Exploring the Effect of Chicano Studies Courses on Student Success at CSU Channel Islands

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Abstract - California State University, Channel Islands (CSUCI) has long embraced the ideal of access to education while seeking to provide high quality degrees for its students. The success of obtaining Hispanic-Serving Institutions grants has been helpful in providing resources for programs offering educational interventions for both Hispanic students and for those from other backgrounds. We have seen anecdotal evidence that Hispanic students who enroll in Chicano Studies courses tend to find community and consequently success. In this project, we use the enormous storehouse of CSUCI data to explore the effectiveness of specific Chicano Studies courses on student success. We apply regression analysis, hypothesis tests for proportions, t-tests, and tests of independence to investigate the quantitative evidence for what we have seen anecdotally.

Keywords : logistic regression; t-test; hypothesis test; graduation rates; retention rates; grade point average; ethnic studies; Chicano studies

Mathematics Subject Classification (2020) **:** 62-08; 62-11; 62J12

1 Introduction

California State University, Channel Islands (CSUCI) is the youngest of the 23 California State University campuses. The university's first semester of classes began in 2002 with 629 transfer students. Since then, CSUCI has grown to a total enrollment of 7,093 (as of Fall 2019), of which 6,860 are undergraduates [3].

CSUCI is the only four-year public institution of higher education in Ventura County. The Hispanic population of Ventura County constitutes 43% of the entire population [17]. Not surprisingly then, CSUCI has always attracted a large Hispanic student population, exceeding 21% every year. The current Hispanic student population at CSUCI is greater than 51% (see Figure 1). CSUCI was designated a Hispanic Serving Institution in 2010.

Since its inception in 2008, the Chicano Studies (CHS) program at CSUCI has offered a wide range of educational interventions both for Chicana/o students and for those from other backgrounds. In recent years, faculty at CSUCI have witnessed several cases of Hispanic students across the university who attribute their present successes to their early experiences in CHS courses. Such anecdotal evidence led to the conception of this project. Our objective was to determine whether there exists quantitative evidence to support the

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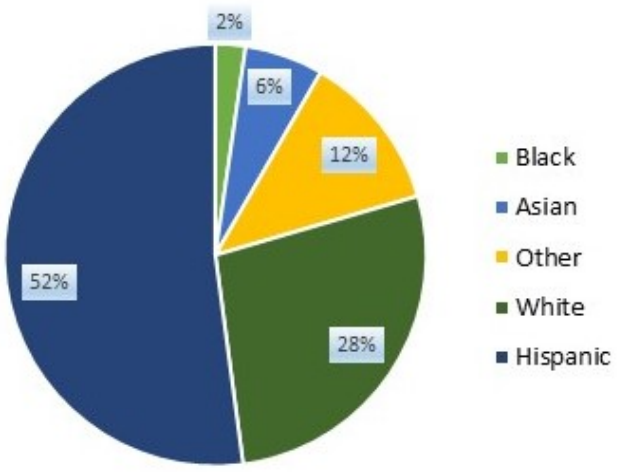

Figure 1: CSUCI Fall 2018 Enrollment

idea that the CHS program provides a benefit to Hispanic students who might otherwise be disconnected from the university culture or unsuccessful in their university pursuits.

The courses and programs supported by CHS serve numerous students beyond those majoring in CHS. In our research, we analyze nine years of institutional data to determine whether retention rates among students who take specific CHS courses are higher than those of the general school population. We also compare these students' graduation rates, grade point averages, and probability of graduating to the associated variables of CSUCI students with similar demographics.

2 Literature Review

While our study is limited to data from CSUCI, it builds on a large body of scholarship over many decades. In [16], Dr. Christine Sleeter at CSU Monterey Bay presents a comprehensive review of research on the impacts of ethnic studies on students. The 105 articles cited in [16] provide a body of evidence suggesting that ethnic studies classes have a variety of positive impacts. Students of color gain more pride in their own history and a sense of belonging in the culture ([18]). They grow more confident and successful in their academic career ([18] and [9]).

Scholarship in the field suggests that in the absence of ethnic studies programs, students of color, over time, start to feel invisible: "... from the time of immigration through subsequent generations, Latino students identify progressively less with their ethnic community, often resulting in a downward spiral of achievement." ([16], p. 8). Ethnic studies courses help them to re-engage with their own culture, and understand more about themselves as students. That growing confidence and interest in the subject results in more success in school, including graduating on time ([16], p. 15 and [15], p. 219).

