COSUMNES RIVER COLLEGE

OFFICE OF RESEARCH & EQUITY

Predictors of Course Success in Large General Education Courses at Cosumnes River College: An Exploratory Analysis

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Important Caveats and Limitations

This report discusses intercorrelations between student demographics, course features, and successful course completion at Cosumnes River College. It is important to note that the presence of a statistically significant correlation does not imply a causal relationship between variables – even for variables for which an apparently obvious causal explanation is present (e.g. income or employment status). The findings presented here are the result of an exploratory evaluation intended to drive initial discussion around successful course completion. They should therefore be used as a starting point in discussing the possible causal mechanisms (explanations) and barriers that students may face. Relatedly, the statistical models described here would not be useful in making exact projections or determinations for an individual student. That is to say, assumptions should not be made about a student's capacity to pass a course on the basis of any of the demographic associations reported here. For example, there are likely *many* students who face the challenges (e.g. being full-time employed and low-income) described within this report who excel in their courses.

Executive Summary

An exploratory analysis examined demographic variables, course features, and their correlation with successful course completion (receiving an A, B, C, or P in a course). These analyses were conducted using data from four large general education courses at Cosumnes River College (CRC). Note that throughout this report, the term "*disproportionate impact*" is used to reference student groups that have statistically lower course completion rates. This terminology is used to highlight the complex interplay of factors that may result in differential course completion for a given group or groups. After holding all other variables constant (employment status, income, prior academic success, etc.; See page 3 for a description of variables), an analysis found several statistically significant associations:

One variable was positively correlated with success across all courses:

1. Students with higher prior success – as measured by their prior college coursework or high school GPA – tended to have higher successful course completion rates.

Several student groups were disproportionately impacted across three or more of the courses:

1. New students and new transfer students were disproportionately impacted relative to continuing students.
2. African American and Hispanic/Latino(a) students were disproportionately impacted.
3. Students with low or below-poverty income were disproportionately impacted relative to students who were not low-income.

Three variables were associated with successful course completion in just two courses:

1. Hybrid courses had lower success rates than online courses in two of the courses analyzed.
2. On-ground courses had higher success rates than online courses in two of the courses analyzed.
3. Unemployed students had higher success rates compared to full-time employed students in two of the courses.

Aside from modality, most of the course and instructor features (number of years teaching the course, day/evening, etc.) evaluated in this report had mixed/inconsistent associations across courses. For example, the number of instructional terms was positively correlated with success in two courses, negatively in another, and uncorrelated in the forth. The findings are therefore not easily generalized to other courses/circumstances. Review the results section of this report for a more detailed description of the findings.

Recommendations

Given the lack of consistent associations between scheduling/course features and successful course completion, and the persistence of disproportionate impact across courses, some may wonder how we ultimately address the barriers faced by students. It is the Research Office's recommendation that the college discusses and provides professional development on *research based and established* practices for instructional improvement, and that faculty engage in self-reflective discussion about their own practices.

Introduction

In Fall 2023, Cosumnes River College (CRC) began a broad discussion around improving course success rates – specifically focused on classroom instruction. These conversations have expectedly led to important questions about why course success rates vary and the factors that predict successful completion of a course. Indeed, understanding the personal, institutional, and instructional barriers that staff and students face is an important initial step in improving how we teach and support students.

To that end, the Research Office worked with the college's Academic Senate to conduct two broad studies on course success. The first study pertained to course success rates in STEM sequences (Meinz, 2024) [1]. The second study, described here, was an exploration of course features, student demographics, and their potential correlation with successful course completion. For the purposes of this investigation, the operational definition of a *successful course completion* is receiving an A, B, C, or P grade in a course.

The Present Investigation

Despite the importance of the analyses presented here, it is essential to note that evaluating course success data can introduce novel statistical and methodological challenges. Specifically, sampled data points (e.g. in this case, student grades) need to be *independent* from one another for certain statistical methods to be valid. That is to say, the value of one sampled data point cannot be associated with the value of another data point[2]. When considering success data, however, the grade a student received in one course is almost certainly associated with the grade they get in another course. Put another way, if we learn that a student got an A in CRC 300, we might also not be surprised to find that they got an A- in CRC 301.

