THE IMPACT OF LATINX FACULTY AND ADMINISTRATORS ON LATINX STUDENT COMPLETION RATES IN CALIFORNIA COMMUNITY COLLEGES

A Thesis

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Elizabeth Delgado

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THE IMPACT OF LATINX FACULTY AND ADMINISTRATORS ON LATINX STUDENT COMPLETION RATES IN CALIFORNIA COMMUNITY COLLEGES

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by

Elizabeth Delgado

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Department of Public Policy and Administration

Abstract

of

THE IMPACT OF LATINX FACULTY AND ADMINISTRATORS ON LATINX STUDENT COMPLETION RATES IN CALIFORNIA COMMUNITY COLLEGES

by

Elizabeth Delgado

The lack of teacher racial/ethnic diversity is a prevalent national public policy issue, also facing California's K-12 schools and public universities. Given low completion rates of Latinx students in California Community Colleges, I studied whether institutions with higher percentages of Latinx faculty and administrators have higher completion rates among different Latinx student groups. This thesis contributes to the limited academic research regarding the institutional characteristics that drive differences in success rates for Latinx students in California community colleges.

I carried out this research by assisting in data collection for a larger research project led by Professor Dr. Wassmer and doctoral student, Meredith Galloway. We collected cohort-level and institutional-level data using publicly available data from the California Community College Chancellor's Office's Student Success Scorecard and Datamart websites. We collected institutional-level and cohort-level data such as completion rates for first-time enrolled, first-year students who declared their goal was to either complete a certificate, associate degree, or transfer (or be transfer ready) to a

college or university. I examined completion rates for five groups Latinx students designated prepared and economically advantaged, Latinx students designated prepared and economically disadvantaged, Latinx students designated unprepared and economically advantaged, Latinx students designated unprepared and economically disadvantaged, and overall cohort completion rates as a base comparison. Completion rates are measured by the percentage in the total entry-year cohort achieving their stated goal within six years. We examined 108 California community colleges from fall 2007 to fall 2011 and analyzed up to 540 observations.

Using panel-data regressions, I found Latinx faculty and administrators had, in most cases, a positive but small impact on Latinx cohort completion rates. Additionally, I found regression results where Latinx faculty and administrators had no effect or a negative impact on Latinx cohort completion rates depending on the different classifications of Latinx students examined. These findings suggest the relationships I studied are complicated. I provide possible explanations to my results and discuss other institutional policy variables that support Latinx student outcomes in California Community Colleges. Finally, I discuss how these findings can contribute to future research studies and education policy discussions.

_____, Committee Chair
Rob Wassmer, Ph.D.

_____
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CHAPTER 1: INTRODUCTION

Since 2013 the United States federal government has aimed to increase accountability and push towards a performance-based funding system in higher education due to low degree attainment (Kurlaender et al., 2016). According to the National Student Clearinghouse, only 58% of students who started college in fall 2012 earned a degree six years later (Nadworny, 2019). In addition, there is a persistent racial equity gap among different student groups in all education segments nationally. Specifically, Latinx, African American, and Native-American students have lower GPAs, test scores, and rates of completion compared to white students in K-12 and postsecondary education segments (Bound et al., 2010). The California Community Colleges system (CCC) also faces low completion rates and disparate outcomes among different student groups. In 2016, 48% of students who enrolled at a California community college left with a degree, certificate, or transferred after six years (Zinshetyn, 2017). Further disaggregation of this data demonstrates that non-completion rates are higher among traditionally underrepresented[1] students. For California community colleges, the overall completion rate is 48%, but for African Americans, it is 37%, American Indians/Alaska Natives it is 35%, and Latinx[2] it is 41% *(2018 Student Success Scorecard*, n.d.). California is also moving towards increasing accountability in higher education. Specifically, California passed in 2018 a statewide Student Center Funding Formula in the CCC system, which gives additional

[1] Traditionally underrepresented refers to students who have been historically underrepresented in postsecondary institutions including low-income, underrepresented racial/ethnic minorities, women, and first-generation students.
[2] Latinx as a gender-inclusive replacement for Latino, Latina, and Latinx, referring to people of Latin American origin.

funding to community colleges that have a large portion of low-income students and to community colleges with better graduation and transfer rates (Burke, 2019). Given both national and statewide political pressure to increase accountability regarding the quality of postsecondary institutions, low college completion rates have economic, political, and social consequences. Using data collected from the California Community College Chancellor's Office websites, Student Success Scorecard, and Datamart, I aim to understand: *what are the institutional characteristics that drive differences in educational attainment rates for Latinx students in California community colleges?* Specifically, I wish to test whether institutions with higher percentages of Latinx full-time or part-time faculty and Latinx administrators have higher completion rates among different Latinx student cohort groups.

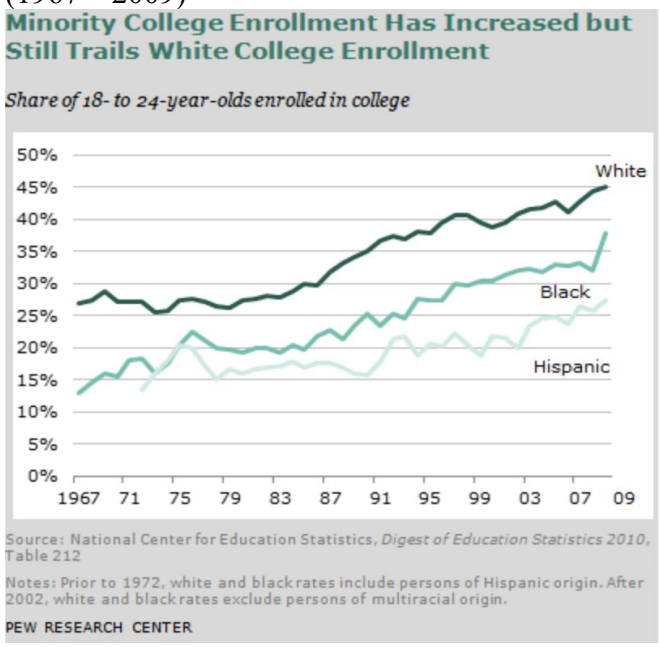
Education Policy Landscape

Since the 1970s, college enrollment has risen dramatically in the United States. An increase in college enrollment is attributed to changes in labor workforce needs, an increase in the college wage premium, and policy interventions that have increased access for underrepresented groups including women, low-income, and nonwhite students (Bound et al., 2010). However, research shows college completion rates are relatively low, as indicated in the National Student Clearinghouse study, in which 58% of students who started college in fall 2012 earned a degree six years later (Zinshetyn, 2017). In addition, nonwhite students lag far behind in attaining a four-year degree compared to white students: Figures 1 and 2 highlight enrollment and completion rates by race over time. Bound's et al. (2010) research argues that the student body's level of

academic preparedness, level of selectivity, and financial standing among different postsecondary institutions[3] as factors contributing to low college attainment. Moreover, tuition at colleges have more than doubled even after adjusting for inflation, and federal aid has declined over time (*College Affordability and Completion*, n.d.). Specifically, Pell Grant covers only about 30 percent of the cost of a public college education (*College Affordability and Completion*, n.d.). This percentage is the lowest percentage in history and less than half of what Pell Grant covered in the 1980s (*College Affordability and Completion*, n.d.). A decrease of federal aid over time has placed pressure on states like California to supplement federal grants with one of the most generous state financial aid programs for higher education. Thus, within the current educational policy landscape, there are looming concerns regarding affordability, value, and quality of postsecondary education for this new socioeconomically and racially diverse student demographic.

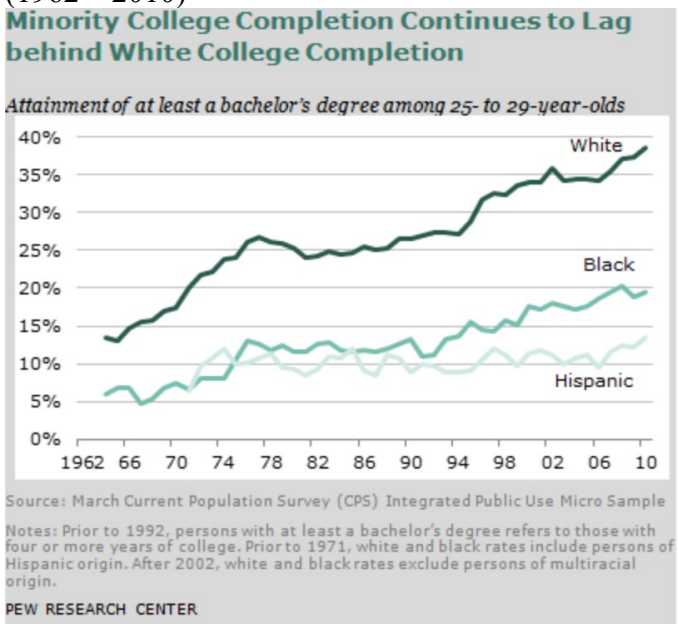
[3] Bound et al. (2010) distinguishes differences between student makeup and expenditures/resources for top 50 public four-years, non-top 50 public four-years, highly selective private four-years, less selective private four-years, and community colleges.

Figure 1. College Enrollment Has Increased Over Time for Students of Color (1967 – 2009)



Source: Pew Research Center Social and Demographic Trends, "Trends in College Enrollment, Completion, Cost and Debt" (2011)

Figure 2. College Completion for Students of Color Lags Behind White Students (1962 – 2010)



Source: Pew Research Center Social and Demographic Trends, "Trends in College Enrollment, Completion, Cost and Debt" (2011)

California Context

California has the largest higher education system in the United States and encompasses a rich and diverse racial/ethnic makeup (Valliani, 2015). The California Community College (CCC) system serves 2.1 million students across 115 campuses in rural, urban, suburban areas of the state (*CA Community College Key Facts*, n.d.). California Community College serves multiple goals: workforce development and training, basic skills and remedial education for personal or professional development, and preparation for students to transfer to a four-year institution. In addition, California Community Colleges offer open access and affordable education to students from various socioeconomic and academic backgrounds. This education segment plays an integral role in serving California's ethnically and socioeconomically diverse population (*CA Community College Key Facts*, n.d.). Specifically, students with nonwhite racial/ethnic backgrounds[4] make up 67% of students in the California community colleges. Also, California community colleges students come from diverse socioeconomic backgrounds (SES). Most of the state's K-12 students qualify for free and reduced-price lunch, which is an indicator of low SES (Johnson, 2014).

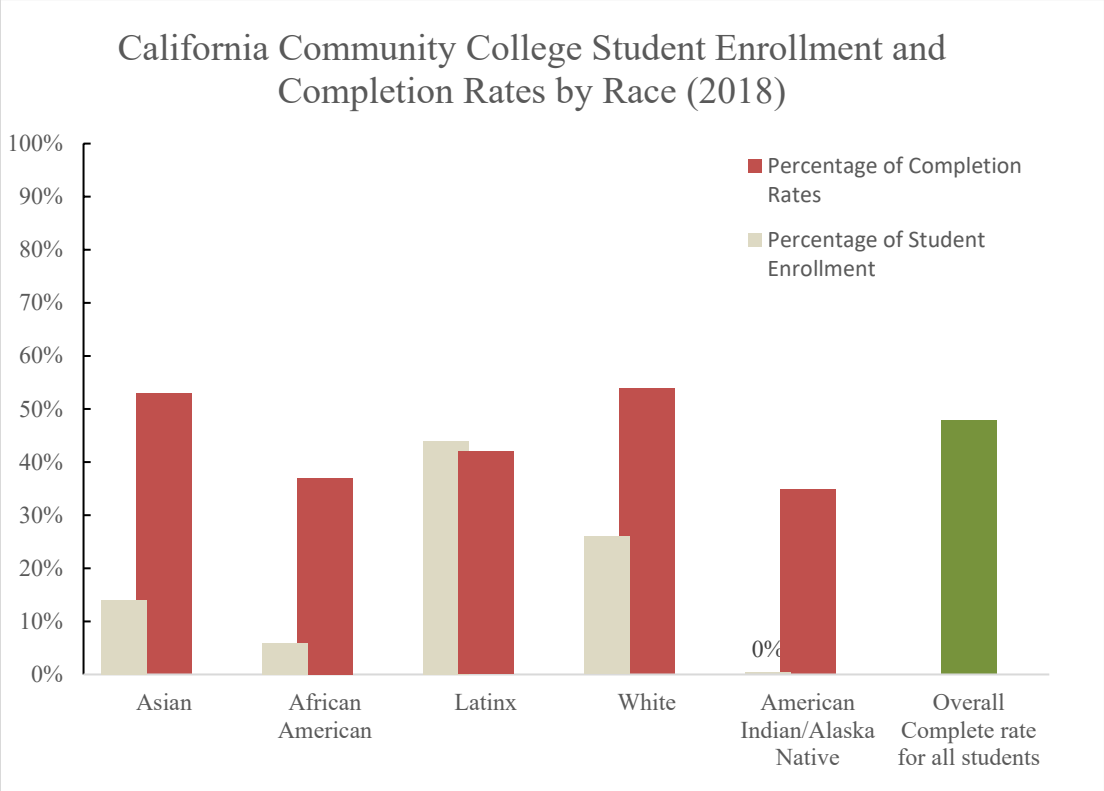
Latinx Student Educational Attainment

Using Munger's Triangle, I argue low college completion rates for Latinx students is both an efficiency and equity public policy issue. Munger's Triangle is a visual representation of how markets, politics, and experts intersect and compete with one

[4] Refers to Latinx, African American, Asian Pacific Islanders and Native-American students.

another to enact policies (Hinich & Munger, 1997). Low completion rates of Latinx students is an efficiency issue because Latinx students make up the largest racial/ethnic group in California community colleges at 44%. Yet, their completion rate of 42% is much lower than the overall completion rate across all student groups of 48% *(2018 Student Success Scorecard*, n.d.). Figure 3 illustrates the percent of student enrollment and completion rate by different student groups in California community colleges.

Figure 3. California Community College Enrollment and Completion Rates by Race



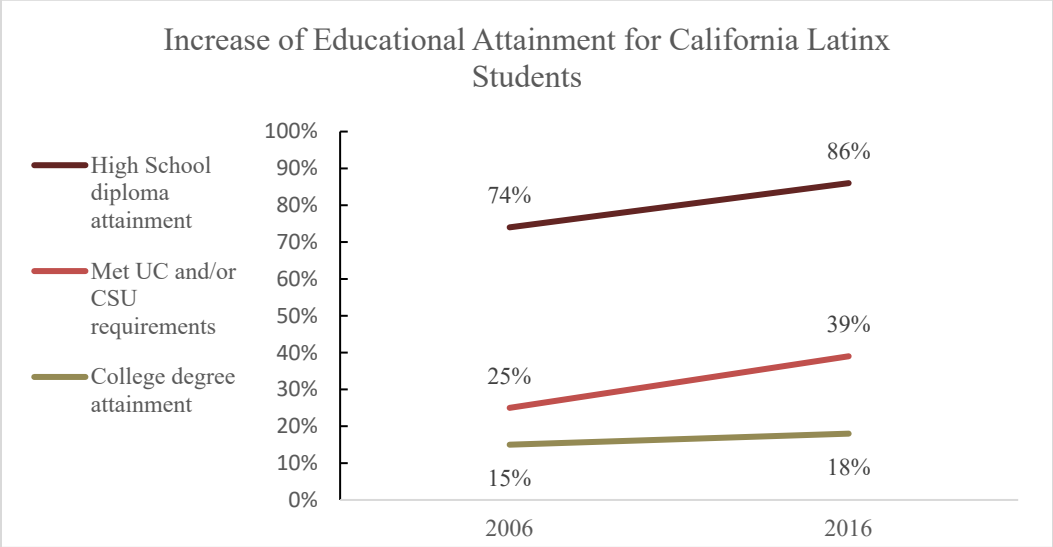
Source: California Community College Chancellor's Office, "2018 Student Success Scorecard"[5] (2018)

[5] I omitted enrollment rates of students with two or more races (4%) and unknown race (5%) given completion rates were not available. American Indian/Alaska Native accounted for .04 percent of student enrollment, which rounded to 0%.

Efficiency

Low completion rates for Latinx students is also an efficiency problem because Latinx residents are the largest ethnic/racial group in California overall (39%). Yet, they have the lowest proportion of college degree attainment, in which 18% of Latinx residents between the ages of 25 to 64 have an associate's degree or bachelor's degree (Bates, Bell, & Siqueiros, 2018). However, there have been considerable increases regarding high school completion rates and academic preparedness for postsecondary education for this group. Specifically, Latinx students' attainment of high school diplomas rose from 74% in 2006 to 86% in 2016 (Gordon, 2018). Also, Latinx students meeting the UC and CSU admission requirements have increased from 25% in 2006 to 39% in 2016 (Gordon, 2018). However, these considerable increases have not been reflected in college degree attainment. In 2006, 15% of Latinx between the age of 25 to 64 had an associate's degree or bachelor's degree, and a decade later, has risen by three percentage points to 18% (Gordon, 2018). Figure 4 illustrates the trends of Latinx educational attainment from 2016-2016. Given Latinx students' meaningful entry to California community colleges to pursue their higher education goals, policymakers, researchers, and higher education institutions need to study the institutional policies and practices that support Latinx students' academic achievement.