While the term "ethnic studies" is an umbrella term for a diverse set of different curricula, the research performed specifically in the realm of Chicano studies offers analogous results. Latino college students who participated in Chicano literature seminars in California developed a sense of community: "This recognition of similarity of hardships led the Latino students to feel as if they were 'not alone' in their position on the periphery of mainstream society in the United States" ([18], p. 908). Latino students who participated in a Mexican-American/Raza studies cohort in Arizona developed the "... belief that education was something that could be theirs" and discovered "... for the first time an academic identity, which also has helped the students develop a strong sense of academic proficiency" ([15], p. 219). According to [14] and [13], students who participated in the Arizona cohort were initially labeled "at-risk." They all began with only four to seven credits completed, whereas their non-cohort peers averaged 12 completed credits; every student had dropped out of school at least once; the average grade point average among students in the cohort was "... in the low 1.0 range" ([14]). After participating in the cohort, the students "... inverted the achievement gap" and 97.5% of them graduated.

According to the research, white college students may benefit even more than students of color. "The higher education studies found that required diversity courses have a greater positive impact on White students than on students of color" ([16] p. 18, [5], [6], [4], [11]). "Mainstream Euro-American studies deny all students — both White and of color — an education that takes seriously the realities of institutionalized racism that people of color live everyday, and knowledge that arises from within communities of color. Ethnic studies, by allowing for multiple voices to enter dialog constructing the narrative of this country, is critical to the development of a democracy that actually includes everyone" ([16], p. 5). Indeed, white students gain a perspective on cultures that are not their own. The country gains citizens who can see history through multiple perspectives, with more empathy for people who are not like themselves ([2]).

"A large body of research in higher education that examines the impact of various diversity experiences, particularly course-taking and interracial interaction, reports quite consistently that such courses have a positive impact on 'democracy outcomes,' particularly when they include cross-group interaction and particularly on White students, since exposure to a systematic analysis of power and cross-racial interaction is newer to White students than to students of color" ([16], p. viii).

According to the present literature, ethnic studies courses (including Chicano studies courses) contribute to success for both the students of the ethnicity studied, and the other students enrolled in the courses.

3 Methods

CSUCI's Office of Institutional Research supplied our team with data on students who had taken any of eight introductory CHS courses. The courses were chosen in collaboration with faculty representatives of the CHS department. As the interest of our research was originally in students who might be disconnected from the university culture, we focused on students who enrolled in CHS courses but *did not major in the program.* Thus, the

choice of classes in the database intentionally excluded majors-only courses. The eight courses chosen are listed in Table 1. For the purposes of our research, we did not weed out students who failed the courses or withdrew from the courses after the drop deadline. All students who were still enrolled in the courses at the end of the drop deadline for the semester were included.

Course Number	**Course Name**
CHS 100	Introduction to Chicana/o Studies
CHS 200	Diversity in Latina/o Communities
CHS 320	Gender and Sexuality in the Chicana/o Community
CHS 331	Transborder Perspectives
CHS 333	History of SoCal Chicana/o Art
CHS 335	Chicana Feminism
CHS 350	Chicana/o History and Culture
CHS 353	Chicana/o Latina/o Literature

Table 1: CHS Courses in Database

The database contains information on every student who enrolled in any of the eight CHS courses (Table 1) between Fall of 2011 and Spring of 2019, with a total of 2,734 individual students. Data included student gender, ethnicity, pell eligibility, veteran status, parents' education, enrollment status, matriculation term, transfer GPA, *semester* GPA for the term in which the CHS course was taken, *cumulative* GPA for the term in which the CHS course was taken, GPA at final outcome, final outcome on record, term of final outcome, whether the student majored in CHS (at matriculation, during the term in which the CHS course was taken, or at final outcome), and grade in the CHS course. For students who took more than one CHS course between Fall 2011 and Spring 2019, our data included the corresponding information for every CHS course taken and the semester(s) of enrollment.

With such a robust compilation of information in the CHS data, one would expect to find similarly detailed information from the university as a whole. Unfortunately, information on pell eligibility, veteran status and parents' education was unavailable or insufficient for the general university data. Analysis involving these variables is not included in this paper. Furthermore, some subsets of ethnicity data for the university population were unusable as they were too small. As a result, we focused our ethnic distinctions on Hispanic and Non-Hispanic students.