Success and grade data, therefore, cannot always be assumed to be independent – because students take multiple courses[3]. This lack of independence may affect our capacity to make inferences about associations with successful course completion data (e.g. if we were trying to estimate the association of a given demographic variable with the likelihood of course success). One practical solution to this issue is to look at first attempts within large courses. This removes duplication of student enrollments because a student can't take the same course more than one time in a semester, and it excludes repeats due to substandard grades. That is to say, each student contributes exactly one data point to the sample.

[1] Calibration and Instructional Improvement: An investigation of course success rates in sequential STEM courses at Cosumnes River College (Meinz, 2024). A copy can be viewed here.
[2] This is (technically speaking) not the most exact way of phrasing things. Independence of sampled data points implies that their covariation will be zero, but lack of covariation does not necessarily imply independence. Nevertheless, the point here was to frame some intuition for the reader.
[3] There are other reasons for the lack of independence (e.g., clustering within course sections) that are described later in this report.

The present investigation therefore focused on the four largest general education courses at CRC (during the post-pandemic era; Spring 2022 to Spring 2024) – ENGWR 300, STAT 300, PSYC 300, and COMM 301. Analysis focused on multiple courses in order to provide converging evidence from several samples on demographic/course associations (or lack thereof).

An Important Note on Terminology

When a significant difference in course success is observed between demographic groups, there are likely a multitude of explanations for that difference. A student group may have lower or higher success rates because of contextual, societal, and institutional factors. Students with lower success rates are therefore referred to as *disproportionately impacted* in this report. This terminology is meant to highlight the complex interplay of factors that may impact a student.

Methods

Study Sample

As previously stated, the investigation described here was an exploratory analysis of demographic, course factors, and their association with successful completion of a course. Data were gathered from the post-pandemic period – Spring 2022 to Spring 2024 (excluding summers) – and focused on the four largest general education courses at CRC: ENGWR 300 (without the co-requisite), STAT 300, PSYC 300, and COMM 301. Sample sizes for each course and a breakdown of demographic characteristics can be found in *Table 2* and *Table 3* below.

With regards to course features, data were gathered on the time the class was offered, the modality (online, hybrid, or on-ground), the session (full-term, first eight week, or second eight week) and the number of terms the given instructor had taught the course. A class was flagged as "evening" if it ended any time after 5pm. In the case of a lecture/lab combo, the latest of the two end times (belonging to either the lecture or the lab) was used in determination of evening status.

A total of thirteen student-level variables were gathered for the purposes of this investigation. Six were related to student race/ethnicity identification – whether or not the student selected "Black/African American", "Hispanic/Latino(a)", "Pacific Islander", "White", "Filipino", or "Native American" on their application to CRC. Unlike prior reports – where a single race/ethnicity was assigned – a student could have selected multiple categories (e.g. Pacific Islander and Hispanic/Latino). Moreover, data were gathered on student age, gender, first generation status, single parent status, enrollment status (continuing, first time, transfer, returning, or special admit) and employment status (full-time, part-time, or unemployed).

The income level of a student was determined using self-reported income ranges (e.g., a student may report that they make between $10,000 and $14,999) and household size. Students were classified into below-poverty, low-income, and middle-income groups on the basis of federal low-income standards for the given year of enrollment, reported income, and family size. In this case, the upper end of the aforementioned income range had to be below

