between Off-campus Environments and Persistence for Women

Individual predictors for the construct of off-campus environmental factors (Model 3) were examined, specifically: hours worked per week, total financial aid received, taking one or more semesters off, being enrolled full-time. Concerning differences on persistence by race/ethnicity for women, none was present in Model 3, so the combination of pre-entry characteristics and environmental factors explained all differences in persistence rates by race/ethnicity for women.

Results from the regression also indicate the same pattern as in Model 2 for pre-entry characteristics. Concerning the relationship between environmental factors and persistence, there were two important factors related to students' external realities. First, the number of hours students worked negatively influenced their persistence at community colleges ($p \leq .05$). Second, whether or not students took at least one semester off, conversely, was positively associated with their persistence in college ($p \leq .001$).

Association between Psychosocial Factors and Persistence for Women

Individual predictors for the construct of psychosocial factors (Model 4) were examined, specifically: importance of being a community leader, financially well off, influencing the political structure, and having steady work; social integration index, and highest degree expected. Concerning differences on persistence by race/ethnicity for women, similar to Model 3, none was present in Model 4 either.

Results from the regression also indicate the same pattern as in Model 2 for pre-entry characteristics, with income, parent's education, age, and high school GPA all significantly influencing student persistence. Concerning the relationship between

environmental factors and persistence, the same pattern was present in Model 4 as in Model 3, with hours worked per week, total financial aid received, and taking a semester off impacting student persistence. Concerning the addition of psychosocial factors, there was one important factor related to students' psychological and social experiences: highest degree expectation was positively associated with persistence, with students aiming to achieve higher degrees influencing their persistence ($p \leq .05$).

Association between Socio-academic Experiences and Persistence for Women

Individual predictors for the construct of socio-academic experiences (Model 5) were examined, specifically: college GPA, academic integration index, and whether or not the student took a remedial course in his or her first year of college. Concerning differences on persistence by race/ethnicity for women, none was present in Model 5.

Results from the regression also indicate the same pattern for Model 5 as in Model 2 for pre-entry characteristics, with income, parent's education, age, and high school GPA all influencing student persistence. Concerning the relationship between environmental factors and persistence, the same pattern was present in Model 5 as in Model 3, with hours worked, total financial aid received, and taking a semester off all being associated with persistence. Concerning psychosocial factors, in contrast to Model 4, highest degree expectation was no longer associated with persistence in Model 5. Also, being a community leader was no longer associated with persistence after accounting for socio-academic factors. For these latter predictors, academic integration and taking a remedial course were not associated with persistence for

women; however, college GPA was positively associated with persistence, meaning that as GPA increased, so did the odds of women's persistence ($p \leq .001$).

Association between Institutional Environments and Persistence for Women

Individual predictors for the construct of institutional environments (Model 6) were examined, specifically: enrollment size, percent minority enrolled, percent of students receiving federal aid, percent of White faculty, and urbanicity of the college. Concerning differences on persistence by race/ethnicity for women, none was present in Model 6, again due to the combination of pre-entry characteristics and environmental factors explaining all differences in persistence rates by race/ethnicity for women.

Results from the regression also indicate the same pattern in Model 6 as in Model 2 for pre-entry characteristics, with income, parent's education, age, and high school GPA all influencing student persistence. Concerning the relationship between environmental factors and persistence, the same pattern was present in Model 6 as in Model 3, with hours worked, total financial aid received, and taking a semester off all being associated with persistence; however, hours worked was only associated with persistence when expanding the alpha to 90/10 after controlling for institutional environments. Concerning psychosocial factors, highest degree expectation was positively associated with persistence in the same pattern in Model 6 as in Model 4 ($p \leq .05$). The other psychosocial factors were not associated with student persistence in the final Model. Concerning socio-academic factors, the same pattern in Model 6 as in Model 5 emerged, with college GPA positively influencing persistence ($p \leq .001$).

Finally, of the institutional characteristics of colleges, none was present as a significant predictor of student community college persistence for women.