All statistical analyses for this project were performed using *Microsoft Excel* and *R*, with a heavier concentration of work on *R*.

3.1 Graduation Rates

We analyzed graduation rates for many different subsections of students at CSUCI with a goal of comparing the university graduation rates to the corresponding rates from within our Chicano Studies data set. We split the data between First-time Full-time Freshmen

and Transfer students before any other subgroups were decided. Among First-time Full-time Freshmen, the university measures graduation rates as a 6-year graduation rate. Therefore, to accurately compare graduation rates of First-time Full-time Freshmen in our data set to those of the university as a whole, we restricted our data only to students who matriculated in 2011 and 2012. For Transfer students, the university applies 3-year graduation rates. Thus, we examined data from Transfer students who matriculated between Fall of 2011 and Fall of 2015.

Within each block of data, we examined subgroups disaggregated by gender and ethnicity. In particular, we applied hypothesis tests for population proportions to compare graduation rates of Hispanic Freshmen in our CHS data set to Hispanic Freshmen in the university as a whole. We performed the same tests for Non-Hispanic Freshmen, Hispanic Transfer students, Non-Hispanic Transfer students, Male Freshmen, Female Freshmen, Male Transfer students, and Female Transfer students in our CHS data set to the corresponding categories in the university data set. The results of our hypothesis tests are provided in Figures 3 and 4, and discussed in the Results section (4.1 Graduation Rates) of this paper.

3.2 Retention Rates

The available university data for retention rates was not as robust as the data for graduation rates. As a result, we were only able to disaggregate the retention data by enrollment status and ethnicity. CSUCI records retention rates as "one year retention." This means that a student who enrolls in a third semester at CSUCI or returns to the university the following year is considered retained. Therefore, in order to accurately compare retention rates among students in the CHS data set, we limited our sample to only students who enrolled in the CHS courses during their first semester at CSUCI. We then examined "one year retention" within that sample. Hereafter, we will refer to that sample as the *First Semester CHS Sample*.

As with the graduation rate analysis described in Section 3.1, we examined retention rates on subgroups of our data, disaggregated by ethnicity. In particular, we applied hypothesis tests for population proportions to compare retention rates of Hispanic First-time Full-time Freshmen in the First Semester CHS Sample to Hispanic First-time Full-time Freshmen in the university as a whole. We performed the same hypothesis tests for Hispanic Transfer students and Non-Hispanic Transfer students in the First Semester CHS Sample to the corresponding categories in the university data set. The number of Non-Hispanic students from the First Semester CHS Sample for First-time Full-time Freshmen was too small to consider ($n = 8$). The results of our hypothesis tests are provided in Figures 7 and 8, and discussed in the Results section (4.2 Retention Rates) of this paper.

3.3 Logistic Regression

We applied logistic regression to make predictive models of the likelihood of a student graduating from CSUCI, and of student retention. Generally, regression models are used

to predict the likelihood of specific dependent variables, based on contributing independent variables. In most of the logistic regressions we performed, the dependent variable represented whether or not a student graduated, with "success" representing graduation. We also performed logistic regressions in which the dependent variable represented whether or not a student was retained after taking a CHS course, with "success" representing retention. Since success/failure is a *discrete* variable, we applied *logistic* regression.

The majority of our attempts at logistic regression proved inconsequential due to multicollinearity; several of our independent variables are correlated. Table 2 compares the specifications of a few of our regression models. Model #1 boasts the largest ROC area, McFadden R^2, and adjusted R^2 values in the group, indicating that it may be a better fitting model than the others. We address Model #1 in greater detail in the paragraphs that follow, and also in the Results section of this paper (4.3 Probability of Graduation). When we created Model #2, we focused on enrollment in CHS 100 and CHS 200 because students who enroll in these courses have little to no prior exposure to Chicano Studies. In Models #3 and 4, the small R^2 values suggest that these logistic regression models may not accurately predict retention.