the federally defined income standard to be classified into a given level. The self-reported ranges were used in the place of more official sources, e.g., official financial aid data, because self-reported data were available for most of the college population. In other words, using more official sources (in analyses with income) would have otherwise greatly reduced the sample size of the study – particularly for populations that aren't eligible for financial aid (e.g. special admit students). That said, these self-reported brackets were validated against actual financial aid data for a subset of students within each course. For this sample of students, official adjusted gross income was divided by the number of family members reported on their financial aid application. This variable was then correlated with their self-reported income level. In each course, the self-reported levels correlated strongly with the aforementioned income variable: $r = 0.516$, $F(3, 2863) = 346.2$, $p < .001$; $r = 0.513$, $F(3, 1494) = 178$, $p < .001$; $r = 0.532$, $F(3,2340) = 307.33$; $r = 0.532$, $F(3, 1461) = 192.09$, $p < .001$; for ENGWR 300, STAT 300, COMM 301, PSYC 300, respectively. The self-reported income levels were therefore assumed to be a valid, although imperfect, measure of student income. Note that five observations were removed in calculating the aforementioned correlation for COMM 301. These observations were clear outliers with AGI's greater than 3 standard deviations from the mean for that group.

Finally, for each student a "success score" was calculated on the basis of their academic achievement prior to the start of the term of first enrollment in a given course. This success score was calculated similar to a GPA, except it included grade notations not typically included in a GPA calculation. For example, P grades were assigned two grade points, whereas W's were assigned zero (see *Table 1* below). A, B, C, D, and F grades were assigned their standard number of grade points, and the success score was calculated in otherwise equivalent fashion to a GPA. If a student did not have prior enrollment at CRC, then their high school GPA was used as a stand-in for their success score.

Table 1. Success score points by grade notation.

Notation	Points
A	4
B	3
C, P, CR	2
D	1
F, W, EW, I	0

Prior to analysis, all continuous variables (success score, number of terms of instruction, and age) were mean centered and divided by their standard deviation. *Table 2* and *Table 3* below provide a summary of the aforementioned discrete and continuous variables by course. The largest sample size of students can be found in ENGWR 300 followed by COMM 301.

Table 2. Headcounts by Course, Demographic, and Course Feature

	ENGWR 300		STAT 300		PSYC 300		COMM 301	
Variable	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**

Day	1645	36.2%	1831	72.1%	959	37.9%	2592	60.3%
Evening	130	2.9%	487	19.2%			573	13.3%
Unscheduled	2774	61.0%	223	8.8%	1573	62.1%	1135	26.4%
Fully Online	2820	62.0%	1237	48.7%	1610	63.6%	3440	80.0%
Hybrid	227	5.0%	24	0.9%			24	0.6%
On-Ground	1502	33.0%	1280	50.4%	922	36.4%	836	19.4%
Full Term	3819	84.0%	2541	100.0%	1637	64.7%	4281	99.6%
First-Eight Weeks	239	5.3%			548	21.6%		
Second-Eight Weeks	491	10.8%			347	13.7%	19	0.4%
Not Hispanic/Latinx	3103	68.2%	1735	68.3%	1728	68.2%	3013	70.1%
Hispanic/Latinx	1446	31.8%	806	31.7%	804	31.8%	1287	29.9%
Not Black/African American	3884	85.4%	2189	86.1%	2095	82.7%	3672	85.4%
Black/African American	665	14.6%	352	13.9%	437	17.3%	628	14.6%
Not Pacific Islander	4432	97.4%	2463	96.9%	2448	96.7%	4191	97.5%
Pacific Islander	117	2.6%	78	3.1%	84	3.3%	109	2.5%
Not White	3028	66.6%	1830	72.0%	1710	67.5%	2880	67.0%
White	1521	33.4%	711	28.0%	822	32.5%	1420	33.0%
Not Filipino	4106	90.3%	2269	89.3%	2268	89.6%	3911	91.0%
Filipino	443	9.7%	272	10.7%	264	10.4%	389	9.0%
Not Asian	2824	62.1%	1521	59.9%	1642	64.8%	2681	62.3%
Asian	1725	37.9%	1020	40.1%	890	35.2%	1619	37.7%
Not Native American	4380	96.3%	2469	97.2%	2437	96.2%	4157	96.7%
Native American	169	3.7%	72	2.8%	95	3.8%	143	3.3%
Below Poverty	1808	39.7%	1006	39.6%	991	39.1%	1648	38.3%
Low	1135	25.0%	599	23.6%	657	25.9%	1144	26.6%
Middle Income and Above	1078	23.7%	617	24.3%	576	22.7%	951	22.1%
Unable to Determine	528	11.6%	319	12.6%	308	12.2%	557	13.0%
Female	2432	53.5%	1399	55.1%	1548	61.1%	2327	54.1%
Male	2012	44.2%	1094	43.1%	934	36.9%	1883	43.8%
Other/Unknown	105	2.3%	48	1.9%	50	2.0%	90	2.1%
First Generation	3311	72.8%	1854	73.0%	1836	72.5%	3172	73.8%
Not First Generation	1238	27.2%	687	27.0%	696	27.5%	1128	26.2%
Not a Single Parent	4339	95.4%	2428	95.6%	2386	94.2%	4122	95.9%
Single Parent	210	4.6%	113	4.4%	146	5.8%	178	4.1%
Continuing Student	1211	26.6%	1351	53.2%	1191	47.0%	2546	59.2%
First Time Student (New)	2543	55.9%	774	30.5%	882	34.8%	937	21.8%
First Time Transfer Student	393	8.6%	145	5.7%	189	7.5%	321	7.5%
Returning Student	303	6.7%	231	9.1%	222	8.8%	434	10.1%
Special Admit	99	2.2%	40	1.6%	48	1.9%	62	1.4%
Full-Time	363	8.0%	243	9.6%	194	7.7%	353	8.2%