Figure 4. Increase of Educational Attainment for California Latinx Students



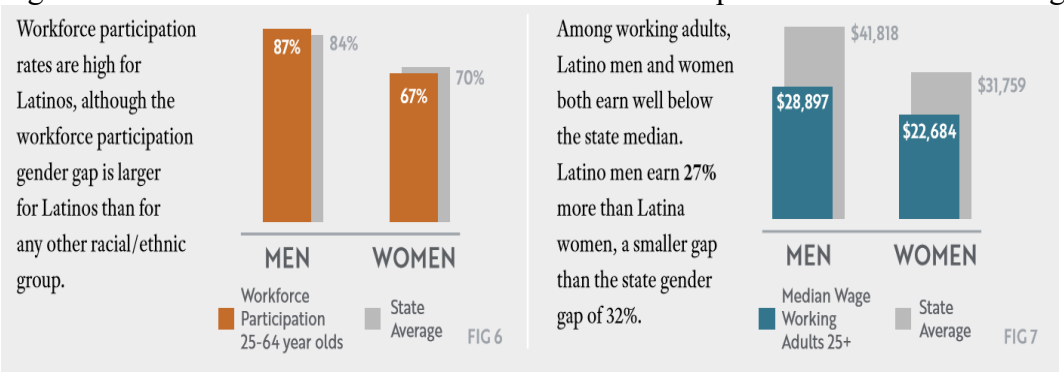
Source: EdSource, "Latino students in California still lag in college success" (2018)

Additionally, California's economic competitiveness is dependent on the certification or degree attainment of Latinx residents. California is facing a deficit of skilled workers in which if the current trend persists, there will be 1.1 million jobs in economic demand by 2030 without a supply of qualified workers to fill those jobs (Bohn, 2014). Researchers' project workforce and labor market needs will require education beyond high school completion. Latinx residents are overrepresented in workforce participation accounting for one-third of California's workforce. However, although Latinx residents have made increases in attaining "some college" level education, educational attainment of this group is not projected to accelerate enough to meet workforce and labor market demands (Bohn, 2014). Thus, policymakers and higher education institutions should consider policies to promote certification or degree completion for Latinx residents to meet these arising workforce needs.

Equity

Low degree attainment of Latinx residents is also an equity issue. Persistent low educational attainment for Latinx residents will leave out a large portion of California's residents from educational, wealth, and workforce opportunities. Latinx workforce participation rates are high; however, they are overrepresented in low-wage jobs. Latinx earn less than the state median wages for the top fields they are employed in—areas such as construction and extraction, office and administrative support, transportation and material moving, building and grounds cleaning, and maintenance. Figure 5 describes the Latinx level of workforce participation and median wage earnings. Thus, it is crucial to increase educational attainment for this group to increase their access to skilled jobs that have higher wage earnings for the social mobility and wealth accumulation of this group.

Figure 5. California Latinx Residents Workforce Participation and Median Earnings



Source: California Competes[6], "Opportunity Imbalance: Race, Gender, and California's Education-to-Employment Pipeline Focus on Latinos" (2018)

[6] California Competes' calculations of American Community Survey Public Use Microdata Sample (PUMS) 2016 five-year estimate data. California Competes used the term "Latino" throughout this brief to refer to men, women, and other Latino/a/x California residents.

Research Focus

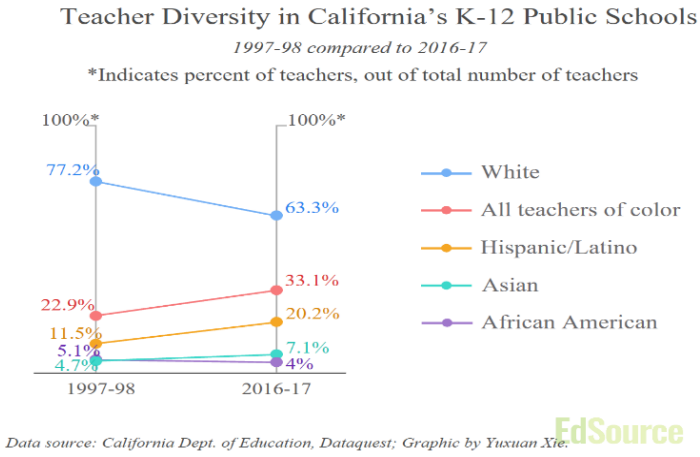
The goal of this research is to see whether or not controlling for other factors; Latinx faculty and administrators have an effect on the cohort success of Latinx students[7]. I looked at cohort level data of Latinx first-year students who entered a California community college and stated a specific educational goal. I measured academic achievement as the percentage of students across the given cohorts studied who achieved this goal within six years. The specific research question I ask is: *what are institutional characteristics that drive differences in success rates for Latinx students in California community colleges?* Specifically, I wish to test whether institutions with higher percentages of Latinx full time or part-time faculty or administrators have higher completion rates among different Latinx student cohort groups. Thus, I am interested in looking at institutional characteristics that lead to higher student outcomes for Latinx students. Although research has heavily focused on student-level determinants of educational achievement (Dee, 2004), it is also critical to study institutional-level data such as policies and practices that contribute to student access, progress, and completion.

One potentially promising development in education policy research is studying whether teachers from traditionally underrepresented groups positively impact education outcomes for historically underrepresented students. This research is grounded by the fact that in 2024, nonwhite students of color (African American, Latinx, Asian-Pacific

[7] For this study, I define cohort success based on CA Community College Student Success Scorecard. The Student Success Scorecard contains percentage completion rates for first-time first-year students who declared their goal at the start to complete a certificate, associate degree, or transfer to a university

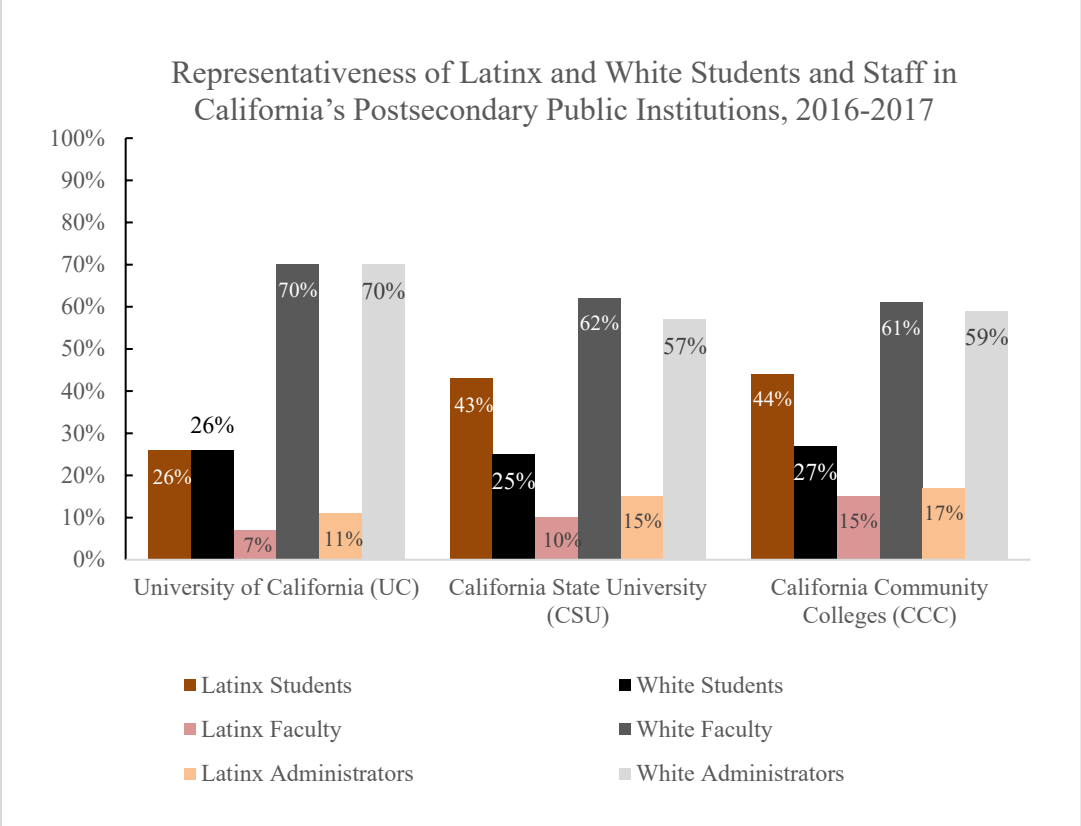
Islanders, and Native American students) will make up 56% of the student population nationally (U.S. Department of Education, 2016). However, teachers in all education segments are overwhelmingly white at 80% (U.S. Department of Education, 2016). Despite California having three-quarters of its students being nonwhite, there is a lack of racial/ethnic diversity of the state's teaching workforce. Figure 6 highlights the lack of teacher racial/ethnic diversity in California's K-12 public schools. Figure 7 highlights the representation of Latinx students and staff in California's higher education segments compared to White students and staff. Thus, college administrators, researchers, policymakers, and advocacy groups aim to understand whether there are benefits to increasing teachers of color to be representative of students of color within institutions. This research seeks to determine if public policy interventions focused on recruiting Latinx professionals to California's community colleges could improve Latinx student outcomes.

Figure 6. Teacher Diversity in California's K-12 Public Schools (1997-1998 compared to 2016-2017)



Source: California Department of Education, Dataquest; Graphic by Yuxan Xie

Figure 7. Representativeness of Latinx and White Students and Staff in California's Postsecondary Public Institutions, 2016-2017



Source: The Campaign for College Opportunity, "Left Out: How Exclusion in California's Colleges and Universities Hurts Our Values, Our Students, and Our Economy" (2018)

Value and Contributions of Teachers of Color

Before drawing upon literature that tests the impact of teachers of color on student outcomes, I will outline different arguments that expand on how teachers of color benefit students, classrooms, schools, and society overall. These arguments focus on teachers' attitudes, expectations, relationships, and practices towards students. In Villegas and Irvine (2010), the researchers reviewed and tested the validity of arguments in favor of diversifying the teaching workforce. Villegas and Irvine (2010) delineated three main arguments for diversifying the teaching force. The three main arguments are: teachers of color can serve as positive role models to all students, teachers of color have a cultural advantage and can increase academic outcomes and school experiences for students of color; and teachers of color can address workforce needs in under-resourced high-need schools (Villegas and Irvine, 2010). For my quantitative study, the argument that teachers of color can increase academic outcomes for students of color is most relevant. However, I will also delineate the other arguments.

Scholars have argued teachers of color can serve as positive role models to all students. Given that school is a setting in which academic knowledge and cultural values are constructed and transmitted, a racially representative teaching workforce can help dispel myths of racial inferiority and stereotypes constructed by the United States' culture (Villegas and Irvine, 2010). Also, a racially diverse teaching force could prepare all students to have a broader world view and set of skills to contribute to a multicultural society. Specifically, Mercer and Mercer (1986) argue the racial and ethnic composition of the teaching workforce signals to students, white and students of color, the distribution

of opportunities, and power in American society. Mercer and Mercer (1986) warn if students fail to see adults of color in professional roles such as teachers or administrators in schools, they may become socialized to implicitly believe that white adults in professional roles are more suited to hold these positions of authority. Waters (1989) constructed a similar argument related to the role-model effect by explaining white students interacting with teachers of color convey adults in ethnically diverse backgrounds also make significant contributions to society.

In addition, teachers of color can serve as positive role models for students of color. Researchers note how teachers of color have expressed a primary motivation for becoming a teacher is to be perceived by students of color as "exemplars of possibility" (Guyton et al. 1996; Jones et al. 1999; Johnson 2008). Latinx teachers have expressed their motivation for choosing this career was to be a role model to Latinx students (Ochoa, 2007). This finding is interesting for California since students of color make up the majority in the K-12 and community college education segments. However, Villegas and Irvine (2010) note the role model effect has not been empirically tested to be unequivocally true. Specifically, none of these stated studies have directly examined the role model effect on white students or students of color, nor described the ways in which the role model effect operates in classrooms and schools (Villegas and Irvine, 2010).

Villegas and Irvine (2010) also analyzed the argument that teachers of color benefit classrooms and schools by their ability to bring cultural understanding to help students of color learn. Irvine (1988) deems this concept "cultural synchronicity," where teachers of color have an advantage over their white colleagues in their ability to tie

learnings to students of color experiences and needs. The rationale is based on educational anthropology and cognitive science that learning occurs inside and outside the classroom in cultural contexts (Heath 1983). When teachers present ideas to students, students utilize their experiences to make sense of new learnings. Teachers of color have an advantage by relating to students of color and base their teachings on culturally relevant ideas, concepts, and experiences to learn. Similarly, Pitts's (2007) research highlights cultural differences in learning styles between different racial/ethnic groups. Villegas and Irvine (2010) contend how the "cultural synchronicity" advantage holds the potential for closing the persistent racial/ethnic equity gap.

In addition, scholars argue teachers of color have more favorable views and higher expectations for students of colors' abilities and potential compared to white teachers (Villegas and Irvine, 2010). Teachers make assumptions and judgments about their students' academic potential and personal disposition. These expectations influence the interactions between the teacher and their students and have a positive or negative impact on students' performance, aspirations, and self-concept (Villegas and Irvine, 2010). Given the US's colonial history of racism, examples of institutional and structural racism permeate in educational institutions' culture, including teaching practices (Bustillos and Siqueiros, 2018). Pitts (2007) highlights how historically, students of color are assigned to lower tracks such as special education or remediation classes, based on teachers' assumptions regarding their students' intellectual abilities. This practice has limited students of color access to equitable learning opportunities. Also, an examination of teachers' disciplinary practices underscores different treatment among different racial

groups in which Black, Latinx, and Native American students are two to five times more likely to be suspended or expelled than white students (Wallace et al., 2008). These interactions shape students' experience in school overall and impact students' performance, aspirations, and self-concept.

Two studies that have looked at teachers' assumptions regarding students of color academic potential and personal disposition are from Uhlenberg and Brown (2002) and Figlio (2005). Uhlenberg and Brown (2002) surveyed an equal number of white and Black K-12 teachers in a variety of subjects regarding the racial/ethnic achievement gap between white and Black students test scores. White teachers perceived the achievement gap as a lack of effort from Black students, uncooperative Black parents, and problems in the Black home environment (Uhlenberg and Brown, 2002). On the other hand, Black teachers believed the achievement gap was primarily attributed to teachers' low expectations of Black students. This study illustrates the different explanations surrounding the racial equity gap between Black teachers and white teachers. However, the sample size of this study was only 54.

Figlio (2005) analyzed 25,000 family records in a large district in Florida to see if teachers treated students differently based on if a student had an ethnically-identifiable name. Figlio (2005) found white teachers did treat students differently depending on students' names. For example, Figlio (2005) found brothers with identical standardized test scores were treated differently. One brother with a non-Black identifiable name was referred to a gifted program, and the other brother with a Black-identifiable name did not receive this educational opportunity. Furthermore, Figlio (2005) found Black teachers in

this study were less likely to form low expectations for students based on their ethnic names over white teachers. These studies underscore how teachers' attitudes, expectations, and biases towards students of color, which are informed by the US historical construction of race, influence students' of color academic experience and opportunities.

The last argument Villegas and Irvine (2010) note is teachers of color can positively contribute to the workforce shortage of teachers in under-resourced high-need schools. Horng (2005) found in a study of 541 teachers in a California elementary school district, Latinx teachers were more likely to stay in low-performing, high-minority schools than white teachers (Horng, 2005). Researchers hypothesize given teachers of color motivation to serve as exemplars of possibility for their students; they are more likely to persist in under-resourced, difficult to staff, high need schools. Thus, a benefit Villegas and Irvine (2010) note to recruiting teachers of color is they could alleviate high attrition rates for schools that share these characteristics.

Subsequently, popular arguments to diversify the teaching workforce are: teachers of color presence in the classroom can dispel myths of racial inferiority and increase representation surrounding people of color in professional roles. However, this argument has not been empirically tested. Also, teachers of color attitudes and behavior towards their students of color can increase the school experience for students of color. Studies show that teachers of color hold higher expectations towards their students of color compared to white teachers. Finally, teachers of color may have the ability to tailor

learnings to be culturally relevant to increase student outcomes. These arguments ground my interest in pursuing this quantitative study.

Thesis Roadmap

The purpose of my master's thesis is to explore whether there is a positive correlation between teachers of color and students' of color academic achievement. Does a larger percentage of Latinx faculty and Latinx administrators in California community colleges increase the cohort success of Latinx students? In this introductory chapter, I described changes in enrollment, federal aid, and educational attainment for underrepresented students in postsecondary institutions. In section two, I argued why low educational attainment for Latinx students in California is a public policy problem that needs to be addressed by education institutions and policymakers. Finally, I explained the benefits and previous research arguments in favor of increasing racial/ethnic diversity in the teaching workforce.