	Dependent Variable	Independent Variables			R-squared (McFadden)	Adjusted R-squared	RMSE	ROC area
#1	Graduation	Number of CHS courses taken	Ethnicity	Enrollment category	0.101	0.096	0.453	0.71
#2	Graduation	Enrollment in CHS 100	Enrollment in CHS 200	Enrollment category	0.079	0.075	0.461	0.68
#3	Retention	Pell eligibility	Ethnicity	First generation student	0.01	0	0.313	0.57
#4	Retention	Pell eligibility	Ethnicity		0.01	0.002	0.313	0.56

Figure 2: Comparison of Logistic Regression Models

In Model #1, our independent variables included the number of CHS courses taken, enrollment category (namely First-time Full-time Freshman or Transfer student), and student ethnicity. The variables for enrollment category and ethnicity were dummy variables, assigned with 0 or 1 ([1], Chapter 27). This is indicated in Equation (1).

$$\begin{aligned} x_1 &= \text{ number of CHS courses taken } (1, 2, \ldots 8) \\ x_2 &= \text{ enrollment category } (0 = \text{Freshman}, 1 = \text{Transfer}) \\ x_3 &= \text{Ethnicity } (0 = \text{Not Hispanic}, 1 = \text{Hispanic}) \end{aligned} \tag{1}$$

The general formula for logistic regression is given by

$$\ln\left(\frac{P}{1-P}\right) = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_n x_n,$$

where P represents the probability of success for the dependent variable ([12], Chapter 1). Therefore, our logistic regression formula is

$$\ln\left(\frac{P}{1-P}\right) = b_0 + b_1x_1 + b_2x_2 + b_3x_3, \tag{2}$$

where x_1, x_2, and x_3 are defined in Equation (1) and coefficients b_n are computed from the data set, using statistical software such as *RegressIt* in Excel and *logit* in R. A value for P that is close to 1 indicates a high probability of graduating from CSUCI, whereas a P value close to 0 indicates a low probability. After a small amount of manipulation with the formula in Equation (2), it's clear to see that

$$P = \frac{1}{1 + e^{-(b_0+b_1x_1+b_2x_2+b_3x_3)}} \quad .$$

In Model #1, we determined the values b_0, b_1, b_2, and b_3 to be

$$\begin{aligned} b_0 &= -0.203 \\ b_1 &= 0.439 \\ b_2 &= 1.537 \\ b_3 &= -0.516 \end{aligned} \tag{3}$$

and thus our logistic equation from (2) became

$$\ln\left(\frac{P}{1-P}\right) = -0.203 + 0.439x_1 + 1.537x_2 - 0.516x_3.$$

The chart in Figure 9 (see Section 4.3) illustrates the outcome of this regression model. It indicates the probability that a Hispanic student will graduate from CSUCI, corresponding to whether the student arrived at CSUCI as a First-Time Full-time Freshman or Transfer student, and the number of CHS courses taken. The corresponding chart for Non-Hispanic students was effectively identical to Figure 9, and therefore excluded from this paper. All other logistic regressions we performed resulted in ROC areas and/or R^2 values that were too low to justify any reasonable conclusions.

4 Results

4.1 Graduation Rates

The tables in Figures 3 and 4 display the results of our hypothesis tests for proportions. We compared graduation rates of the CHS data to the corresponding graduation rates of the entire university. In *every* category, the graduation rates for students who enrolled in CHS courses are *higher* than the corresponding graduation rates for the general university. In fact, the majority of the outcomes show an increase in graduation rates by more than 10 percentage points.

From the P-value columns, we can see that these results are statistically significant for all categories except Non-Hispanic Freshmen (P-value $= 8.67 \times 10^{-2}$) and Female Freshmen (P-value $= 1.57 \times 10^{-1}$). It appears that there is an association between increased graduation rates and enrollment in specific CHS courses (see Table 1 for a list of courses included in the CHS data set). Moreover, this association is apparent not only for Hispanic students, but also for Non-Hispanic students, both male and female.

Original Enrollment Status	Ethnic Category (Self-Declared)	Grad Rates CHS Data	Grad Rates CSUCI	P-value
First-time Full-time Freshmen	Hispanic	69.61%	54.31%	2.47×10^{-5}
	Non-Hispanic	70.27%	59.02%	8.67×10^{-2}
	All Freshmen	69.96%	56.89%	4.1×10^{-5}
Transfer	Hispanic	71.25%	66.12%	3.26×10^{-2}
	Non-Hispanic	84.93%	69.53%	2.31×10^{-3}
	All Transfer	73.70%	68.10%	9.8×10^{-3}