Association between Race/Ethnicity, Pre-entry Characteristics, and Persistence for Men

Individual predictors for the constructs of race/ethnicity and pre-entry characteristics were examined: one race/ethnicity predictor and four pre-entry predictors were significant in Models 1 and 2, respectively. Results from the regression indicate that Black men were less likely to persist at two-year community colleges as compared to White men ($p \leq .05$). However, Latinx men did not differ significantly from White men. For Model 2, I controlled for students' pre-entry characteristics, specifically: income, parent's education, student born in the U.S., age, high school GPA, student took calculus in high school, student took pre-calculus in high school, student took the ACT and/or SAT. The Black-White difference on persistence for men remained ($p \leq .05$) in Model 2.

Results from the regression also indicate some important factors being associated with persistence for men. Interestingly, income was not significant for men, but parent's education was positively associated with persistence ($p \leq .05$). In addition, student age had a negative influence on persistence ($p \leq .05$). Concerning students' high school experiences, high school GPA was not associated with persistence for men. However, both taking calculus in high school ($p \leq .001$) and taking pre-calculus in high school ($p \leq .05$) were positively associated with student persistence.

Association between Off-campus Environments and Persistence for Men

Individual predictors for the construct of off-campus environmental factors (Model 3) were examined, specifically: hours worked per week, total financial aid received, taking one or more semesters off, being enrolled full-time. Concerning differences on persistence by race/ethnicity for men, the same pattern as in the previous models emerged in Model 3, with no Latinx-White difference, but with Black men persisting less than White men ($p \leq .001$).

Results from the regression also indicate the same pattern in Model 3 as in Model 2 for pre-entry characteristics, with one exception: high school GPA in Model 3 was positively associated with persistence for men ($p \leq .05$), whereas in Model 2 it was not significant. Concerning the relationship between environmental factors and persistence, there were some important factors related to students' external realities. First, the number of hours students worked negatively influenced their persistence at community colleges ($p \leq .001$). Second, whether or not the student took at least one semester off, conversely, was positively associated with their persistence in college ($p \leq .001$). Finally, enrolling as a full-time student was also positively associated with persistence ($p \leq .001$).

Association between Psychosocial Factors and Persistence for Men

Individual predictors for the construct of psychosocial factors (Model 4) were examined, specifically: importance of being a community leader, financially well off, influencing the political structure, and having steady work; social integration index, and highest degree expected. Concerning differences on persistence by race/ethnicity for men, the Black-White difference remained ($p \leq .001$), with Black men persisting at lower rates than White men.

Results from the regression also indicate the same pattern in Model 4 as in Model 2 for pre-entry characteristics concerning age, calculus, and pre-calculus all influencing student persistence. However, parent's education and high school GPA were no longer significant, dissimilar to Model 3. Concerning the relationship between environmental factors and persistence, the same pattern was present in Model 4 as in Model 3, with hours worked per week, taking a semester off, and enrolling full-time being associated with men's student persistence. Last, there was one important factor related to students' psychological and social experiences. Specifically, highest degree expectation was positively associated with persistence, with students aiming to achieve higher degrees positively influencing their persistence ($p \leq .01$).

Association between Socio-academic Experiences and Persistence for Men

Individual predictors for the construct of socio-academic factors (Model 5) were examined, specifically: college GPA, academic integration index, and whether or not the student took a remedial course in his or her first year of college. Concerning differences on persistence by race/ethnicity for men, the same Black-White difference remained ($p \leq .05$).

Results from the regression also indicate the same pattern in Model 5 as in Model 4 for pre-entry characteristics, with age and calculus influencing student persistence. However, dissimilar to Model 4, parent's education and pre-calculus were no longer significant. Concerning the relationship between environmental factors and persistence, the same pattern was present in Model 5 as in Model 4, with hours worked, taking a semester off, and being enrolled full-time all being associated

with persistence. Concerning psychosocial factors, highest degree expectation remained positively associated with persistence. Finally, the only significant socio-academic factor was college GPA, which was positively associated with persistence for men; higher college GPAs impacted higher persistence rates ($p \leq .001$).

Association between Institutional Environments and Persistence for Men

Individual predictors for the construct of institutional factors (Model 6) were examined, specifically: enrollment size, percent minority enrolled, percent of students receiving federal aid, percent of White faculty, and urbanicity of the college.