In chapter two, I review literature that used regression analysis methods to study the effect of teacher racial/ethnic characteristics on student outcomes related to test scores, dropout rates, and completion of academic goals. The chapter consists of two sections in which I provide K-12 quantitative research on this topic and community college quantitative research on this topic. This chapter includes different methods to measure this relationship and presents positive, negative, and null correlation findings. In chapters three and four, I share how I obtained my data, the type of regression I used, and details regarding my model specification. I discuss my regression model used to test my hypothesis that an increase in Latinx faculty and administrators would positively

influence cohort completion rates of Latinx students in California community colleges. Then I present the regression results for each of the four dependent variables I examined – Latinx students designated prepared and economically advantaged, Latinx students designated prepared and economically disadvantaged, Latinx students designated unprepared and economically advantaged, and Latinx students designated unprepared and economically disadvantaged. In chapter five, I discuss which findings were consistent with the literature and which were not, limitations to my study, and how these results could contribute to education policy discussions.

CHAPTER 2: A REVIEW OF THE LITERATURE

In this chapter, I provide a review of the literature and academic studies that have attempted to identify whether there is a positive relationship between student academic success and exposure to same-ethnicity teachers. As discussed in chapter one, Latinx students face low degree attainment, and one policy measure to improve students' outcomes is to see the impact of Latinx faculty and administrators on Latinx student outcomes. I will draw from K-12 and community studies that try to identify and measure these types of relationships. However, I want to acknowledge I found minimal research that focuses on the impact of Latinx teachers on student outcomes for different ethnic/racial student groups.

Quantitative Evidence Looking at Performance Indicators From K-12 Schools

Scholars have tried to employ quantitative analysis to understand the impact of teachers of color on students in K-12 settings. Dee (2004) employed an experimental design to study whether racial pairing between students and teachers improved students' scores in K-12 reading and math. Dee (2004) used a four-year longitudinal data set from Tennessee's Project STAR to study whether reading and math scores improved for students taught by a teacher of their race. The original purpose of Tennessee's Project Star was to study the impact of class size on student outcomes. Tennessee Project Star randomly assigned kindergarteners elementary schools with different class sizes. The sample size was over 11,000 students. A student was placed in either a small class size made up of 15 students or a regular class size made up of 22 students. Then the researchers tracked the students' test scores over time from kindergarten to third grade.

Dee (2004) conducted a randomized experiment and limited his scope of research by focusing on 79 elementary schools and studying reading and math scores of only two student groups – Black students and white students. Data such as school identifier, class type, student race, gender, age, income, and teacher's race, experience, education, and merit pay status were used as controls in this study. Dee (2004) found that both white and Black students who were taught by their race had, on average, a 3.8% increase in math scores and a 3.1% increase in reading scores.

Another researcher who used standardized testing to understand the impact of teachers of color on student outcomes in a K-12 setting was Clewell et al. (2005). Clewell's research question was: does exposure to a same-race teacher increase reading and math scores of African American and Latinx students? Clewell (2005) found Latinx fourth and sixth-grade students had statistically higher test scores gains in math when taught by Latinx teachers than those taught by racially mismatched teachers. For reading, Clewell et al. (2005) noted the same effect but only for Latinx students in fourth grade. Clewell et al. (2005) noted the impact was weaker for African American students. However, African American students performed better in math when taught by African American teachers.

Hanushek (1992) employed a regression analysis using data from the Gary Income Maintenance Experiment to look at family characteristics, work behavior, and income of Black families. Hanushek (1992) merged this data set with an Iowa data set on reading comprehension and vocabulary test scores from children of the families in the Gary experiment. Hanushek's (1992) data set analyzed research over from 1971-1975 to

understand the impact of students' family size, birth order, and child spacing on academic performance from 2nd to six grade. In addition, Hanushek (1992) added teacher characteristics to his model, such as experience, degree level, class size, gender, race, and teachers' test scores, to determine what school factors influenced the children's academic performance. Hanushek (1992) found teachers' years of experience, class size, test scores, and race as statistically significant. Specifically, white teachers had a negative impact on Black students' performance (-0.071 for reading comprehension scores and -0.076 for vocabulary scores) compared to Black teachers.

Ehrenberg (1995) also looked at K-12 data by using the National Educational Longitudinal Study (NELS) in 1988 to survey 8th-grade students and their teachers to understand how teacher's race, gender, and ethnicity (referred as RGE) influenced students both from the same RGE group and from other groups. Their research goal was to understand how much students learn based on RGE characteristics of their teacher and also how teachers from different RGE groups subjectively relate to and evaluate their students. The survey was first distributed to students while they were in 8th grade to assess their cognitive skills in two subjects among four options –English/reading, mathematics, science, and history/social studies. In addition, the students' teachers in the two subjects chosen were surveyed. Then, the same students were sent a similar survey in 1990 when they were in 10th grade to measure their gains in scores. This analysis was restricted to white, Black, and Latinx students and white, Black, and Latinx teachers. Overall, Ehrenberg et al. (1995) had 1,776 observations in history, 2,848 in reading, 3,029 in math, and 2,445 in science. Ehrenberg et al. (1995) found white students

outperformed the other student groups, on average, on all four tests; male students in each racial/ethnic group outperformed female students in mathematics and underperformed compared to females in reading. The analysis found there was no association between teachers' race, gender, or ethnicity, and how much students learn, which contradicts the research noted above.

Pitts (2007) employed an explanatory study to test the relationship of racial, ethnic/representation of teachers and school administrators on student outcomes of different ethnic/racial groups. Pitts operationalized ethnic/racial representation by using a continuous variable range from 0 – 1 to represent either a perfect mismatch between administrators' and teachers' race/ethnicity and race/ethnicity of students as 0, a perfect match between administrators' and teachers' race/ethnicity and race/ethnicity of the students as 1, and any other ethnic/racial match between teachers, administrators, and students would receive a score between 0 and 1. In addition, Pitts operationalized student outcomes by looking at the overall pass rate of the Texas Assessment of Academic of Skills (TAAS), dropout rates, and SAT scores to predict college attendance. Pitts noted the indicators he chose for this study are not conclusive measures of learning. In addition, Pitts used district-level data from Texas because 1 in 14 school districts across the nation is in Texas. Pitts (2007) ran an ordinary least squares (OLS) regression to hypothesize three main arguments.

Hypothesis 1: Higher ethnic/racial representation among administrators, teachers, and students will lead to higher organizational performance measured by various student outcome indicators.

Hypothesis 2: The impact of ethnic/racial representation on organizational performance will be stronger at the teacher-level than at the administrator-level.

Hypothesis 3: Higher ethnic/racial representation among teachers, administrators, and students will lead to more positive outcomes for students of color than for white students.

Pitts found all hypotheses were at least partially supported. For hypothesis 1, Pitts (2007) found school districts in which the racial/ethnic composition of teachers matched the student population had performance increases. Specifically, teachers' ethnic representation had a positive impact, which was statistically significant for Latinx (1.760**) and African American students' (3.484**) respective TAAS test scores and dropout rates. However, for school administrators, only the racial/ethnic composition of African American administrators had a positive and statistically significant impact on African American students (2.463*). Overall, teachers' representativeness had a fifteen times stronger influence on increasing student outcomes. These findings are interesting because it indicates that, although school administrators formulate policy and program recommendations, teachers have a more substantial impact on student performance given their discretion to implement policies and their role having more interactions with students. Overall, Pitts (2007) found the representativeness of faculty and administrators led to an increase in student outcomes for students of color, and specific student groups appear to respond more positively than others. However, Pitts (2007) noted this research might not be generalizable.

Community College Quantitative Evidence

Fairlie and Oreopoulos (2014) studied whether students of color had increased education outcomes when being taught by faculty of color. Fairlie and Oreopoulos (2014) utilized a case study approach by studying a cohort of students and instructors from fall 2002 to spring 2007 at De Anza Community College. De Anza Community College is located in the San Francisco area and has a diverse student population in terms of ethnicity, race, age, socioeconomic status, etc. Sixteen percent of De Anza instructors come from traditionally underrepresented communities compared to the national average of 10% statewide. Fairlie and Oreopoulos (2014) also used data from the National Student Clearinghouse to track long-term outcomes for these students—such as transfer rates to 4-year higher education institutions from 2007 to 2012.

Fairlie and Oreopoulos (2014) focused on studying individual classes that were taught by instructors of color. Within the specific course, Fairlie and Oreopoulos (2014) compared various student metrics (test scores, dropout rates, grades) between students of color and white students. Fairlie and Oreopoulos (2014) controlled for instructor fixed effects by analyzing specific classes to ensure students of color and white students had the same level of classroom shocks[8]. In addition, Fairlie and Oreopoulos (2014) focused on studying students with low registration priority status to ensure a student was not self-sorting into particular classes that may give them a comparative advantage[9].

[8] Classroom shocks refers to teacher's criteria to grading, teacher's philosophy, and external factors.
[9] Fairlie employed regression analysis on 446,239 student-class observations

Fairlie and Oreopoulos's (2014) findings were mainly positive; the researchers' estimate indicates a decrease (2 to 3 percentage points) in dropout behavior for students taught by a teacher of color. The performance gap between students of color and white students dropped 20-50% when students of color were taught by an instructor of color. In addition, Fairlie and Oreopoulos (2014) study found empirical evidence of long-term impacts related to transfer, degree completion, and retention rates. However, this study noted trade-offs for white students taught by an instructor of color and variation regarding the magnitude and strength of this relationship between different variations of racial-matching instructors and students, which I will share more in the mixed evidence and research limitations section.

Institutional Characteristics that Drive Completion Rates in Community Colleges

Bailey et al. (2005) conducted a nationwide study to understand the institutional college that drives success for low-income and students of color in community colleges. Bailey et al. (2014) noted most research on community colleges has looked at how students' characteristics such as academic preparedness, household income, parents' level of education impact student outcomes. This scholarly work helped me understand the other explanatory variables that drive differences in student completion rates for community college students to include in my model.

Bailey et al. (2005) merged institutional-level data sets such as *the Students Right to Know* (SRK) graduation rates from the National Center for Education Statistics (NCES) and the Integrated Postsecondary Education Data System (IPEDS) with an individual-level data set from the National Educational Longitudinal Study of 1988

(NELS:88). Bailey et al. (2005) looked at the explanatory variables: institution size, percent of full-time students, location, percent of full-time faculty, instruction expenditures per full-time equivalent student, academic support expenditures per full-time equivalent student, etc. on graduation rates of that institution (dependent variable). Specifically using the SRK and IPEDs data, Bailey et al. (2005) looked at the proportion of a cohort of first-time, full-time students enrolled in 1999-2000 who completed a certificate or degree at the starting institution within 150% of the time traditionally associated with earning the credential. In addition, Bailey et al. (2005) used survey data from the NELS:88 data set, which consisted of 1,464 students across 441 community colleges. Bailey et al. (2005) followed Scott's et al. (2004) approach and estimated graduation rates using a grouped logistic regression. Bailey et al. (2005) defined graduation rates as a student earning a certificate or associate degree within three-years for the *SRK* and IPEDs data and an eight-year window for a student to earn a certificate, associate degree, or transfer from the NELS:88 data. Bailey's et al. (2005) study aimed to understand better the institutional characteristics that impact student outcomes and does not analyze or measure the performance of any individual institution. In addition, Bailey et al. (2005) reiterate data from this study represents the effect of campus environmental factors on the likelihood of community college students to earn a degree and not the likelihood of a particular individual with particular characteristics to earn a degree.

Bailey et al. (2005) found for the *SRK* and IPEDs data, institutions with a higher proportion of part-time students, women, and students of color had a negative impact. In addition, large size institutions and location in urban settings rather than rural settings had

a negative impact. Lastly, colleges that had a greater emphasis on associate degrees and expenditures on instruction had a positive effect. Bailey et al. (2005) were surprised by the findings that large size institutions and a higher proportion of women negatively impact student outcomes because literature generally notes the opposite effect. For the NELS:88 data, Bailey et al. (2005) found some consistency of large size institutions, location in an urban setting, and a high proportion of students of color had a negative impact. In addition, percent of part-time faculty, a high percentage of Pell grant recipients, more substantial expenditures on academic support all had a negative effect. Bailey et al. (2005) shared their reasoning that more substantial spending on academic support could have this impact is because potentially, these institutions have more high need students, so the institution needs to invest in more academic support resources for them. Lastly, expenditures on administrators and student services had a positive impact. Bailey et al. (2005) note larger expenditures on administrators can create policies and practices that promote work culture and staff retention.

Mixed Evidence and Research Limitations to Regression Studies

Although researchers found positive outcomes between the interaction of teachers of color and students of color, there are caveats to some of the studies. Ehrenberg's (1995) longitudinal study regarding RGE on students' gain scores in history, reading, math, and science noted across all the student groups surveyed, teachers in this sample were mostly white. This observation highlights that there was a small sample for teachers of color, which may have led to unobserved statistical significance when looking at the RGE effects of teachers on student performance. In addition, Ehrenberg (1995) noted the

survey questionnaire for students was short. There were 21-40 questions, which could have led to measurement error regarding student performance results.

Dee's (2004) study that used Tennessee's Project STAR data to look at the impact of same-race teachers on elementary students' math and reading scores acknowledged that external validity critiques might arise regarding this study. Dee (2004) explained external validity might not exist for two reasons. First, Dee (2004) acknowledged the subset of schools used in this study had high rates of segregation. Ninety-five percent of white students in the study were taught by a white instructor, and 45% of Black students in this study were taught by a Black instructor. This sample may not be generalizable to states that have more heterogeneous makeup in their schools. Similarly, Dee (2004) contends the findings may only apply to Tennessee since the research design was a randomized experiment. Thus, Dee (2004) notes generalizability may not be present in this study. In addition, this study only tracks students in four years, so it is difficult to assess long-term impact. Also, Dee (2004) acknowledges that the increase of student outcomes was only significant in the regular size classrooms and was not significant in the smaller size classrooms. Dee explains that in smaller size classrooms could have been an additive effect in which the teacher's behavior influenced student outcomes by possibly having more opportunities to interact with students. Thus, other factors may contribute to student outcomes such as teacher quality instead of the variable race itself. Subsequently, Lastly, Dee (2004) emphasizes the difficulty of delineating how teachers benefit the classroom with their race alone. Dee (2004) used the concept of "active" and "passive" teacher effects to argue his point. Some researchers note a role model effect—

that having a teacher of color in the classroom helps students of color reconsider educational possibilities. Active teacher effects refer to race/ethnic culture-specific patterns of behavior that teachers of color use when teaching students of that same ethnic background. Fairlie and Oreopoulos's (2014) evidence did not expand on whether or not the positive association of faculty of color on student outcomes was due to active or passive teacher effects. Thus, it is important to expand research on this hard-to-observe effect on student outcomes.

Another caveat is that several research papers, including Fairlie and Oreopoulos (2014), Pitts (2007), and Dee (2004), found non-minority (white) students who were taught by instructors of color academic performance decreased. An example of this research is Fairlie and Oreopoulos (2014) noted white students did worse when taught by instructors of color. In addition, Fairlie and Oreopoulos (2014) Appendix Table 7 showed matching a Latinx instructor to a non-Latinx student raised the likelihood of dropping the course. Consequently, a policy intervention of increasing the recruitment of teachers from different ethnic/racial backgrounds may have unintended consequences such as raising or lowering the racial equity gap. It is important to assess further and disentangle how teachers of color benefit the classrooms and how far/for whom do these benefits extend.

Bailey et al. (2005) acknowledged several limitations regarding this study. Specifically, the researchers omitted other key variables such as academic preparedness and the socioeconomic status (SES) of a typical student among the community colleges studied. The reason these variables were omitted is that community colleges do not have a widely used measure for these variables. Instead, the researchers had to omit variables

or develop proxy variables to try to measure what they wanted to capture. An example is since there is no SES data of a typical student in a community college, Bailey et al. (2005) used federal aid per full-time equivalent enrollment, known as the proportion of Pell Grant recipients. Pell grant is a proxy to indicate the financial need of college students. However, a more critical variable that does not exist would be to show the measure of the wealth of that institution rather than students' financial need (Bailey et al., 2005). Bailey et al. (2005) also note there is a drawback to using a group model because it assumes the student cohorts are affected by the explanatory variables in a similar way, which is inaccurate. Lastly, Bailey et al. 2005 note their sample only captures a younger proportion of students (18-25) since the NELS:88 data looks at an eight-year window of college enrollment when a student begins 8th grade. This data leaves out another critical group, older non-traditional students in community colleges. However, this research is relevant because it underscores how institutional policies and practices can positively shape student outcomes.