Figure 3: Graduation Rates by Ethnicity

Original Enrollment Status	Gender (Self-Declared)	Grad Rates CHS Data	Grad Rates CSUCI	P-value
First-time Full-time Freshmen	Male	78.94%	56.55%	6.0×10^{-3}
	Female	67.96%	63.20%	1.57×10^{-1}
	All Freshmen	69.96%	56.89%	4.1×10^{-5}
Transfer	Male	86.61%	60.42%	1.0×10^{-4}
	Female	81.72%	68.42%	1.0×10^{-4}
	All Transfer	73.70%	68.10%	9.8×10^{-3}

Figure 4: Graduation Rates by Gender

In Figures 5 and 6, the grey bars depict the proportion of graduates among students from the CHS data. It is consistently higher than the red bar depicting the proportion of graduates among CSUCI students, for both First-time Full-time Freshmen (Figure 5) and Transfers (Figure 6).

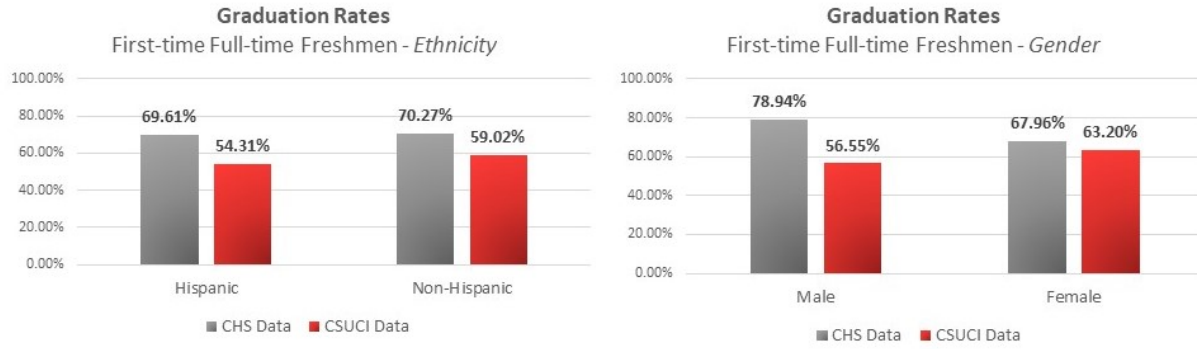

Figure 5: Graduation Rates - First Time Full Time Freshmen

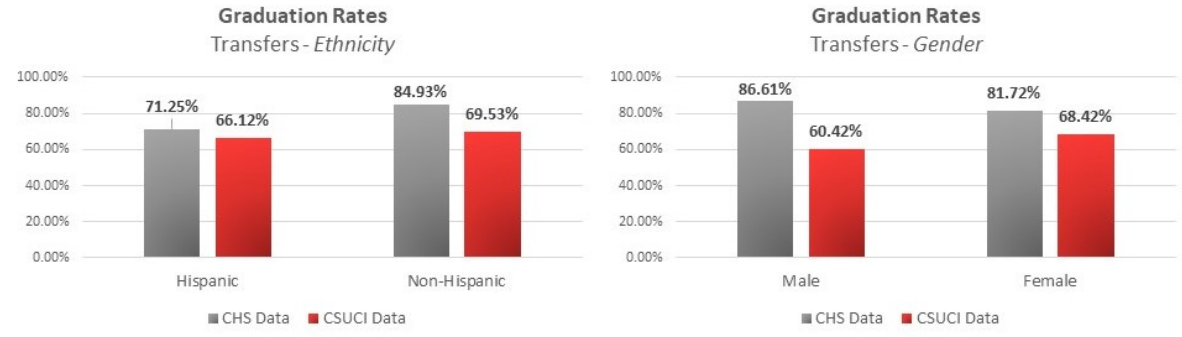

Figure 6: Graduation Rates - Transfers

4.2 Retention Rates

The table in Figure 7 displays the results of our hypothesis tests for proportions, comparing retention rates of the First Semester CHS Sample to retention rates of the university as a whole. As we saw in our analysis of graduation rates in Section 4.1, we see here that retention rates for the CHS data appear higher than the rates for the university as a whole, in *every* category. The P-values in Figure 7 are consistent with a 90-95% significance level, for all categories except the general population of First-time Full-time Freshmen. There is an association between increased retention rates and enrollment in

non-major CHS courses. This is also evident in Figure 8, as the grey bars representing retention rates among students in the First Semester CHS Sample are consistently higher than the red bars.