Concerning differences on persistence by race/ethnicity for men, none were present in Model 6, unlike Models 1-5. Therefore, the inclusion of institutional characteristics accounted for the significant difference between Black and White men, and their persistence rates at community colleges.

Results from the regression also indicate the same pattern in Model 6 as in Model 5 for pre-entry characteristics, age and high school GPA influencing student persistence, but with parent's education and pre-calculus no longer being significant factors on persistence. Concerning the relationship between environmental factors and persistence, the same pattern was present in Model 6 as in Model 5, with hours worked, taking a semester off, and being enrolled full-time all being associated with persistence. Concerning psychosocial factors, highest degree expectation was positively associated with persistence in the same pattern as in Model 5 ($p \leq .01$). Concerning socio-academic factors, the same pattern in Model 6 as in Model 5 emerged, with college GPA positively influencing persistence ($p \leq .001$). Finally, of the institutional characteristics of colleges, one was a significant predictor of student

community college persistence for men: enrollment size was negatively associated with persistence, meaning the larger the school, the less likely a student is to persist ($p \leq .05$).

Women-Men Comparison

In the following section, I compared findings from the regression results of women with those from men. Overall, women and men at community colleges experienced both similar and different factors that influenced their persistence.

Race/Ethnicity

In comparing the relationship between race/ethnicity and persistence in Model 1 for women as compared to men, some interesting differences emerged. For women, there was no difference in persistence rates between White and Black women, whereas Black men persisted at lower rates than White men. Conversely, Latinx women persisted less than White women, but there was no difference in persistence between Latinx men and White men.

Pre-entry Characteristics

Concerning the relationship between pre-entry characteristics and persistence, there were some similarities and differences between women and men. After controlling for students' pre-entry characteristics in Model 2, the persistence comparison by race/ethnicity and gender exhibited different patterns. For women, after controlling for students' backgrounds, there was no Latinx-White difference, meaning that background characteristics explained the difference observed in Model 1. Further, Black women in Model 2 persisted at higher rates than White women. In contrast, the pattern for men remained the same in Model 2 as in Model 1; therefore,

students' pre-entry characteristics did not explain the Black-White persistence difference for men.

Concerning the influence of pre-entry characteristics on persistence for the two subsamples, there were some similarities and differences. For both women and men, parent's education had a positive impact on persistence, age had a negative effect, and being U.S. born and taking either the SAT or ACT had no effects on student persistence. Other factors varied by gender. Both family income and high school GPA had a positive impact on persistence for women, but not for men. In contrast, taking pre-calculus or calculus in high school had a positive effect on persistence for men, but not for women. Overall, not only were there different findings by race/ethnicity on persistence for the two subsamples, but aside from a few similarities, the pre-entry factors that led to women persisting were different than the factors that facilitated men to persist in college.

Environmental Factors

Concerning the relationship between environmental factors and persistence, there were some similarities and differences between women and men. After controlling for environmental factors in Model 3, there were again some differences by race/ethnicity on persistence for the two subsamples. For women, no difference by race/ethnicity remained, so students' off-campus environments explained the previous differences for the women's subsample. For men, on the other hand, the Black-White difference remained, with Black men persisting at lower rates than White men.

Concerning the influence of pre-entry characteristics, the same pattern from Model 2 was present in Model 3 with one exception: after controlling for

environmental factors in Model 3, high school GPA had a positive impact on men's persistence.

The association between environmental factors and persistence exhibited some similarities and differences for the two subsamples. For both women and men, working more hours led to lower persistence rates. Similarly, taking a semester off had a positive impact on persistence for both women and men. And for men, there was a positive effect between being enrolled full-time and their persistence.

Psychosocial Factors

Concerning the relationship between psychosocial factors and persistence, there were some similarities and differences between women and men. After controlling for psychosocial factors in Model 4, the same pattern as in Model 3 for women and men, respectively, was present concerning differences on persistence by race/ethnicity. Likewise, the same pattern as in Model 3 for both pre-entry characteristics and environmental factors remained in Model 4.

Concerning the impact of psychosocial factors on persistence between the two subgroups, they were similar. First, being financially well off, influencing the political structure, having steady work, and the social integration index did not impact persistence for either women or men. Second, highest degree expectations for both women and men had a positive effect on students' persistence.