Expanding on this Research

Looking ahead, I aim to expand to limited research on CA's community college system by looking at the impact of Latinx faculty and administrators on Latinx students. To do this, I assisted in data collection for a larger research project, Professor Dr. Wassmer and doctoral student, Meredith Galloway, led called "Differences in California Community College Success Rates: Do Policy Variables Matter?" to examine this relationship. We collected cohort-level and institutional-level data using publicly available data from the California Community College Chancellor's Office from the

Student Success Scorecard website and Datamart website. Then I conducted a panel-data regression using these key explanatory variables and other explanatory variables to control for to understand further the institutional characteristics that support Latinx cohort completion rates in California community colleges. In the next chapter, I share more details regarding how I obtained the data, the type of regression I used, and details regarding my model specification.

CHAPTER 3: RESEARCH METHODOLOGY

Regression model, method, and data

In chapter two, I reviewed quantitative studies that analyzed the impact of teachers of color on student achievement in K-12 and California community college settings. Most of the academic research I found was in K-12 settings and looked at racial/ethnic matching of Black and white students and teachers. My study attempts to add to limited community college research on how Latinx administrators and faculty impact Latinx student outcomes. Specifically, I aim to understand how institutional characteristics such as the percentage of Latinx faculty and administrators influence differences in completion rates of Latinx students. My study examined these differences by looking at different classifications of Latinx students– Latinx students who are economically advantaged and academically prepared, economically advantaged and academically unprepared, economically disadvantaged and academically prepared, or economically disadvantaged and academically unprepared. The remainder of this chapter will discuss how I obtained the data, the type of regression I used, the model specification, and variables not included in my model.

Regression Analysis

I ran panel-data regressions to explore whether a positive relationship exists between the percentage of Latinx full or part-time faculty or percentage of Latinx administrators (key explanatory variables) and the success of different classifications of Latinx students among the five cohorts studied (dependent variables) in California community colleges. Cohort success is based on the California Community College

Student Success Scorecard.[10] Regression analysis is a quantitative research approach in which multiple explanatory variables (independent variables) are analyzed to see if and how they influence a dependent variable. However, I must also include other explanatory variables (control variables) in my model to control for their influence on my dependent variable to understand the relationship between the key variables the research is most relevant for. It is essential to try to include all the factors that will influence the dependent variable in my model to avoid omitted variable bias. Omitted variable bias occurs when the dependent variable is affected or correlated with an omitted variable, which is a variable not included in the model. I conducted this analysis using STATA/IC 15.1, which is a statistical and data analysis software program. To do my study, I first assisted in more extensive data collection to provide all the relevant variables to form a robust model (set of factors). In the following sections, I review the sources I obtained my data from and describe the model specification to test my hypotheses.

Data Sources

I assisted in data collection for a larger research project Professor Dr. Wassmer and doctoral student, Meredith Galloway, led called "Differences in California Community College Success Rates: Do Policy Variables Matter?" to examine this relationship. We collected cohort-level and institutional-level data using publicly available data from the California Community College Chancellor's Office. Specifically, we collected data from the Student Success Scorecard website and Datamart website, which contain completion rates for first-time enrolled, first-year students who declared

[10] https://scorecard.cccco.edu/scorecard.aspx

their goal at the start to complete a certificate, associate degree, or transfer[11] (or be transfer ready) to a four-year college. The recorded completion rates are the percentage in the total entry-year cohort achieving their stated goal within six years. The five cohorts we examine began in the fall of 2007, 2008, 2009, 2010, and 2011. We studied 108 California community colleges during this period.

Dependent Variables

I examine several dependent variables as measures of student academic achievement for Latinx students in the cohort studied. Specifically, I focus on cohort completion rates for four different Latinx student groups designated prepared and economically advantaged, designated prepared and economically disadvantaged, designated unprepared and economically advantaged, and designated unprepared and economically disadvantaged, and overall completion rates as my base comparison. For a student to be designated academically unprepared requires a student to be enrolled in either remedial math or English language community college courses. It is important to note the recent passing of AB705 (2018) requires California Community Colleges to maximize the likelihood of students enrolling in transfer-level English and math rather than be placed in lower level remedial English and math. Institutions are using other measures such as high school performance indicators (GPA, courses taken, course grades) to measure academic preparedness rather than historically use placement tests to

[11] Transfers to four-year universities are counted when data is captured by the *National Student Clearinghouse* or automatically captured if a student transfers to a California public four-year university. To be counted as a "transfer," students must have earned 12 or more units at the community college prior to transfer.

measure academic preparedness (Hern, 2015).[12] For a student to be designated as economically disadvantaged, they must receive (or be eligible for) Board of Governor's Waiver or Pell Grant, be a CalWorks or Workforce Investment Act participant, or be a Department of Social Services TANF client. I looked at five different dependent variables to see how Latinx faculty and Latinx administrators influenced different Latinx students who have differences between academic preparedness and state or federal aid eligibility as a proxy of economic status to see if Latinx faculty and administrator representation is more impactful with specific groups. As previously noted, Bound et al. (2010) draws on research that institution's completion rates are influenced by their students' academic preparedness. In addition, Bailey et al.'s (2005) research found institutions with a higher percent of Pell Grant enrollment have a negative impact on completion rates. Thus, I aimed to explore if there are differences in completion rates between the different variations of prepared, unprepared, economically advantaged, and economically disadvantaged Latinx students, and overall completion rates when examining the influence of the key explanatory variables (percentage of Latinx faculty and administrators), which I describe more below.

The cohort completion rate for Latinx students prepared and economically advantaged ranged from 0 to 100, with the average completion rate at 65.62% percent. The cohort completion rate for Latinx students prepared and economically disadvantaged

[12]Placement tests have been found to not be a good predictor of college readiness and have been found to negatively impact students of colors' long-term completion rates since they are much more likely to be disproportionately concentrated in the lowest levels of remedial math. https://edsource.org/2015/some-college-students-more-prepared-than-placement-tests-indicate/90418

ranged from 0 to 100, with the average completion rate at 62.16% percent. The cohort completion rate Latinx Student unprepared and economically advantaged ranged from 0 to 100, with the average completion rate at 33.95% percent. The cohort completion rate for Latinx students unprepared & economically advantaged ranged from 17 to 100, with the average completion rate at 35.78%. The overall completion rate for all students regardless of race/ethnic background is 46% and range from 23 to 67.

Table 1. Completion Rate for Latinx Students Across Cohorts Studied

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
Prepared and Economically Advantage	532	65.62	16.68	0	100
Prepared and Economically Disadvantage	540	62.16	12.74	0	100
Unprepared and Economically Advantage	539	33.95	12.61	0	100
Unprepared and Economically Disadvantage	540	35.78	5.8	17	52.60
All Overall Completion	540	46.45	7.89	23	67.00

Sources for Key and Other Explanatory Variables

I used the racial/ethnic makeup of faculty and administrators in California community colleges as the key explanatory variables to examine. Latinx faculty and administrators who are represented in this sample indicated Latinx as their single choice of race/ethnicity. Specifically, I examined the percentage of Latinx full-time faculty (either tenured or tenure track), percentage of Latinx part-time faculty, and percentage of Latinx administrators in California Community Colleges. The percentage of Latinx part-time faculty ranges from 0 to 37, with the average percent of Latinx full-time faculty in the California community colleges studied at 12.27%. The percentage of Latinx part-time faculty ranged from 0 to 66, with the average percent of Latinx part-time faculty at

10.16%. The percentage of Latinx administrators ranged from 0 to 57, with an average of Latinx administrators at 15%.

Table 2. Average Percentage of Latinx Faculty and Administrators Across Cohorts Studied

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
Latinx Faculty Full-Time	539	12.27	6.26	0	37.21
Latinx Faculty Part-Time	539	10.16	6.58	0	66.67
Latinx Administrators	528	15	11.21	0	57.14

Model Specification

In this section, I describe the regression model I used to test my hypothesis. I also explain my justification for all variables I included in my model to isolate the impact of percent of Latinx faculty or administrators on the completion rates of the various Latinx student groups studied. Furthermore, I discuss why I omitted some factors and potential implications regarding this decision.

Panel-Data Regression

I employed a panel-data regression estimation to test my hypothesis. The data is panel data because of the cross-sectional nature of gathering data from different colleges (108) over five different start years for each of the cohorts. Next, I offer a model of general factors expected to influence the completion rate of Latinx students in a cohort who are given six academic years to complete their stated educational goal (complete a certificate, associate degree, or transfer/be transfer ready). I used previous scholarly arguments, previous quantitative and qualitative research, and available data to construct

my model of general factors, which I outline and describe below. Based upon my reading of the previous literature, I believe that in this panel data set, differences in cohort completion rates can be explained by the general factor categories of faculty and administrator characteristics, student cohort characteristics, institutional characteristics, and macroeconomic factors to measure the fixed effects. Because I will use fixed-effect panel-data regression analysis, the model also accounts for time-invariant factors unique to college that did not change over the period observed but also affected cohort completion.

> **Cohort Completion Rate of Latinx Students = f (Faculty and Administrator Characteristics, Student Cohort Characteristics, Institutional Characteristics, Macroeconomic Characteristics)**
>
> Where,
>
> **Faculty Admin Characteristics** = f (Faculty Full-Time Percentage, Latinx Faculty Full-Time Percentage, Latinx Faculty Part-Time Percentages, Latinx Admin Percentage),
>
> **Student Cohort Characteristics** = f (Female Percentage, Age 21-24 Percentage, Age 25-39 Percentage, Age 40 Plus Percentage, African American Percentage, Pacific Islander Percentage, White Percentage, Pell Grant Recipient Percentage, Full-Time Student Percentage),
>
> **Institutional Characteristics** = f (Number of Credit Sections, Avg. Enrollment Per Credit Section, Evening Credit Sections Percentage, Hybrid Credit Sections Percentage, Edu. Opportunities Prog. Enrollment Percentage),
>
> **Macroeconomic Characteristics** = f (2008 Cohort Start, 2009 Cohort Start, 2010 Cohort Start, 2011 Cohort Start).

Justification for Key Explanatory Variables and Control variables

The ethnic/racial makeup of faculty and administrators in California community colleges is the main key explanatory variable expected to influence cohort completion

rates of Latinx students. Specifically, I examined the percentage of Latinx full-time faculty (either tenured or tenure track), percentage of Latinx part-time faculty, and percentage of Latinx administrators. Faculty and administrators represented in the percentages indicated Latinx as their single choice of race/ethnicity. It is important to note the CCC data does not offer the characteristics of a specific cohort but instead the characteristics of all students at a college in the academic year that the cohort started. Thus, I measure the characteristics of all the students at the college, which falls under the student cohort characteristics of which the Latinx cohort is a subset and not the features of Latinx students itself. Given the available data collected for student cohort characteristics across California community colleges, I include gender/sex (binary variable – male or female), age, race/ethnicity, the share of students of the cohort receiving a Pell grant, which is an indicator of financial need, and percentage of full-time students as explanatory variables to control for in my model. Also, I included institutional characteristics such as credit sections offered, average student enrollment in all credit sections, whether classes occur during the day, night, or in hybrid form[13], percent of students enrolled in California's Educational Opportunity Program Services (EOPS)[14], and other college-specific characteristics that do not change over time in my model to acknowledge institutions' choices regarding policy, practice, or programs influence completion rates. Finally, I controlled for macroeconomic characteristics by adding five dummy variables representing each cohort year possible start date to control for

[13] Hybrid form of all or partial internet based.
[14] Program that provides academic support services for low-income students

macroeconomic occurrences that could influence cohort completion rates if not isolated, such as the Great Recession that occurred during this cohort year examined in 2008.

Drawing on Bailey et al.'s (2005) research, I expect a higher percentage of Pell Grant recipients and EOPs enrollment to have a negative impact on Latinx student cohort completion rates. In addition, I expect a higher percentage of full-time students and number of credit sections offered as a proxy for institution size to have a positive impact on Latinx student cohort completion rates. I expect a higher percentage of Latinx faculty, administrators, and students to have a positive impact on Latinx student cohort completion rates. Other institutional characteristics that community college research such as Bailey et al.'s (2005) have shown to influence completion rates that were not captured in my model are urban location (+), expenditures on administrators (+), and expenditures on student services (+). I did not capture urban location since this variable is a fixed effect that is controlled for in the panel-data regression. Bailey et al. (2005) note larger expenditures on administrators can create policies and practices that promote a positive work culture and staff retention. The reason I did not include these variables was that the California Community College Chancellor's office does not have data on expenditures of administrators or expenditures on student services readily available for each college and for every year. Table 3 includes a description of each of the explanatory variables I used in the model and the expected effect on the dependent variable.

Table 3. Description of Each Explanatory Variable and Expected Impact

Variable Name	Description	Expected Impact
Latinx_Faculty_Full_Time_ Percentage	Percentage of Latinx Full-Time Faculty	+
Latinx_Faculty_Part_Time_ Percentage	Percentage of Latinx Part-time Faculty	+
Latinx_Admin_Percentage	Percentage of Latinx Administrators	+
Female_Percentage	Percent of Students Female at College in Year that Cohort Started	+
Age21to24_Percentage	Percentage of Students Age 21-24 in Cohort	-
Age25to39_Percentage	Percentage of Students Age 25-39 in Cohort	+
Age40Plus_Percentage	Percentage of Students Age 40 plus in Cohort	+
African_American_ Percentage	Percentage of African American Students in Cohort	?
Asian_Percentage	Percentage of Students Asian in Cohort	?
Filipino_Percentage	Percentage of Students Filipino in Cohort	?
Latinx_Percentage	Percentage of Students Latinx in Cohort	+

Native_American_ Percentage	Percentage of Students Native American in Cohort	**?**
Pacific_Islander_Percentage	Percentage of Students Pacific Islander in Cohort	**?**
White_Percentage	Percentage of Students White in Cohort	**?**
Pell_Grant_Recipient_ Percentage	Percentage of Students Pell Grant Recipients	**-**
Full_Time_Student_ Percentage	Percentage of Students Full-time in cohort	+
Number_Credit_Sections	Number of Credit Sections	+
Avg_Enrollment_Per_Credit _Section	Average Enrollment Per Credit Section	+
Evening_Credit_Section_ Percentage	Percentage of Evening Credit Sections	+
Hybrid_Credit_Section_ Percentage	Percentage of Hybrid Credit Sections	+
Educ_Opp_Prog_Enroll_ Percentage	Percentage of EOPs Enrollment	**-**
2008_Cohort_Start	Student cohort began in 2008	**?**
2009_Cohort_Start	Student cohort began in 2009	**?**
2010_Cohort_Start	Student cohort began in 2010	**?**
2011_Cohort_Start	Student cohort began in 2011	**?**

Multicollinearity

Prior to conducting the panel-regression, I tested for the possibility of multicollinearity in this data. Multicollinearity occurs when the explanatory variables in the model operates in a manner where they are highly linearly related, which makes it difficult to assess the statistical significance of each from one another. I test for this by first deriving the simple correlation coefficients between all the explanatory variables in my model. A simple correlation coefficient reviews the relationship between any two variables. This statistical command shows the effect one variable has on another when it increases and has a range close to -1 or 1. Given the size of the Stata output, which checked for pairwise correlation coefficients, I have placed this table in the Appendix section (Appendix A). There are no coefficients that are close to 1 or -1. Thus, there are no strong relationships between any two variables, which indicates multicollinearity most likely does not exist. In addition, I also ran a variance inflation factor (VIF) after I ran my panel-data regression, which is another method to check for multicollinearity. If VIF value is more than 5 for any variable, there may be a multicollinearity issue. However, my VIF in Table 4 shows a mean of 4.10. These tests show that multicollinearity does not exist between each variable.

Table 4. Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
_WhitePer	22.3	0.044
_LatinPer	21.63	0.046
_AsianPer	8.82	0.113
_AfAmPer	5.52	0.181
_Age40Plus	4.69	0.213
_Age21to24	4.06	0.246
_Lat_PTFac	2.96	0.338
_Start2011	2.54	0.393
_PellPer	2.4	0.417
_Lat_FTFac	2.33	0.429
_Start2010	2.25	0.443
_FemalePer	2.19	0.456
_Age25to39	2.18	0.458
_EnrollPer_Cred	2.16	0.463
_FTStudent	2.1	0.476
_EligibleEOPPer	2.07	0.482
_FilipPer	2.07	0.483
_Evening_Cred_Sec	2.02	0.494
_Start2009	1.95	0.512
Hybrid	1.94	0.514
_Start2008	1.66	0.602
_NatAmPer	1.53	0.652
_TotalCredit	1.47	0.678
_Lat_Admin	1.42	0.702
_PacificPer	1.29	0.772
_FTFacPer	1.16	0.86
Mean VIF	4.1	

Heteroskedasticity

The last test I conducted was to check for heteroskedasticity. Heteroskedasticity can create bias in the test statistics and confidence intervals. I used The Wooldridge Test (Drukker 2003) to look at the significance value of chi2 variable. If chi2 variables are significant, this means the presence of heteroskedasticity, which means the data is not

normally distributed and needs to be corrected. If heteroskedasticity is not corrected, it can skew the statistical significance of the key explanatory variables' coefficients (direction and how much the dependent variable is expected to increase when the independent variable increases by one). To fix this, I reran my regression using the robust standard error command to review if my p-value changed much. By using robust standard errors, it does not change the coefficient estimated but, instead, changes the test statistics and p-values, which gives more accurate results. I reviewed my original regression results with the robust regression results, and my p-values did not change much, indicating heteroskedasticity is not a problem for my model.