Original Enrollment Status	Ethnic Category (Self-Declared)	Retention Rates First Semester CHS Sample	Retention Rates CSUCI	P-value
First-time Full-time Freshmen	Hispanic	85.55%	78.80%	0.0751
	All Freshmen	84.69%	79.11%	0.1083
Transfer	Hispanic	89.21%	83.10%	0.0353
	Non-Hispanic	96.67%	85.11%	0.0641
	All Transfer	90.53%	84.23%	0.0161

Figure 7: Retention Rates by Ethnicity

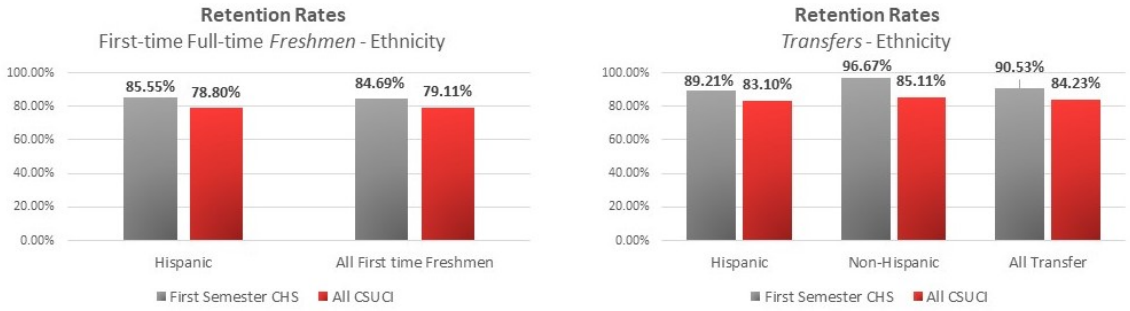

Figure 8: Retention Rates by Ethnicity

4.3 Probability of Graduation

The logistic regression model in Figure 9 suggests that the more CHS courses a student takes, the higher the probability that the student will graduate from CSUCI. This result holds for Hispanics and Non-Hispanics alike, as well as for both First-time Full-time Freshmen and Transfers. At first glance, this appears to demonstrate that CHS courses directly impact a student's potential for graduating. While this may be true, it's important to acknowledge that the more courses any student takes (in *any* university program) the closer the student comes to graduating. It is also important to observe that the probability of graduation for Transfer students is naturally higher than the probability

of graduation for First-Time Full-time Freshmen, because Transfer students arrive at the university closer to graduation than Freshmen.

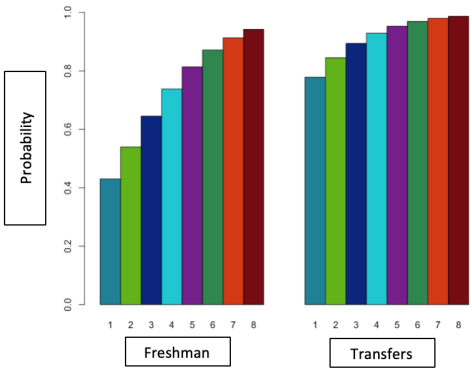

Figure 9: Probability of Graduating vs. Number of CHS Courses Taken

4.4 A Word on Grade Point Average

We had hoped to find conclusive results on student grade point averages (GPA's), disaggregated by the variables in our CHS data set. Unfortunately, we could not obtain raw data on GPA for the university as a whole; the only useful GPA information available to us was a mean GPA of 3.14 for all students enrolled at CSUCI during the Fall 2018 semester. A simple t-test to compare the mean GPA of students in the Chicano Studies courses to the mean GPA of the university student population revealed that the students in our data set performed at a *lower* GPA than the university as a whole. For example, the mean GPA at final outcome for First-time Full-time Freshmen across all years of our data set was 2.767, compared to 3.14 for the general population, with a P-value less than 2.2×10^{-16}. The mean GPA at final outcome for Transfer students across all years of our data set was 2.986. This, too, was significantly lower than the general population's mean GPA. This is illustrated in Figure 10, which also shows the corresponding mean GPA of the CHS student data at matriculation. Even the mean GPA for the terms in which the students took the CHS courses (2.82) and the cumulative mean GPA for the terms in which the students took the CHS courses (also 2.82) were lower than the mean GPA for the general population. There are surely a number of reasons for this, including the fact that students who enroll in these courses may already be predisposed to lower GPAs for unrelated reasons such as ethnicity, opportunity, economic status, and effects of first-generation college experiences. While our data set for CHS students included this information, these factors were unavailable and/or unusable in the university data for the general population and therefore impossible to address for this project.