Socio-academic Factors

Concerning the relationship between socio-academic factors and persistence, there were some similarities and differences between women and men. After controlling for socio-academic factors in Model 5, the same pattern as in Model 4 for

women and men, respectively, was present concerning differences on persistence by race/ethnicity. Similarly, the same pattern as in Model 4 for pre-entry characteristics, environmental factors, and psychosocial factors remained in Model 5 with one exception: after controlling for socio-academic factors, being a community leader was no longer significant for women.

Concerning the influence of socio-academic factors on persistence for the two subgroups, there were two similarities and no differences. First, the academic integration index and taking a remedial course had no relationship with persistence for either women or men. Second, college GPA had a positive impact on persistence for both women and men.

Institutional Factors

Concerning the relationship between institutional factors and persistence, there were some similarities and differences between women and men. After controlling for institutional factors in Model 6, a different pattern from Model 5 for men emerged: the Black-White difference on persistence was explained by including institutional factors. Concerning the patterns from Model 5 for pre-entry characteristics, environmental factors, psychosocial factors, and socio-academic factors, all remained in Model 6. Finally, concerning the relationship between institutional factors and students' persistence, there were three similarities for the two subsamples. The percent of minority students enrolled, the percent of students who received federal aid, and the percent of White faculty had no effect on persistence for either women or men.

Table B

HLM Logistic Regression on Persistence Results by Gender

Women's subsample, N=2,537							Men's subsample, N=1,837					
Variables	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6
Race/Ethnicity												
Black	-0.085 (0.129)	0.369* (0.187)	0.153 (0.196)	0.192 (0.197)	0.286 (0.200)	0.337 (0.218)	- 0.279* (0.140)	- 0.387* (0.163)	- 0.590* ** (0.180)	- 0.645* ** (0.188)	- 0.434* (0.200)	-0.363 (0.226)
Latinx	- 0.378* (0.151)	-0.139 (0.191)	-0.214 (0.201)	-0.202 (0.198)	-0.065 (0.204)	0.045 (0.241)	-0.202 (0.164)	-0.190 (0.220)	-0.166 (0.218)	-0.214 (0.221)	-0.109 (0.234)	0.083 (0.277)
Pre-entry Characteristics												
Income		0.086* ** (0.019)	0.103* ** (0.021)	0.099* ** (0.020)	0.010* ** (0.021)	0.103* ** (0.021)		0.001 (0.016)	0.009 (0.019)	0.009 (0.020)	0.013 (0.021)	0.012 (0.022)
Parents Ed		0.106* ** (0.025)	0.107* ** (0.025)	0.102* ** (0.025)	0.098* ** (0.025)	0.093* ** (0.026)		0.061* (0.028)	0.067* (0.030)	0.058 (0.031)	0.055 (0.032)	0.061 (0.033)
US Born		-0.332 (0.295)	-0.378 (0.305)	-0.319 (0.308)	-0.206 (0.304)	-0.311 (0.315)		-0.355 (0.300)	-0.383 (0.329)	-0.317 (0.329)	-0.243 (0.344)	-0.341 (0.372)
Age		- 0.136* * (0.046)	- 0.136* * (0.047)	- 0.133* * (0.048)	- 0.174* ** (0.051)	- 0.172* ** (0.051)		- 0.153* * (0.052)	- 0.114* (0.054)	- 0.114* (0.055)	- 0.146* * (0.054)	- 0.148* * (0.056)
HS GPA		0.281* * (0.095)	0.311* ** (0.097)	0.309* * (0.098)	0.250* (0.099)	0.210* (0.104)		0.163 (0.108)	0.221* (0.111)	0.201+ (0.112)	0.135 (0.115)	0.088 (0.118)
Calculus		0.301 (0.296)	0.358 (0.314)	0.332 (0.310)	0.189 (0.315)	0.239 (0.331)		0.973* ** (0.286)	1.030* ** (0.297)	1.032* ** (0.301)	0.827* * (0.288)	1.047* ** (0.308)
Pre-Calculus		0.316 (0.203)	0.317 (0.217)	0.304 (0.219)	0.273 (0.229)	0.277 (0.232)		0.607* * (0.215)	0.510* (0.234)	0.483* (0.236)	0.413 (0.236)	0.517 (0.243)
Took SAT and/or ACT		0.178 (0.140)	0.239 (0.144)	0.223 (0.145)	0.157 (0.146)	0.119 (0.149)		-0.099 (0.155)	-0.100 (0.162)	-0.130 (0.165)	-0.067 (0.171)	-0.088 (0.181)
Environmental Factors												
Hrs. worked per week			- 0.010* (0.004)	- 0.010* (0.004)	- 0.009* (0.005)	-0.008 (0.005)			- 0.017* ** (0.005)	- 0.017* ** (0.005)	- 0.017* ** (0.005)	- 0.015* * (0.005)
Total fin aid received			0.262 (0.143)	0.267 (0.145)	0.239 (0.145)	0.260 (0.151)			0.120 (0.135)	0.113 (0.139)	0.073 (0.139)	0.027 (0.139)
Took semester off			1.117* ** (0.165)	1.119* ** (0.165)	1.218* ** (0.158)	1.225* ** (0.161)			1.284* ** (0.148)	1.282* ** (0.149)	1.437* ** (0.148)	1.346* ** (0.149)
Full-time			0.042 (0.151)	0.018 (0.153)	0.061 (0.156)	0.015 (0.160)			0.670* ** (0.149)	0.694* ** (0.152)	0.699* ** (0.154)	0.740* ** (0.164)
Psycho-social Factors												
Community leader				-0.248 (0.140)	-0.232 (0.146)	-0.170 (0.151)				-0.007 (0.146)	-0.060 (0.148)	-0.102 (0.155)