Table 5. Breusch-Pagan / Cook-Weisberg Test for Heteroskedasticity

H0: Constant variance

Variables: fitted valued of YUnprepCom

Chi2(1) = **1.31**

Prob > chi2 = **0.2517**

Descriptive Statistics

Table 6 provides a summary of the descriptive statistics for the dependent and explanatory variables, which includes the total number of observations, mean, standard deviation, maximum, and minimum values each variable can take.

Table 6. Descriptive Statistics of All Dependent and Explanatory Variables Used

(540 Observations drawn from 108 California Community Colleges and Five Cohorts Starting in the fall of 2007, 2008, 2009, 2010, and 2011)

Variable Name	Mean	Standard Deviation	Minimum	Maximum
Dependent				
Latinx_ Prepared_Econ_Advantage	65.62	16.68	0	100.00
Latinx_ Prepared_Econ_Disadvantage	62.16	12.74	0	100.00
Latinx_ Unprepared_Econ_Advantage	33.95	12.61	0	100.00
Latinx_ Unprepared_Econ_Disadvantage	35.78	5.80	17	52.60
All_Overall_Comp_Rate	46.45	7.89	23	67.00
Explanatory				
Faculty Admin Characteristics				
Latinx_Faculty_Full_Time_Percentage	12.27	6.26	0.00	37.21
Latinx_Faculty_Part_Time_Percentage	10.16	6.58	0.00	66.67
Latinx_Admin_Percentage	15.00	11.21	0.00	57.14
Student Cohort Characteristics				
Female_Percentage	53.13	6.70	18.77	69.30
Age21to24_Percentage*	31.47	6.90	4.41	100.00
Age25to39_Percentage	27.39	5.14	9.90	53.39
Age40Plus_Percentage	14.84	6.92	5.00	44.95
African_American_Percentage**	7.09	7.00	0.19	44.40
Asian_Percentage	9.79	9.00	0.30	40.64
Filipino_Percentage	2.79	2.45	0.10	17.60
Latinx_Percentage	41.61	16.32	13.50	90.85
Native_American_Percentage	0.60	0.92	0.00	6.80
Pacific_Islander_Percentage	0.52	0.54	0.00	5.45
White_Percentage	29.91	15.48	1.30	75.80
Pell_Grant_Recipient_Percentage	21.83	10.02	3.83	53.69
Full_Time_Student_Percentage	48.25	9.52	10.40	76.09
Instutional_Characteristics				
Number_Credit_Sections	14389.50	770.84	254.00	4016.00
Avg_Enrollment_Per_Credit_Section	27.59	5.20	13.35	42.81
Evening_Credit_Section_Percentage***	26.80	5.40	12.03	43.93
Hybrid_Credit_Section_Percentage	15.92	8.61	0.00	66.38
Educ_Opp_Prog_Enroll_Percentage	4.15	2.24	0.92	13.82
Macroeconomic Characteristics				
2008_Cohort_Start**	0.20	0.40	0.00	1.00
2009_Cohort_Start	0.20	0.40	0.00	1.00
2010_Cohort_Start	0.20	0.40	0.00	1.00
2011_Cohort_Start	0.20	0.40t	0.00	1.00

Notes: Excluded categories: *less than age 21, **unknown (mixed race/ethnicity and decline to state), ***percentage of all sections offered in daytime, and ****cohort began in the fall of 2007.

Conclusion

In this chapter, I discussed the data sources, regression model, and limitations to my data set and model as I aim to explore whether there is a positive relationship between a higher percentage of Latinx faculty and administrators on Latinx completion rates in the cohorts studied. I discussed the weaknesses of my model and tests I ran to strengthen it. In the next chapter, I will present and interpret findings from my regression analyses.

CHAPTER 4: FINDINGS

In the previous chapter, I discussed the regression model I used to test my hypothesis that an increase in Latinx faculty and administrators would influence completion rates of Latinx students in California community colleges. In this chapter, I present the regression results for each of the four dependent variables I examined – Latinx students designated prepared and economically advantaged, Latinx students designated prepared and economically disadvantaged, Latinx students designated unprepared and economically advantages, and Latinx students designated unprepared and economically disadvantaged. For comparison sake, I also offer regression results that use overall completion rate data.

In the remainder of this chapter, I present my findings of the key explanatory variables and other explanatory variable results from my panel-data regression model that did not account for interaction variables. Then, I explain why I added interaction variables to my model. Finally, I share my regression results with the interaction variable and compare how the magnitude and direction of the variables changed, given the different models.

Hypothesis

Research Question

What are institutional characteristics that drive differences in success rates for Latinx students in California community colleges? Specifically, I wish to test whether institutions with higher percentages of Latinx full-time or part-time faculty or

administrators have higher completion rates among different Latinx student cohort groups.

> H0 – In Latinx student cohorts of different academic and economic classifications at different California Community colleges that started their education in the fall of 2007, 2008, 2009, 2010 and 2011, there is no relationship between the percentage of Latinx full-time faculty, Latinx part-time faculty, or Latinx administrators and completion rates. This is measured as a percentage of the Latinx student within each of the cohorts achieving their stated goal of either receiving a certificate, associate's degree, or transfer (are transfer ready).

Panel-Data Regression Estimation with and without Interaction Variables

The reason I ran two sets of regressions that utilize all the dependent variables of interest is that the first regression describes the influence of the key explanatory variables if the community college's (unit of analysis) percentage of Latinx students held constant. Given that the average percentage of Latinx students in the California community colleges is 42%, you can think of the effect calculated earlier as adding one more percentage point of full-time faculty, part-time faculty, or administrators that are Latinx to a college with a percentage of Latinx students at the statewide average of 42%. However, it is important to measure the effects not only as if Latinx students' percentages were held constant but also measure if the Latinx faculty or administrators' variable effects changed when the percentage of Latinx students at the California community colleges studied rise.

The first type of regression analysis included no interaction effects between my three key explanatory variables (Latinx full-time faculty, Latinx part-time faculty, and Latinx administrators) and the percentage of Latinx students at a college. In addition, all of these control for other explanatory factors thought to influence the different types of Latinx student cohorts – Latinx students designated prepared and economically advantaged, Latinx students designated prepared and economically disadvantaged, Latinx students designated unprepared and economically advantaged, and Latinx students designated unprepared and economically disadvantaged, and overall completion rates for the cohort of all Latinx students. These regressions results are in Table 7.

For each regression analysis, Table 7 lists the explanatory variables on the far-left column then the regression results of each of the dependent variables examined in the subsequent columns. I included the regression coefficient followed by the regression standard error in parenthesis for each regression result. I placed asterisks by regression coefficients that were statistically significant at the 90% confidence interval or greater (in a two-tailed test). I will only discuss the detected effects found to be statistically significant. The results from the first-row percentage of Latinx full-time faculty (tenure or tenured track) – which range varies from 0% to 37% across the various community college institutions – indicate a one-percentage-point increase in the percentage of Latinx full-time faculty is expected to raise the completion rate of Latinx students designated prepared and economically advantaged at 0.91, which is relatively large in magnitude finding. This means for every one-percent increase of Latinx full-time faculty, there is a 0.91 increase of completion rates for Latinx students in the cohort academically prepared

and economically advantaged. However, this key explanatory variable was not statistically significant for the other dependent variables examined.

Regarding the percentage of Latinx part-time faculty – which ranges from 0 to 67% across the community colleges examined -- a one-percentage-point increase in the percentage of Latinx part-time faculty is expected to decrease completion rates of Latinx students designated prepared and economically advantaged at 0.65 and Latinx students designated prepared and economically disadvantaged at a similar magnitude at 0.55. However, for Latinx students deemed academically unprepared and economically disadvantage, there is a slight percentage-point increase of 0.09 regarding the impact of this key explanatory variable.

For the last key explanatory variable I examined, the percentage of Latinx administrators – which ranged from 0 to 57% -- indicates there is a positive but relatively small influence on completion rates for Latinx students designated prepared and economically advantaged at an increase of 0.38 and Latinx students designated unprepared and economically disadvantage at an increase of 0.04.

Given Fairlie and Oreopoulos's (2014) findings that white students' performance decreased when taught by instructors of color and that Latinx instructors had mixed results regarding the impact on other non-Latinx students, I also included overall completion rates in this first set of regressions to see if an increase in the percentage of Latinx faculty and administrators had a negative impact on overall completion rates, which encompasses all student groups by race. The explanatory variable percentage of Latinx full-time faculty is not statistically significant. However, the explanatory variables

Latinx part-time faculty and Latinx administrators are statistically significant. A one-percentage-point increase in part-time Latinx faculty resulted in a 0.11 increase in overall completion rates. In addition, a one-percentage-percentage point increase of Latinx administrators resulted in a .04 increase in overall completion rates. These findings are very small in magnitude. However, these findings highlight an increase of Latinx faculty and administrators does not decrease overall completion rates for all students. Given my research focus was impact on Latinx faculty and administrators on Latinx students, checking the impact of Latinx faculty and administrators on other student racial/ethnic group is outside of this research's scope, and that is why I focused on looking at overall completion rates instead.

Regarding the other 27 explanatory variables I controlled for, most yielded some statistically significant results. However, none of the key explanatory or other explanatory variables yielded consistent statistically significant results in regard to magnitude and direction across all four types of Latinx student group classifications. The percentage of full-time faculty was found to have a small magnitude and positive influence on completion rates for Latinx students deemed prepared and economically advantaged at an increase of 0.38 and for Latinx students deemed unprepared and economically disadvantaged an increase of 0.06. For student cohort characteristics, a one-percentage-point increase in the percentage of students who are Pell Grant recipients led to a decrease in completion rates for Latinx students prepared and economically advantaged (decrease of 0.23) and Latinx students unprepared and academically unprepared (decrease of 0.09). In addition, a one-percentage-point increase in the

percentage of full-time students led to an increase of completion rates for Latinx students academically prepared and economically advantaged (increase at 0.49). These findings are consistent with Bailey et al.'s 2005 scholarly research and my expectations of how these control variables would impact the dependent variables in increasing or decreasing completion rates.

For institutional characteristics, several variables such as average enrollment per credit section, percentage of evening credit sections offered, percentage of hybrid credit sections offered, and percentage of Educational Opportunity Program Services (EOPS) enrollment were statistically significant for at least one of the four dependent variables. In particular, a one-percentage-point increase in average enrollment per credit section led to an increase of completion rates for Latinx students deemed prepared and economically advantaged at an increase of 0.34 and for Latinx students deemed unprepared and economically disadvantaged at an increase of 0.13. Every percentage increase in evening credit sections offered, which comes from a percentage decrease in daytime courses offered, led to a 1.25 increase in completion rates for Latinx students designated prepared and economically advantaged and a 0.46 increase in completion rates for Latinx students designed unprepared and economically disadvantaged. This is the largest institutional characteristic impact detected in my regression across all four dependent variables. Perhaps an explanation for this is that Latinx community college students are more likely to also work given their high percentage of workforce participation. Thus, evening classes are beneficial to help them achieve their stated educational goals. However, this explanatory variable was not consistently statistically significant across all dependent

variables. In addition, every percentage increase in hybrid credit sections offered, which comes from a percentage decrease in day-time courses offered, led to an increase of completion rates for Latinx students designated prepared and economically advantaged by 0.46 percentage points and completion rates for Latinx students designated unprepared and economically disadvantaged by 0.08 percentage points. Lastly, the percentage of Educational Opportunity Program Services (EOPS) enrollment was positive and statistically significant (increase of 0.46) for Latinx students designated prepared and economically advantaged, which is the opposite outcome I expected.

It is important to note other explanatory variables such as macroeconomic factors like cohort year and other student cohort characteristics also had regression coefficients that were statistically significant. However, I did not explicate these findings, given that my primary focus was to examine how Latinx faculty and administrators' characteristics and institutional characteristics influence completion rates for Latinx students.

Table 7: Regression Results Using Completion Rate of Latinx Students as Dependent Variables

	Dependent Variable: Latinx Completion Rates				
Explanatory Variable	**All Overall Completion Rate**	**Prepared Economically Advantaged**	**Prepared Economically Disadvantaged**	**Unprepared Economically Advantaged**	**Unprepared Economically Disadvantaged**
Faculty Admin Characteristics					
Latinx_Faculty Full_Time Percentage	-0.021 (0.045)	0.905*** (0.146)	0.509 (0.254)	0.167 (0.127)	0.190 (0.117)
Latinx_Faculty Part_Time Percentage	0.110*** (0.025)	-0.654* (0.253)	-0.551** (0.135)	-0.107 (0.103)	0.095* (0.045)
Latinx_Admin_ Percentage	0.041** (0.010)	0.150** (0.041)	0.033 (0.037)	0.033 (0.060)	0.042*** (0.005)
Full_Time_ Faculty Percentage	0.022 (0.021)	0.382*** (0.063)	-0.049 (0.130)	0.132 (0.070)	0.062* (0.024)
Student Cohort Characteristics					
Female_ Percentage	0.112* (0.048)	0.190 (0.124)	-0.436 (0.135)	0.305 (0.321))	0.006 (0.124)
Age21to24_ Percentage	-0.063* (0.025)	0.222 (0.124)	0.186 (0.135)	-0.088 (0.113)	-0.097 (0.062)
Age25to39_ Percentage	-0.074 (0.045)	-0.708* (0.319)	0.863* (0.084)	-0.021 (0.214)	-0.222*** (0.044)
Age40Plus_ Percentage	-0.050 (0.034)	0.345 (0.323)	-0.157*** (0.048)	-0.300 (0.210)	-0.157** (0.048)
African_ American_ Percentage	-0.046 (0.023)	0.745*** (0.051)	0.951 (0.471)	0.338** (0.119)	0.295 (0.184)
Asian_ Percentage	0.098* (0.046)	-0.750 (0.168)	0.442** (0.117)	-0.100 (0.162)	0.405*** (0.060)
Filipino_ Percentage	-0.128 (0.069)	2.235** (0.746)	0.212 (0.431)	0.666 (0.422)	0.055 (0.154)
Latinx_ Percentage	-0.073** (0.017)	0.654** (0.175)	-0.026 (0.177)	0.423 (0.226)	0.127 (0.094)
Native_ American_ Percentage	230 (0.204)	-0.590 (1.416)	0.511 (0.533)	0.791 (0.765)	0.517** (0.148)
Pacific_ Islander Percentage	0.142 (0.113)	5.611*** (1.344)	3.148* (1.224)	-1.756*** (0.318)	0.088 (0.064)
White_ Percentage	0.030** (0.011)	-0.226 (0.310)	-0.309*** (0.070)	-0.285 (0.169)	0.241*** (0.031)
Pell Grant_ Recipient_ Percentage	0.003 (0.013)	-0.229* (0.096)	0.076 (0.097)	0.050 (0.029)	-0.087** (0.029)

Full_Time_ Student_ Percentage	0.103** (0.040)	0.486** (0.161)	0.047 (0.151)	0.064 (0.038)	0.041 (0.056)
Instutional_ Characteristics					
Number_Credit Sections	-0.001*** (0.000)	-0.007 (0.003)	-0.002 (0.001)	0.003* (0.001)	0.0006 (0.0003)
Avg_ Enrollment_Per Credit_Section	0.086 (0.049)	0.342** (0.098)	-0.290 (0.202)	0.344 (0.167)	0.126** (0.035)
Evening_Credit Section_ Percentage	-0.060** (0.16)	1.249** (0.068)	-0.473 (0.396)	0.456** (0.130)	0.060 (0.078)
Hybrid_Credit_ Section_ Percentage	-0.039* (0.018)	0.460** (0.146)	-0.024 (0.172)	-0.189 (0.091)	0.075** (0.019)
EducOppProg_ (EOP)Enroll_ Percentage	0.017** (0.004)	0.455*** (0.077)	-0.041 (0.044)	-0.058 (0.038)	-0.001 (0.177)
Macroeconomic Characteristics					
2008_Cohort Start	-1.385*** (0.115)	1.191* (0.496)	--0.574 (0.530)	-1.618 (0.417)	-1.394*** (0.169)
2009_Cohort Start	-2.734** (-.287)	-3.092 (1.653)	2.410 (0.886)	-1.614 (0.847)	-1.396** (0.358)
2010_Cohort Start	-2.213** (0.286)	-1.191 (2.435)	3.741*** (0.836)	1.621 (0.960)	-0.798 (0.444)
2011_Cohort Start	-2.007*** (0.354)	0.254 (2.973)	1.911 (1.113)	5.042*** (1.077)	-0.286 (0.679)
Constant	42.468 (5.690)	-50.825** (18.290)	94.199*** (20.506)	-18.401 (10.854)	17.262 (11.629)
Within R-Squared	0.157	0.136	0.070	0.139	0.090

^ Using STATA "xtscc" command with "lag(4)" and college-specific fixed effects.
Confidence Percentage Levels: * = 90% to 94% [p<.10]; ** = 95% to 98% [p<.05]; *** = 99% [p<.01]
Robust standard errors in parenthesis.