The lower mean GPA among students in the CHS data set, as compared to the mean GPA of the entire university, may have considerable implications. In particular, it suggests that students who enrolled in these CHS courses were *not* pre-disposed to graduation or

Original Enrollment Status	GPA calculated	Mean GPA	Standard Deviation	P-value
First-time Full-time Freshmen	At Matriculation	2.797	0.653	2.2×10^{-16}
	At Final Outcome	2.767	0.664	2.2×10^{-16}
Transfer	At Matriculation	2.99	0.402	2.2×10^{-16}
	At Final Outcome	2.986	0.409	2.34×10^{-16}

Figure 10: Mean GPA of CHS students < CSUCI Population Mean GPA of 3.14

retention before enrolling in CHS courses. Generally speaking, lower GPA's are correlated with lower success rates, particularly among underrepresented students ([7]). The results of our study demonstrate a counter-intuitive result: students with lower GPA's but higher graduation and retention rates. This suggests that implicit selection bias is likely absent from our data set. We can reasonably assume that the introduction of a CHS course is indeed an independent variable, and graduation/retention are dependent variables.

A χ^2-test for variance showed a subtle disparity in the spread of GPA data among students who took CHS courses, disaggregated by ethnicity. The more interesting analysis would have been to compare such GPA data with the university population. As previously mentioned, this data was not available to us.

5 Limitations of the Study

By and large, the greatest limitation of our study was our data. We did not have a simple random sample of data. In fact, students in our data set were self-selected, thereby allowing for inherent selection bias. The argument that *students who enroll in CHS courses are more likely to graduate* appears to be equal in strength to the argument that *potential graduates are more likely to take a CHS course*. Based on our graduation and retention analyses alone, we cannot discern the dependent and independent variables. The results of our analysis on GPA (Section 4.4), however, provide compelling evidence for CHS courses as the independent variable. The body of research addressed in the literature review also provides evidence that CHS courses are the independent variable and graduation/retention rates are the dependent variables. Reasonable explanations for this phenomenon, and similar evidence are provided in the literature review.

All student data was extracted from a single institution and consequently the results may not generalize to other institutions. The data was also drawn from specific years (2011-2019), a relatively short period in the life of a growing and changing university.

As we addressed in Section 3.1, there were also substantial limitations to our logis-

tic regression. Several variables were dependent on each other, rendering many of our regression models unusable.

6 Conclusion and Future Work

While it is impossible to show causality in a study such as this, the results of our analysis provide quantitative evidence to support what we observed anecdotally. In particular, among Hispanic Students at CSUCI, there is an association between student success and participation in the CHS program. The results indicate even more than this, though, as the association is apparent among Hispanic *and* Non-Hispanic students alike. Among male, female, Hispanic, Non-Hispanic, freshmen, and transfer students, graduation and retention rates are higher than that of the general population at CSUCI.

These results are farther-reaching than what the researchers expected to find. The anecdotal evidence of student success, which was the impetus for this project, came from Hispanic students. One might attribute the success of Hispanic students enrolled in CHS courses to perhaps a found identity or camaraderie among students of similar backgrounds and cultures. Our analysis suggests that while such an explanation may be valid for some students, it is clearly not the only explanation for success among CHS students. The impacts of the Chicano Studies program are consequential to the general student population at CSUCI. Possible reasons for this are discussed in the Literature Review, including the fact that Non-Hispanic students gain a perspective on a culture that is not their own, whereas Hispanic students develop academic identity and proficiency.

Future work exploring the effectiveness of other ethnic studies courses – or other introductory courses at CSUCI – could illuminate the impacts of programs such as Chicano Studies to the population at CSUCI. A farther-reaching study comparing similar data from across the California State Universities would allow the researchers to observe specific trends among the various sub-populations of students. An interesting analysis could also follow from comparing data from Hispanic Serving Institutions with data from schools that are not Hispanic Serving Institutions.

Finally, with the passing of California Assembly Bill 1460, students at California State Universities will be required to complete a course in ethnic studies, beginning with the 2021-2022 academic year. An entirely new body of data will quickly form, with potential for a more robust and detailed analysis. Moreover, a qualitative study on CSUCI students who enroll in present and future ethnic studies courses could provide a better explanation for why they experience the success that we now see quantitatively.

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