Financially well off				-0.109 (0.162)	-0.108 (0.164)	-0.112 (0.168)				0.035 (0.184)	0.058 (0.188)	0.168 (0.191)
Political structure				0.016 (0.151)	-0.001 (0.152)	-0.013 (0.158)				0.114 (0.167)	0.111 (0.171)	0.082 (0.175)
Steady work				0.250 (0.206)	0.221 (0.210)	0.156 (0.214)				-0.323 (0.224)	-0.381 (0.233)	-0.448 (0.248)
Social integration				0.001 (0.002)	0.001 (0.002)	0.001 (0.002)				-0.001 (0.002)	-0.001 (0.002)	-0.002 (0.002)
Highest degree exp				0.101* (0.044)	0.079 (0.043)	0.092* (0.045)				0.136* (0.052)	0.114* (0.052)	0.153* (0.055)
Socio-academic Factors												
GPA					0.004* ** (0.001)	0.004* ** (0.001)					0.005* ** (0.001)	0.005* ** (0.001)
Academic integration					0.002 (0.002)	0.001 (0.002)					0.002 (0.002)	0.003 (0.002)
Took remedial					-0.171 (0.131)	-0.161 (0.133)					-0.103 (0.153)	-0.057 (0.161)
Institutional Factors												
Enrollment size						-3.23e-06 (0.000)						-0.000* * (0.000)
Percent minority						-0.006 (0.005)						-0.008 (0.006)
Percent received federal aid						-0.002 (0.006)						-0.002 (0.005)
Percent White faculty						-0.581 (0.801)						-1.47 (0.839)
Urban						-0.150 (0.188)						0.148 (0.179)

*Means are reported with standard errors in parentheses. P-values are based on estimations with robust standard errors. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Conclusion

After creating additional subsamples based on gender for the HLM logistic regression, many similarities existed between women and men. Most notable were the differences by race/ethnicity among the two subsamples: after controlling for covariates, there were no racial/ethnic differences for women, but there were

differences between White and Black men in all models but the final one, which controlled for institutional factors. Concerning the association between pre-entry characteristics and persistence, the main differences were that income impacted women's persistence, but high school math influenced men's persistence. For environmental factors, being enrolled full-time influenced men's persistence but not women's. Conversely, psychosocial factors and socio-academic factors had a similar relationship with student persistence for both genders. Last, the institutional factor of enrollment size influenced men's but not women's persistence.

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