Since my first regression results varied greatly in terms of statistical significance of the key explanatory and control variables, I wanted to examine if interaction variable effects exist. Specifically, if the percentage of Latinx students (control variable) influences the effect of percentage of Latinx faculty and administrators (key explanatory variables). The reason for this is my first regression results describes the influence of the key explanatory variables if the community college's (unit of analysis) percentage of

Latinx students is held constant at the average of 42%. However, I must also measure how the effects changed depending on the interaction between percentage of Latinx faculty and administrators and rise in percentage of Latinx students within the community colleges examined.

Accounting for interaction variable effects could help me further understand how the composition of the student body such as percent of Latinx students in the community colleges studied could change the effect of Latinx faculty and administrators' influence on the different dependent variables (cohort completion rates for different classifications of Latinx students). Thus, I generated interaction variables to see whether or not percentage of Latinx students (control variable) influences the effect of percentage of Latinx faculty and administrators (key explanatory variables) on the different dependent variables. To generate the interaction variables, I multiplied percentage of Latinx full-time faculty with percentage of Latinx students, percentage of Latinx part-time faculty with percentage of Latinx students, and percentage of Latinx administrators with percentage of Latinx students to generate three new interaction variables. Table 8 offers the descriptive statistics for each of these three new explanatory variables.

Table 9 includes explanatory interaction variables, if any, of the interactions that exert an influence on cohort completion that is statistically significant from zero at a p-value less 0.10, or 90 (95) percent confidence in a two (one) tailed test. I was able to reject the null hypothesis but not in its entirety given impact of the different dependent variables.

Table 8. Descriptive Statistics of Variables Generated to Measure Interaction Effects

Interaction Variable Generated	Observation	Mean	Standard Deviation	Minimum	Maximum
Percentage of Latinx full-time faculty * percentage of Latinx students	539	560.85	471.84	0	2790
Percentage of Latinx part-time faculty* percentage of Latinx students	539	500.4	577.99	0	6056.97
Percentage of Latinx administrators * percentage of Latinx students	528	701.01	712	0	4422.63

Table 9 lists the regression results using four different forms of Latinx cohorts as the dependent variables along with the interaction variable results. A one-percentage-point increase in percentage of Latinx full-time faculty is expected to raise the cohort completion rate of Latinx students designated prepared and economically advantaged by 2 percentage points if there are no Latinx students at the college. But the smallest percentage of Latinx student at a California community college in this sample is 14%. Subsequently, the percentage of Latinx student effect needs to be considered by measuring the interaction effect which results are located at the bottom of Table 9. To find the interaction effect of Latinx full-time faculty, take the 1.99 for zero percentage of Latinx students designated prepared and economically advantage and add (the % Latinx students * -0.028). Or, another way of thinking about this is finding when the positive effect goes away by dividing it by the interaction effect (1.996 / 0.0282) or about 71%.

Similarly, the interaction effect for Latinx students designated unprepared and economically advantaged, which takes the .802 coefficient for zero percentage and divides it by the % of Latinx students * 0.149, becomes negative when 5.38% of the student body is Latinx. Next, to find the interaction effect of Latinx part-time faculty, I take the -2.03 for zero percentage of Latinx students designated prepared and economically disadvantaged and divide it by the interaction effect .028. The result indicates when the Latinx student body reaches beyond 73% the effect becomes positive. The interaction effect for Latinx students designated unprepared and economically advantaged, which takes the -0.378 coefficient for zero percentage and divides it by the % Latinx students * 0.006 becomes positive when 63% of the student body is Latinx. Lastly, to find the interaction effect of Latinx administrators, I take the .532 for zero percentage of Latinx students designated prepared and economically advantaged and divide it by the interaction effect .009. The result indicates when the Latinx student body reaches beyond 59% the effect becomes negative. The interaction effect for Latinx students designated unprepared and economically advantaged, which takes the -.284 coefficient for zero percentage and divides it by the % Latinx students * 0.007 becomes positive when 41% of the student body is Latinx.

The interaction effect of Latinx faculty and administrators on the overall completion rates was only statistically significant for percent of Latinx full-time faculty. The interaction effect of Latinx full-time faculty becomes positive on overall completion rates when 45% of the student body is Latinx.

Regarding the other 27 explanatory variables I controlled for, all but two control variables yield statistically significant results to some degree. However, none of the key explanatory or other explanatory variables I controlled for yielded consistent statistically significant results across all four types of Latinx cohort classifications. Percentage of full-time faculty was found to have a small magnitude and positive influence on completion rates for Latinx students deemed prepared and economically advantaged at an increase of 0.35, Latinx students deemed unprepared and economically advantaged at an increase of 0.17, and Latinx students deemed unprepared and economically disadvantaged at an increase of 0.07. For student cohort characteristics, a one-percentage-point increase of students who are Pell Grant recipients led to a decrease in completion rates for Latinx students unprepared and economically advantaged (decrease of 0.07) and Latinx students unprepared and economically disadvantaged (decrease of 0.09). In addition, a one-percentage-point increase in percentage of full-time students led to an increase of completion rates for Latinx students academically prepared and economically advantaged (increase at 0.49). For institutional characteristics, a one-percentage-point increase in average enrollment per credit section led to an increase of completion rates for Latinx students deemed prepared and economically advantaged at an increase of 0.33 and for Latinx students deemed unprepared and economically disadvantaged at an increase of 0.15, which is fairly close to the previous regression results. A one-percentage-point increase for percentage of evening credit sections offered led to a similar statistically significant result at 1.23% increase of completion rates for Latinx students designated prepared and economically advantaged and a less significant increase at 0.50 for Latinx

students designated unprepared and economically advantaged. Percentage of hybrid credit sections offered had mixed results in this regression. Specifically, a one-percentage-point increase in hybrid credit sections offered led to an increase by 0.44 percentage points of completion rates for Latinx students designated prepared and economically advantaged, a decrease by 0.20 percentage points of completion rates for Latinx students designated unprepared and economically advantaged, and an increase by .07 percentage points of completion rates for Latinx students designated unprepared and economically disadvantaged. Lastly, percentage of Educational Opportunity Program Services (EOPS) enrollment was positive and statistically significant (increase of 0.45) for Latinx students designated prepared and economically advantaged which is the opposite outcome I expected. It is important to note that other explanatory variables such as macroeconomic factors like cohort year and other student cohort characteristics also had regression coefficients that were statistically significant. However, I did not explicate these findings given my primary focus was to examine how Latinx faculty and administrators' characteristics and institutional characteristics influence completion rates for Latinx students.

Table 9: Regression Results Using Completion Rate of Latinx Students as Dependent Variables with Interaction Variables

		Dependent Variable: Latinx Completion Rates			
Explanatory Variable	**All Overall Completion Rate**	**Prepared_ Economically Advantaged**	**Prepared_ Economically Disadvantaged**	**Unprepared_ Economically Advantaged**	**Unprepared_ Economically Disadvantaged**
Faculty Admin Characteristics					
Latinx_Faculty_ Full_Time Percentage	-0.342** (0.121)	1.996** (0.654)	0.867 (0.606)	0.802** (0.257)	0.321 (0.238)
Latinx_Faculty_ Part_Time_ Percentage	0.122** (0.212)	-2.030** (0.504)	-0.763 (0.526)	-0.378 (0.123)	0.516 (0.352)
Latinx_Admin_ Percentage	0.019 (0.027)	0.532*** (0.106)	0.043 (0.102)	-0.284* (0.123)	0.002 (0.035)
Full_Time_ Faculty Percentage	0.024 (0.021)	0.350*** (0.079)	-0.049 (0.121)	0.166* (0.068)	0.065** (0.023)
Student Cohort Characteristics					
Female_ Percentage	0.124* (0.057)	0.190 (0.126)	-0.442 (0.291)	0.295 (0.315)	-0.014 (0.132)
Age21to24_ Percentage	-0.064 (0.033)	0.303* (0.117)	0.198 (0.153)	-0.082 (0.104)	-0.119 (0.072)
Age25to39_ Percentage	-0.070 (0.050)	-0.705** (0.255)	-0.364* (0.166)	0.035 (0.171)	-0.235*** (0.054)
Age40Plus_ Percentage	-0.058 (0.034)	0.410 (0.299)	0.878*** (0.081)	-0.287 (0.181)	-0.165** (0.044)
African_ American_ Percentage	-0.072 (0.053)	0.771*** (0.097)	0.966 (0.517)	0.351** (0.114)	0.332 (0.197)
Asian_Percentage	0.088 (0.047)	-0.631 (0.500)	0.450** (0.154)	-0.177 (0.151)	0.395*** (0.051)
Filipino_ Percentage	-0.054 (0.154)	2.186** (0.656)	0.144 (0.380)	0.455 (0.320)	-0.026 (0.150)
Latinx_ Percentage	-0.183* (0.082)	0.915* (0.349)	0.046 (0.379)	0.391 (0.223)	0.236 (0.175)
Native American Percentage	0.205 (0.178)	-0.664 (1.236)	0.514 (0.532)	0.821 (0.804)	0.584** (0.157)
Pacific Islander Percentage	0.170 (0.110)	5.749*** (1.167)	3.113* (1.268)	-2.041*** (0.379)	0.031 (0.061)
White_ Percentage	0.029* (0.011)	-0.207 (0.104)	-0.310*** (0.065)	- 0.314 (0.163)	0.239*** (0.032)
Pell Grant_ Recipient_ Percentage	-0.001 (0.015)	-0.083 (0.093)	0.0841 (0.094)	0.069* (0.030)	-0.087** (0.026)
Full_Time _Student Percentage	0.108* (0.044)	0.492** (0.148)	0.043 (0.164)	0.049 (0.041)	0.033 (0.065)

Instutional_Characteristics					
Number_Credit_Sections	-0.001*** (000)	-0.006 (0.003)	-0.002 (0.002)	0.003 (0.001)	-0.000 (0.000)
Avg_Enrollment_Per_Credit_Section	0.078 (0.055)	0.326*** (0.067)	-0.296 (0.220)	0.292 (0.164)	0.149** (0.050)
Evening_Credit_Section_Percentage	-0.062** (0.019)	1.231*** (0.084)	-0.468 (0.391)	0.504** (0.129)	0.063 (0.075)
Hybrid_Credit_Section_Percentage	-0.033 (0.016)	0.441** (0.141)	-0.029 (0.180)	-0.196* (0.093)	0.073** (0.019)
Educ_Opp_Prog_Enroll_Percentage	0.079* (0.005)	0.453*** (0.069)	0.040 (0.042)	-0.060 (0.038)	0.002 (0.014)
Macroeconomic Characteristics					
2008_Cohort Start	-1.268*** (0.196)	1.185 (0.624)	-0.616 (0.776)	-1.583** (0.481)	-1.594*** (0.337)
2009_Cohort Start	-2.617*** (0.385)	-2.9291 (1.862)	2.445 (1.197)	-1.134 (0.908)	-1.679** (0.606)
2010_Cohort Start	-2.105*** (0.369)	-1.020 (2.731)	3.810*** (1.158)	2.270* (1.039)	-1.102 (0.700)
2011_Cohort Start	-1.882** (0.500)	0.665 (3.324)	2.009 (1.516)	5.725*** (1.196)	-0.696 (1.011)
Interaction Effects (reported if statistically significant)					
Latinx_FullTime_Fac_% * Latinx_Student_%	0.007** (0.002)	-0.0282* (0.011)	-	-0.149* (0.006)	-
Latinx_PartTime_Fac_% * Latinx_Student_%	-	0.028** (0.008)	-	0.006** (0.001)	-
Latinx_Admin_% * Latinx_Student_%	-	-0.009*** (0.002)	-	0.007** (0.002)	-
Constant		-64.187** (25.074)	90.891*** (14.418)	-17.397 (13.891)	14.286 (9.235)
Within R-Squared	0.167	0.147	0.070	0.147	0.099

^ Using STATA "xtscc" command with "lag(4)" and college-specific fixed effects.
Confidence Percentage Levels: * = 90% to 94% [p<.10]; ** = 95% to 98% [p<.05]; *** = 99% [p<.01]
Robust standard errors in parenthesis.
(Latinx Faculty and Admin %s interacted with % Latinx Students)

Conclusion

In this chapter I presented findings from my panel-data regression models with and without interaction variables. I was able to reject the null hypothesis primarily for Latinx students designated prepared and economically advantaged, but the results were mixed for the other student classifications even after adding for the effect of interaction variables. In the final chapter of my thesis, I discuss limitations to my regression model, an explanation as to why I was unable to reject the null hypothesis altogether, and how these results could be utilized in discussions surrounding education policy.

CHAPTER 5: CONCLUSION

In chapter 4, I shared my two regression models with and without interaction variable findings. In this chapter, I will discuss which results were consistent with the literature and which results had the opposite effect I anticipated. I will also share possible explanations for these findings and limitations from my study. I will conclude with recommendations for how these findings can be utilized to further research on this topic and considered in policy discussions surrounding racial/ethnic diversity in the teacher workforce.

Re-examining the Public Policy Problem and My Research Question

My thesis argued low completion rates for Latinx students in California Community Colleges is both an efficiency and equity public policy issue that needs to be addressed. I used Munger's Triangle, which is a visual representation of how markets, politics, and experts intersect and compete with one another to enact policies to analyze this public policy problem (Hinich & Munger, 1997). Low college completion of Latinx students in California community colleges is an efficiency issue because it contributes to the persistent racial equity gap in higher education between white students and students of color. As noted in Figure 3, Latinx student completion rates are lower than white student completion rates and overall completion rates across all student groups. This is an efficiency problem because Latinx residents are the largest ethnic/racial group in California. Yet, they have the lowest proportion of college degree attainment of any ethnic/racial group. Latinx students have made great strides in educational attainment this

last decade, as noted in Figure 4 regarding high school completion rates (+12 percentage points) and meeting the CSU and UC requirements (+14 percentage points). However, college degree attainment (+3) has not increased to this level and is not projected to accelerate enough to meet labor market demands (Bohn, 2014). The lack of degree or certification completion for this group could create negative externalities for California since the state is at risk of not having a large enough skilled labor force to meet its economic demands. This could result in businesses that bring job opportunities and financial incentives through tax revenues to move to other states to attain a workforce with these highly sought-out skills. In addition, this is an equity issue as noted in Figure 5. The Latinx workforce participation is high, but Latinx are overrepresented in low-wage jobs. Subsequently, increasing college degree attainment for Latinx residents would provide them with certification and skills to meet labor market demands and increase their wage earnings, which is integral for wealth accumulation and social mobility. Thus, since California community colleges are the primary point of entry for Latinx students striving to attain a college certification or degree, it is critical researchers examine the institutional characteristics that contribute to student access, progress, and success for Latinx students. Research has heavily focused on student-level determinants of educational achievement, and my study aimed to shift focus on the policies California community colleges can institute to support the educational attainment of this group further.

One promising practice that scholars have called attention to is the prospect of increasing the racial/ethnic diversity of teachers in schools to improve student outcomes

for nonwhite students. Researchers have argued teachers of color benefit classrooms by their ability to tailor learnings to be culturally relevant and fit the lived experiences and academic needs of students of color compared to white teachers (Irvine, 1988; 2007; Villegas and Irvine, 2010). Also, researchers have argued teachers of color have more favorable views and higher expectations for students of color abilities and academic potential. Due to the United States' colonial history founded on racism, institutional and structural racism also exists in educational institutions through policies, practices, and culture. Structural racism has led to institutional policies that have negatively impacted student of color in areas such as placement in lower educational tracks, inaccessibility to equitable educational opportunities, and experience with more punitive disciplinary practices compared to white students (Bustillos and Siqueiros, 2018; Pitts, 2007; Villegas and Irvine, 2010). These interactions shape not only students of color experience regarding their sense of belonging at schools but also positively or negatively impact their self-concept, self-aspiration, and performance.

The lack of racial/ethnic diversity in the teacher workforce is a prevalent national public policy issue also facing CA's K-12 schools and public universities as emphasized in Figure 6 and Figure 7. These figures demonstrate the proportion of teachers of color in these education segments do not reflect the large proportion of students of color in these education segments. Given low completion rates of Latinx students in California Community Colleges, I explored and expanded on the very limited community college research on this topic. I studied same ethnicity/race impact of teachers, administrators,

and students by examining the percentage of Latinx faculty and administrators on cohort completion rates of different classifications of Latinx students.

The purpose of my thesis is to contribute further understanding of the institutional characteristics that drive differences in success rates for Latinx students in California community colleges. I tested whether institutions with higher percentages of Latinx full time or part-time faculty or administrators have higher completion rates among different Latinx student cohort groups. I carried out this research by assisting in data collection for a larger research project led by Professor Dr. Wassmer and doctoral student, Meredith Galloway. We collected cohort-level and institutional-level data using publicly available data from the California Community College Chancellor's Office's Student Success Scorecard and Datamart websites. We collected data such as completion rates for first-time enrolled, first-year students who declared their goal was to either complete a certificate, associate degree, or transfer[15] (or be transfer ready) to a four-year college for Latinx students designated prepared and economically advantaged, Latinx students designated prepared and economically disadvantaged, Latinx students designated unprepared and economically advantaged, Latinx students designated unprepared and economically disadvantage, and overall cohort completion rates. Completion rates are measured by the percentage in the total entry-year cohort achieving their stated goal within six years. The five groups we examined began in the fall of 2007, 2008, 2009,

[15] Transfers to four-year universities are counted when data is captured by the *National Student Clearinghouse* or automatically captured if a student transfers to a California public four-year university. To be counted as a "transfer," students must have earned 12 or more units at the community college prior to transfer.

2010, and 2011. We studied 108 California community colleges and analyzed up to 540 observations. Then I conducted two panel-data regressions, one without interaction variables and one with interaction variable effects, using these and other explanatory variables to understand my research question.

Further Analyses of Research Findings

Table 10 below summarizes the direction of the detected statistically significant influences on the various types of Latinx students examined as well as the overall completion rates as a base comparison. The first top section has a summary of findings for the explanatory variables on the dependent variables without interaction effects. Then the next bottom-half section has the review of outcomes for the explanatory variable on the dependent variable with interaction effects. The interaction results are emphasized only when the interaction results gave statistically significant and different results than the non-interaction results. I have color-coded in “green” positive impacts, “red” negative impacts, and “yellow” no impacts between the three key explanatory variables on each of the five dependent variables. For the magnitude of an interaction effect, I assume the value expected to occur for a hypothetical California community college whose student body is 42% Latinx. In Table 10, there are 15 possible outcomes regarding the impact of increasing Latinx faculty and administrator representation.

In summary, the impact of Latinx faculty and administrators had 7 positive influences, 5 negative influences, and three no statistically significant on Latinx cohort completion rates across the four different classifications on Latinx students and overall completion rates. A percentage increase of Latinx full-time faculty had a negative impact

on overall completion rates and Latinx students designated unprepared and economically advantaged and had a positive impact on Latinx students designated prepared and economically advantaged. Percentage of Latinx part-time faculty had a negative impact on Latinx students designated prepared and economically advantaged and Latinx students designated prepared and economically disadvantaged and had a positive impact on overall completion rates, Latinx students designated unprepared and economically advantaged, and Latinx students designated unprepared and economically disadvantaged. Lastly, Latinx administrators had a negative impact on Latinx students designated unprepared and economically advantaged and a positive impact on overall completion rates, Latinx students designated prepared and economically advantaged, and Latinx students designated unprepared and economically disadvantaged.

Scenario-Based Analysis to Hiring Latinx faculty and administrators

Given the added interaction variable effects on the bottom-half section in Table 10, I also laid out the expected effect of hiring Latinx faculty and administrators in California Community Colleges. As shown in the second column of Table 10, the impact of hiring a Latinx full-time faculty member in a California Community College is expected to be negative on overall completion rates for all students unless the college has more than 45% of students who are Latinx. Regarding Latinx student cohorts only, this hiring of new Latinx full-time professors is expected to increase the completion rate of the prepared and economically advantaged in this cohort, unless the college has more than 71% Latinx students. In comparison, this hiring of new Latinx full-time professors is expected to have the opposite negative effect on the unprepared and economically

advantaged. There are no detected effects on the Latinx cohorts of prepared and economically disadvantaged, and unprepared and economically disadvantaged.

I discuss my explanation for these findings next. As previously mentioned from the academic literature, faculty of color can tailor learnings to be culturally relevant to fit the needs of students of color; faculty of color build strong relationships with students of color through mentoring, setting high expectations, and fostering a strong sense of belonging for students of color. In this case, Latinx full-time faculty impact had the strongest impact on Latinx students designated prepared and economically advantaged surrounding their self-concept, self-aspiration, and performance. Still, this impact may not be enough to overcome Latinx students who face more financial and academic hardships/barriers to complete their educational goals. According to research, this is likely due to how low socioeconomic status and lack of academic preparedness negatively impact student outcomes, so students in these circumstances may need more institutional resources outside of an interaction with a Latinx full-time faculty member alone (Bound, 2010; Bailey et al. 2005). In addition, hiring more Latinx faculty has a detected positive effect on completion rates for all unless the college has half or more Latinx students. This analysis could be a data-driven endorsement to hire more full-time Latinx faculty; however, community colleges should not expect improvements of all Latinx students but instead, the most economically and academically advantaged Latinx students.

Next, I analyze the expected effect of hiring a Latinx part-time faculty member. As shown in the second column of Table 10, the impact of hiring a Latinx part-time

faculty member on overall completion rates is expected to be positive. Regarding Latinx student cohorts only, this hiring of new Latinx part-time professors is expected to decrease the completion rate of the prepared and economically advantaged in this cohort, unless the college has more than 73% Latinx students. The hiring of new Latinx part-time professors is also expected to have a negative effect on the prepared and economically disadvantaged. There are also positive effects on the Latinx cohorts of unprepared and economically advantaged and unprepared and economically disadvantaged.

My explanation for these findings is similar to my previous analysis. The impact of Latinx part-time faculty has a positive impact on overall completion rates and the completion rates for specific classifications of Latinx students. I find that Latinx part-time faculty influence is positive for Latinx students classified as unprepared and both economically advantaged and economically disadvantaged. This suggests the representation of Latinx part-time faculty does not impact different classifications of Latinx students in the same way. Given that hiring more Latinx part-time faculty is correlated with an increase in overall completion rates, this can be considered an evidence-based endorsement to hire more part-time Latinx faculty. Still, institutions should not expect this policy to increase the outcomes across all classifications of Latinx students.

Finally, consider the expected effect on a California community college that aims to make its next hire (or series of hires) a Latinx administrator. As shown in the second column of Table 10, the effect on the overall completion rates for all students,

independent of race/ethnicity, is expected to be positive. Regarding Latinx student cohorts only, this hiring of new Latinx administrators is correlated with an increase in the completion rates of prepared and economically advantaged Latinx students, up to the threshold of the college having 60% and over Latinx students. The effect of bringing more Latinx administrators to the Latinx cohort of unprepared and economically advantaged is negative until the college's student body is higher than 41% Latinx, and always positive for the unprepared and economically disadvantaged. However, there is no impact on Latinx administrators for Latinx students designated prepared and economically disadvantaged.

Subsequently, it appears that the influence of Latinx administrators on completion rates has a positive impact on the most advantaged Latinx cohort when the Latinx presence is not large and the unprepared especially when more than four out of 10 students are Latinx. Given these findings, an increase of Latinx administrators benefits overall completion rates and different classifications of Latinx students overall. There are no caveats to these findings regarding the benefits of increasing the presence of Latinx administrators at California Community Colleges.

Table 10. – Direction of Detected Statistically Significant Influences of Various Types of Latinx Students

	Latinx Cohorts				
Explanatory Variable without interaction effects	All Overall Completion Rate	Prepared Economically Advantaged	Prepared Economically Disadvantaged	Unprepared Economically Advantaged	Unprepared Economically Disadvantaged
Latinx Full-Time Faculty %	none	positive	**none**	none	**none**
Latinx Part-Time Faculty %	**positive**	negative	**negative**	none	**positive**
Latinx Administrator %	**positive**	positive	**none**	none	**positive**

Explanatory Variable with interaction effects	All Overall Completion Rate	Prepared Economically Advantaged	Prepared Economically Disadvantaged	Unprepared Economically Advantaged	Unprepared Economically Disadvantaged
Latinx Full-Time Faculty %	**negative (positive beyond 45% Latinx students)**	**positive (negative beyond 71% Latinx students)**	none	**positive (negative beyond 5.8% Latinx students)**	none
Latinx Part-Time Faculty %	positive	**negative (positive beyond 73% Latinx students)**	none	**positive**	none
Latinx Administrator %	none	**positive (negative beyond 59% Latinx students)**	none	**negative (positive beyond 41% Latinx students)**	none

^ Based upon previous regression findings in Tables 8. And 9.

Other Explanatory Variables Overall Influence and Explanation of Findings

In general, regarding the other 27 explanatory variables I controlled for, most yielded statistically significant results. Similar to the key explanatory variables, there was variation regarding statistical significance, magnitude, and direction across the different classifications of Latinx students. Specifically, the percentage of full-time

faculty and percentage of full-time students in institutions had a positive impact, and the percentage of Pell Grant recipients had a negative impact on cohort completion rates for Latinx students. These findings are consistent with Bailey et al.'s (2005) research and my expectations of how these control variables would impact the dependent variables given that other research has found an increase in full-time faculty and full-time students positively impact institutions' completion rate. Also, Pell Grant recipients, which is a proxy for a students' low socioeconomic status, have been found to decrease institutions' completion rate. The percentage of the EOPS enrollment had a positive impact on cohort completion rates for Latinx students, which was surprising since this impact was the opposite of what I expected. As I looked closer, the positive result was only for Latinx students designated prepared and economically advantaged and had no effect on the program's target population on Latinx students designated unprepared and economically disadvantaged. Future research could examine the demographics of which student groups opt into this program and its impact on student outcomes.

Finally, regarding institutions' choices about classes offered, average enrollment per credit section had a positive impact on cohort completion rates for Latinx students, which refers to larger student class sizes. An explanation for this is institutions that have larger class sizes give Latinx students and other student groups more of a possibility to enroll given issues like impaction. The most interesting findings I learned in this process was that increasing the percentage of evening courses, which comes from a decrease of day-time courses, led to a significant increase at 1.25 on cohort completion rates for Latinx students. In addition, increasing the percentage of hybrid credit courses also had

positive and moderate impact on cohort completion rates for Latinx students. Thus, as institutions make policy choices regarding class offering times, there is an evidence-based endorsement to providing evening credit and hybrid credit sections for Latinx students.

Study Limitations

Although my goal was to capture as many explanatory variables that could potentially impact cohort completion rates for Latinx students, which is a subset of this cohort-level data, there are limitations to the data I collected and used in this study. The unit of analysis is cohort-level data of each institution examined. This study does not replicate Fairlie and Oreopoulos (2014) matching student-level performance indicators with racial matching/interaction of faculty in classrooms. Instead, my research aimed to operationalize and test racial/ethnic representation by analyzing the percentage of Latinx faculty and administrators on student outcomes for different classifications of Latinx students, which is more like Pitts' (2007) regression approach. Subsequently, I cannot be certain the ways in which Latinx students interacted with the Latinx faculty or administrators at each community college institution examined. In addition, Dee (2004) notes teacher quality can impact completion rates, which I did not capture in my model. Despite these limitations, my dataset and model provide several relevant institutional, student cohort-level, and macroeconomic characteristics grounded in academic research that influence completion rates in California Community Colleges.

Policy and Research Implications and Recommendations

Reflecting on the public policy problem and findings, I will discuss how what I have learned through this process could be utilized to push forward further research on this topic and contribute to the education policy discussions regarding racial/ethnic diversity in the teaching workforce.

Detected Direction of Regression Findings

Overall, the regression results found an increase in the percentage of Latinx faculty and administrators at the typical California community college resulted in seven positive influences, five negative influences, and three no impact across the four Latinx cohort completion rates and overall completion rates. Concerning the impact of Latinx full-time and part-time faculty on the Latinx cohorts, four of the results were positive, three were negative, and three had no effect. One of the negative impacts changed to positive only when the Latinx student body was higher than 73% for prepared and economically advantaged for the influence of Latinx part-time faculty. Concerning the impact of Latinx administrators, three of the results were positive, one was negative, and one had no effect. The negative impact on a Latinx cohort of unprepared and economically advantaged was negative until the college's student body was greater than 41% Latinx; then, it changed to positive. Concerning overall completion rates for all students regardless of race/ethnicity, two impacts were positive, one was negative but became positive when the college's student body is greater than 45% Latinx for the influence on Latinx full-time faculty, and one had no impact.

Regression Coefficient Findings' Magnitude

The regression coefficient in Table 7 represents the percent change in the completion rate for a one-percentage increase in Latinx full-time and part-time faculty and Latinx administrators. In Table 7, none of the effects were greater than 1, which is considered inelastic because a 1% increase in the key variables' intervention yielded less than a 1% response to the dependent variables. Instead, the most significant positive impact was the key explanatory variable Latinx full-time faculty to the Latinx cohort prepared and economically advantage at increase 0.91 and the most significant negative effect occurred on the same dependent variable at -0.65 for the influence on Latinx part-time faculty. The administrator effects were small in magnitude and near a nonexistent effect since the largest coefficient was 0.15 for the Latinx cohort designated prepared and economically advantaged.

Additionally, the regression coefficient in Table 9 represents the percent change in the completion rate for a one-percentage increase in Latinx full-time and part-time faculty and Latinx administrators after adding the interaction variable effects. In Table 9, there were two effects that were greater than one, which is considered elastic because a 1% increase in the key variables' intervention yielded more than a 1% response to the dependent variables. The most significant positive effect was the key explanatory variable Latinx full-time faculty to the Latinx cohort prepared and economically advantage at 2% and the most significant negative effect on the same dependent variable at -2% for the influence on Latinx part-time faculty. The administrator effects were small

but larger magnitude in which the largest coefficient was 0.53 for the Latinx cohort designated prepared and economically advantaged.

How Findings Could Be Used to Further Research

These findings suggest Latinx faculty and administrators, in most cases, had a positive impact across the Latinx student cohorts and overall completion rates. However, there were instances when these key explanatory variables had a negative impact on certain types of Latinx groups and overall completion rates depending on the cohort's SES and academic preparedness as well as the student body size of the Latinx students within the institution. Also, the magnitude of the regression coefficients for Table 8 and Table 9 yielded inelastic results, which suggest that increasing the percentage of Latinx faculty and administrators will not significantly increase Latinx cohort completion rates. However, as a whole, Latinx faculty and administrators exhibited small and positive effects. Thus, I cannot reject the null hypothesis given that percentage of Latinx faculty and administrators did not result in an unequivocally positive relationship across all the different classifications of Latinx students.

Furthermore, this study does not delineate whether the institutions with a higher percentage of Latinx faculty and administrators interacted with the Latinx cohorts found to have higher cohort completion rates. It is challenging to reveal whether the interactions between Latinx faculty and administrators and Latinx students within these different cohorts occurred and if so, whether the effects were "active" or "passive" teacher effects as Dee (2004) previously mentioned this concept. Active teacher effects refer to cultural behavior that teachers of color exhibit when interacting with students of color. Passive

teacher effect refers to the role model effect in which the sheer presence of that faculty or administrator in an educational institution increases a students' of color self-concept, self-aspiration, and performance when they see themselves represented in professional roles. Thus, it is essential to expand research on these hard-to-observe effects. Also, it is crucial to disentangle how teachers of color benefit the classrooms and institutions overall and how far/for whom these benefits extend.

One way to learn more is do conduct qualitative interviews with Latinx faculty and administrators at California Community Colleges with high percentages of Latinx faculty and administrators and also at California Community Colleges with low percentages of Latinx faculty and administrators to see whether their professional experience varies based on peer demographics. Also, it would be useful to interview both sets of Latinx faculty and administrators and Latinx students to understand their perceptions, expectations, and interactions with one another on-campus to understand faculty and administrators' perceived role in closing the racial equity gap. Potentially, some professionals of color may not want to take on this role and, instead, will need further institutional buy-in and support, given that Latinx students have a wide range of academic, socioeconomic, and aspiration desires/needs.

How Findings Could be Utilized in Policy Discussions

Amid a current cultural commitment to racial justice due to the impact of the Black Lives Matter movement, the Californian state legislature placed Proposition 16 on the November ballot, which would reinstate affirmative action and would change public agencies' hiring practices (Kristoffersen and Ashton, 2020). If voters pass this

proposition, public institutions like public postsecondary institutions could strategically recruit professionals from underrepresented backgrounds. These groups include but are not limited to women and nonwhite ethnic/racial groups who face structural barriers that keep these groups from accessing equitable employment opportunities and equitable wage earnings and upward mobility within this sector compared to white professionals (Kristoffersen and Ashton, 2020). In light of the possible Proposition 16 passage, researchers and practitioners in the education policy realm, such as the California Community College Chancellor's Office, should examine relevant research on this topic. In particular, the California Community College Chancellor's Office should look at what research has shown about recruiting and retaining Latinx faculty and administrators and what types of organizational barriers might still exist for Latinx professionals, and at what stage(s) in the preparation and recruitment process. Given the positive findings, this institution should ask itself, should it embed in its long-term organizational Equal Employment Opportunity goals to have faculty, administrators, and staff be racial/ethnic representative of the student body? Finally, California policymakers should examine and explore pathways and potential incentives to lead more professionals of color into the teacher workforce. These findings suggest teachers of color cannot unilaterally or single-handedly address the racial equity gap between white students and students of color. However, having more professionals of color at the table to contribute meaningfully to policy, program, and practice discussions and decisions could positively shape educational institutions to further embrace and institutionally support all students' enrolled, academic achievement.

Conclusion

In this chapter, I further analyzed and provided explanations regarding my findings. Additionally, I provided recommendations for future research on this topic and made policy arguments, and posed questions for policymakers and the California Community College Chancellor's Office regarding their interest in increasing racial/ethnic diversity in the teacher workforce on behalf of student success.

APPENDIX A: PAIRWISE CORRELATION COEFFICIENTS STATA OUTPUT

	_FtimeFacPer	_Lat_FT Fac	_LAT_PTFac	_Lat_Amin	_Female Per	_Age21-24	_Age21-25
_FtimeFacPer	1						
_Lat_FTFac	0.1646	1					
_LAT_PTFac	0.1428	0.5748	1				
_Lat_Amin	0.0701	0.3621	0.3559	1			
_FemalePer	-0.0682	-0.0826	-0.0826	-0.033	1		
_Age21-24	0.0865	0.1283	0.1201	0.0319	0.3197	1	
_Age25-39	-0.0458	-0.032	-0.0019	0.0174	-0.3036	-0.4975	1
_Age40Plus	-0.1145	-0.0778	-0.1607	-0.1173	-0.3918	-0.7908	0.4216
_AfAmPer	-0.0553	-0.1173	-0.0963	-0.0961	0.1959	-0.001	0.3363
_NatAmPer	-0.1588	-0.2119	-0.1601	-0.164	-0.0236	-0.2295	0.1266
_AsianPer	0.1651	-0.0049	-0.2364	-0.0455	-0.0411	0.1151	-0.0488
_FilipPer	0.1392	0.0816	-0.1453	-0.0398	0.0101	0.1673	-0.1426
_LatinPer	0.1001	0.517	0.7435	0.4202	0.1357	0.1704	-0.0479
_PacisPer	0.0464	-0.1078	-0.188	-0.0847	-0.0101	-0.0515	0.1817
_WhitePer	-0.1882	-0.4771	-0.5175	-0.4225	-0.169	-0.2235	-0.0658
_PellPer	-0.0056	-0.0044	0.2537	0.0323	0.4466	0.2983	-0.0972
_Ftime Student	0.1428	-0.0716	0.0746	-0.0935	0.2445	0.3185	-0.4097
_TotalCredit	0.1007	0.1007	0.0963	0.0216	-0.0077	0.2825	-0.2051
_EnrollPer	0.1107	0.2762	0.2189	0.1737	0.1879	0.3406	-0.1864
_Even_Sec	-0.0625	0.044	0.036	0.0922	0.2861	0.1431	0.0987
Hybrid Sec	-0.1487	-0.1295	-0.135	-0.1216	-0.3726	-0.4092	0.3206
_EligleEOPPer	0.0844	0.2339	0.0513	-0.012	-0.4434	-0.4263	0.3227
_Start2008	-0.0757	-0.0148	-0.0006	-0.0069	-0.0138	0.0782	-0.0097
_Start2009	-0.0197	-0.002	0.0242	0.0007	0.0004	0.0276	-0.0045
_Start2010	0.0603	0.0162	0.0424	-0.0238	0.0174	-0.0517	0.0034
_Start2011	0.0477	0.053	0.063	-0.0026	0.0164	-0.137	0.0308
LftFacLStu	0.1636	0.8913	0.7698	0.4226	-0.0098	0.1326	-0.0287
LptFacLStu	0.1782	0.5386	0.9647	0.3549	0.0354	0.1165	-0.0379

LatAdmiPer	0.0827	0.4758	0.5798	0.8975	0.0253	0.0703	-0.0122
	_Age40Plus	_AfAm Per	_NatAm Per	_Asian Per	_FilipPe r	_Latin Per	_PacisPer
_Age40Plus	1						
_AfAmPer	-0.0139	1					
_NatAmPer	0.1118	-0.1408	1				
_AsianPer	-0.0749	-0.0062	-0.2248	1			
_FilipPer	-0.1473	0.0005	-0.206	0.4447	1		
_LatinPer	-0.2593	-0.0205	-0.1712	-0.4291	-0.2109	1	
_PacisPer	-0.0336	0.1425	0.053	0.2361	0.2693	-0.2461	1
_WhitePer	0.2899	-0.3999	0.3602	-0.2464	-0.2077	-0.645	-0.0121
_PellPer	-0.4187	0.1131	0.0701	-0.3171	-0.211	0.3768	-0.1398
_Ftime Student	-0.4682	-0.1759	0.1135	0.0098	0.019	0.088	0.0026
_TotalCredit	-0.1924	-0.148	-0.126	-0.1782	0.0342	0.0183	-0.0685
_EnrollPer	-0.3703	0.0818	-0.3594	0.202	0.0029	0.3286	-0.1131
_Even_Sec	-0.0076	0.2336	-0.1603	0.2049	0.173	-0.0221	0.0884
Hybrid Sec	0.4584	-0.0732	0.2163	-0.1954	-0.161	-0.1339	-0.0235
_EligleEOPP er	0.45	0.0354	0.1148	-0.0586	-0.0772	-0.0231	0.0524
_Start2008	0.0181	0.0249	0.001	-0.0115	0.0123	-0.0285	-0.0277
_Start2009	-0.0167	-0.0015	-0.0071	0.0006	0.0074	0.0065	-0.0521
_Start2010	-0.0251	-0.0275	-0.0182	0.012	0.0185	0.0351	0.0001
_Start2011	-0.0247	-0.0474	0.0228	0.0139	-0.0523	0.0611	0.0989
LftFacLStu	-0.1422	-0.117	-0.1642	-0.2259	-0.0861	0.7902	-0.1941
LptFacLStu	-0.1692	-0.111	-0.1164	-0.2857	-0.1866	0.7805	-0.2105
LatAdmiPer	-0.1677	0.0199	-0.1659	-0.2056	-0.145	0.691	-0.1855
	_WhitePer	_PellPe r	_FT-dPer	_Total Cre-t	_Enroll-c	_Even_-r	_Hybr-r
_WhitePer	1						
_PellPer	-0.1451	1					
_FtimeStude nt	-0.0072	0.3773	1				
_TotalCredit	-0.0824	-0.017	0.2733	1			

_EnrollPer	-0.4713	0.0242	0.1823	0.2613	1		
_Even_Sec	-0.234	-0.0122	-0.2684	-0.0834	-0.0362	1	
_Hybrid_Sec	0.315	-0.1518	-0.2224	-0.1696	-0.2517	-0.4103	1
_EligleEOPPer	0.0458	-0.3068	-0.2006	-0.2927	-0.1801	-0.1678	0.3024
_Start2008	0.0318	0.1093	-0.0928	0.061	-0.1373	0.1051	0.0286
_Start2009	0.0008	-0.003	-0.0036	0.0072	0.0971	-0.025	0.0348
_Start2010	-0.0331	-0.0748	0.1062	-0.0316	0.1307	-0.0966	-0.0034
_Start2011	-0.0564	-0.1083	0.1026	-0.0803	0.1678	-0.1911	-0.0196
LftFacLStu	-0.5697	0.1815	0.0051	0.0606	0.2929	0.0424	-0.1497
LptFacLStu	-0.5044	0.3188	0.121	-0.0108	0.1978	0.0469	-0.1462
LatAdmiPer	-0.5314	0.1661	-0.0447	-0.017	0.2321	0.0718	-0.128
	_EligleEOPPer	_Start2008	_Start2009	_Start2010	_Start2011	LftFacLStu	LptFacLStu
_EligleEOPPer	1						
_Start2008	-0.1064	1					
_Start2009	0.0033	-0.25	1				
_Start2010	0.0832	-0.25	-0.25	1			
_Start2011	0.1358	-0.25	-0.25	-0.25	1		
LftFacLStu	0.1242	-0.0253	0.0004	0.0242	0.0578	1	
LptFacLStu	0.0169	-0.0095	0.0135	0.0335	0.0525	0.7817	1
LatAdmiPer	-0.0155	-0.0014	0.0056	-0.0126	0.0142	0.6451	0.6083
	LatAdmiPer						
LatAdmiPer	1						

APPENDIX B: REGRESSION STUDIES SUMMARY TABLE

Author, Publication Date, Title	**Data Source, Method of Analysis, and Sample**	**Dependent Variable**	**Key Explanatory Variable(s)**	**General Findings**
Bailey et al. (2005) Community college student success: What institutional characteristics make a difference	**Data Source:** Merged institutional-level data National Center for Education Statistics *Student Rights to Know* graduation rates with the National Educational Longitudinal Study of 1988 (NELS:88) **Method of Analysis:** Logistic regression **Sample:** 1,464 students across 441 community colleges nationally	**Dependent Variable:** Institution graduation rates looked at the proportion of a cohort of first-time, full-time students enrolled in 1999-2000 who completed a certificate or degree	**Key Explanatory Variable(s):** Institution size, percent of full-time students, location, percent of full-time faculty, instruction expenditures per full-time equivalent student, academic support expenditures per full-time equivalent student	Found a higher proportion of part-time students, women, and students of color had a negative impact on institutions' graduation rates. In addition, large size institutions and location in urban settings rather than rural settings had a negative impact on institutions' graduation rates. Higher expenditures on administrators and student services had a positive impact.
Clewell et al. (2005) Does It Matter If My Teacher Looks Like Me? The Impact of Teacher Race and Ethnicity on Student Academic Achievement.	**Data Source:** Elementary schools **Method of Analysis:** Regression **Sample:** N/A	**Dependent Variable:** Math and reading scores of different student groups	**Key Explanatory Variable(s):** Teachers' race	Found Latinx students in fourth and sixth grade had statistically higher test scores in math when taught by the same-race teacher. Black students performed better in math, too, when instructed by the same-race teacher.

Dee (2004) Teachers, Race, and Student Achievement in a Randomized Experiment.	**Data Source:** Tennessee's Student Teacher Achievement Ratio (STAR) Project four-year longitudinal data set that began with kindergarten students in fall of 1985 **Method of Analysis:** OLS regression and 2SLS estimates **Sample:** 23,883 observations on math test scores and 24,544 observations for reading test scores	**Dependent Variable:** Scaled math and reading scores from the Stanford Achievement Test (SAT) for White and Black students	**Key Explanatory Variable(s):** Teachers' race **Other variables:** **Class size** **Teacher characteristics** – experience, merit pay, and education level **Student characteristics** – race, gender, age, and eligible for free or reduce lunch (SES measure)	Found both White and Black students who had same-race exposure had, on average 3.8% increase in math and 3.1% increase in reading scores.
Ehrenberg et al. (1995) Do teachers' race, gender, and ethnicity matter? Evidence from the national educational longitudinal study of 1988	**Data Source:** National Educational Longitudinal Study (NELS) in 1988 to survey 8th-grade students and their teachers **Method of Analysis:** surveyed students in 8th grade then administered the same survey in 10th grade and also, analyzed students' score gains **Sample:** 1,776 observations	**Dependent Variable:** Students' of various races/ethnicities gain scores in history, reading, math, and science	**Key Explanatory Variable(s):** Teachers' race, gender, and ethnicity	Found no association between teachers' race, gender, or ethnicity and students' gain scores in history, reading, math, or science.

Fairlie, Hoffman, and Oreopoulos (2014) A Community College Instructor Like Me: Race and Ethnicity Interactions in the Classroom	**Data Source:** National Student Clearinghouse longitudinal data from 2007-2012 and data from De Anza Community College Fall 2002 to Spring 2007 **Method of Analysis:** panel-data regression **Sample:** 446,225 student-class observations	**Dependent Variable:** **-term student outcomes** - Dropout course rates, passing rates, course grade, course grade greater than a B, student enroll in the same subject course for White, Black, Asian, Latinx, and other race/ethnicity students **Long-term student outcomes –** retention rates, obtained degree, transferred to a four-year college	**Key Explanatory Variable(s):** Instructor's race/ethnicity	Found positive influence on racial matching between students and instructors. Specifically, the performance gap between students of color and white students fell 20-50% when students of color were taught by an instructor of color. Also, Fairlie found positive impact on long-term impacts related to transfer, degree completion, and retention rates. However, this study noted trade-offs (White students do worse when taught by an instructor of color) and mixed-results when the variation of race of instructor and students change.
Hanushek (1992) The Trade-Off Between Child Quantity and Quality	**Data Source:** Merged the Gary Income Maintenance Experiment four-year longitudinal data set from 1971 – 1975 with Iowa Test of Basic Skills (Grade 3-6) **Method of Analysis:** OLS with Log-log form **Sample:** 1,920 students	**Dependent Variable:** Vocabulary and reading comprehension scores for Black students	**Key Explanatory Variable(s):** Teachers' race **Other variables:** **Family characteristics –** family size, birth order, child spacing **Parental choices** **Class size**	Found white teachers negatively influence Black student reading and vocabulary scores -0.076 for vocabulary scores and -0.071 for reading comprehension scores. Hanushek argues this finding may reflect Black students do better

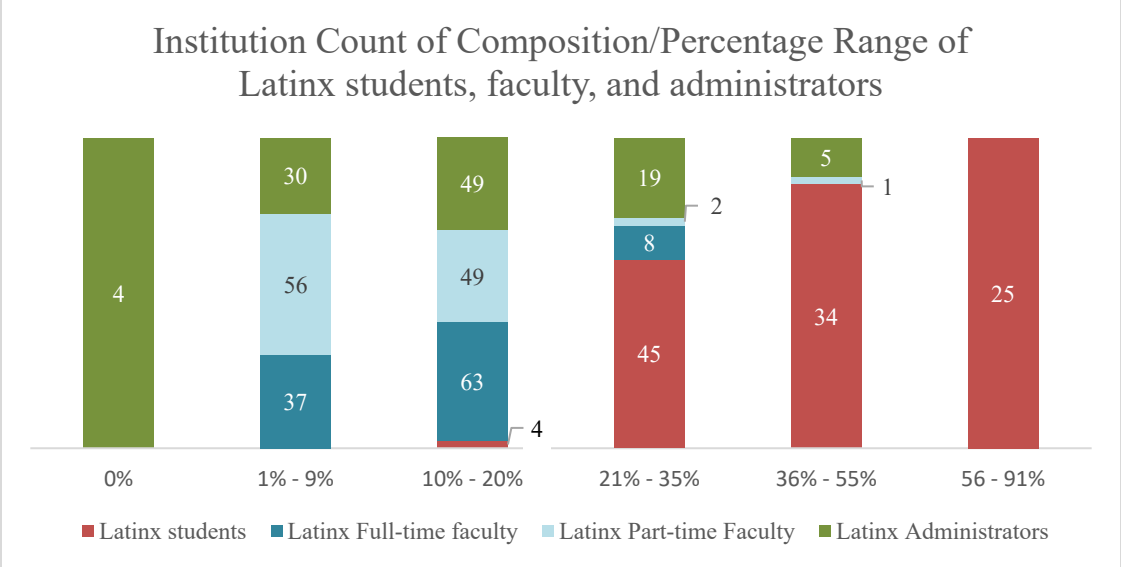
			<u>Teacher characteristics</u> – years of experience, degree level **<u>Student characteristics</u>** – race, gender, age, and eligible for free or reduced lunch (SES measure)	with teachers of their own race.
Pitts (2007) Representative Bureaucracy, Ethnicity, and Public Schools: Examining the Link Between Representation and Performance	**Data Source:** Public School District Data from Texas between 1995-2002 **Method of Analysis:** OLS regression **Sample:** 1,776 observations	**Dependent Variable:** **<u>Organizational performance indicators for districts –</u>** Texas Assessment of Academic Skills (TAAS) pass rate, student dropout rate, whether or not students became college-bound for different student groups (white, Black, Latinx, and other race/ ethnicities)	**Key Explanatory Variable(s):** Racial/ethnic representation of administrators and teachers **Other control variables:** Environmental resource variables (teacher constraints, teacher resources, student constraints, student resources), time-constant phenomenon	Pitts found a positive relationship between the racial/ethnic representation of Latinx teachers and Latinx student outcomes (1.760 increase) and racial/ethnic representation of Black teachers on Black student outcomes (3.484 increase) TAAS test scores and dropout rates. For school administrators, only the racial/ethnic representation was positive and statistically significant on Black student outcomes (2.463 increase).

APPENDIX C: INSTITUTION COUNT OF PERCENTAGE RANGE IN WHICH LATINX STUDENTS, FACULTY, AND ADMINISTRATORS FALL WITHIN

Cells Contain Number of California Community Colleges that Fall Within the Percentages Ranges Listed in first column for Various Latinx Categories

Percentage Range	**Latinx students**	**Latinx Full-time faculty**	**Latinx Part-time Faculty**	**Latinx Administrators**
0%	0	0	0	4
1% - 9%	0	37	56	30
10% - 20%	4	63	49	49
21% - 35%	45	8	2	19
36% - 55%	34	0	1	5
56 – 91%	25	0	0	0
Institution Count	*108*	*108*	*108*	*107*[16]

For Various Percentage Ranges, Each Bar Represents the Corresponding Distribution of California Community Colleges that have the same Percentage Rage of



[16] There was one college that had unknown percent of Latinx administrators.

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