Part-Time	2027	44.6%	1241	48.8%	1197	47.3%	2121	49.3%
Unemployed	2159	47.5%	1057	41.6%	1141	45.1%	1826	42.5%
Total	**4549**		**2541**		**2532**		**4300**	

Table 3. Means/SDs for Continuous Variables

Course	Variable	Mean	SD
ENGWR 300	Terms of Instruction	20.9	11.9
	Student Age	20.9	6.0
	Success Score	2.9	1.0
STAT 300	Terms of Instruction	12.4	12.2
	Student Age	22.0	6.6
	Success Score	2.7	1.0
PSYC 300	Terms of Instruction	16.3	11.8
	Student Age	21.3	6.1
	Success Score	2.7	1.1
COMM 301	Terms of Instruction	18.9	13.6
	Student Age	21.9	6.4
	Success Score	2.7	1.1

Analysis Method

Data were analyzed using logit regressions assuming binomial error. The significance of each association (e.g. between age and successful course completion) was assessed while holding all other variables constant. For example, if a statistically significant association was found for age, the association would be interpreted as the correlation of age with successful completion holding gender, race/ethnicity, income, employment, etc., constant. Statistical control (a.k.a. "holding things constant") is an important step in adequately identifying and understanding associations in an exploratory analysis. For example, if we found that single parents have lower success rates, it may be because they tend to have lower income levels than other students. If the association for single-parents remained after controlling for income level (e.g. a low-income non-single parent has a higher likelihood of success than a low-income single parent), it highlights the possibility that other factors may be at play and/or that income may only be a partial explanation for the association.

Furthermore, when testing for an association, it is important to have an accurate estimate of how much that association may vary from sample-to-sample. Specifically, having an accurate and unbiased estimate of this *standard error* is essential for drawing conclusions about statistical significance. The *regression coefficient* – a description of how much the outcome variable changes on the basis of a one unit change in a predictor variable – is typically divided

by this standard error to produce a test statistic[4]. Significance is determined on the basis of this test statistic. If, for some reason, the standard error is not estimated properly, then one might draw incorrect conclusions about the association in question.

It is therefore important to note that the data in the analyses described here are inherently clustered. That is, students take classes in sections together, and as such they may be similar to each other in some way (they aren't independent, as mentioned in the introduction of this report). In most circumstances, this clustering results in estimates of standard error that are too low, potentially resulting in spurious significant results. Cluster robust estimates of standard errors[5] were therefore used in testing significance of associations. Errors were estimated assuming student data were clustered in their class section.

Finally, day/evening/unscheduled (see *Table 2*) status was analyzed in a separate model excluding modality but including all other variables. There was substantial overlap between the time of day variable and the online modality variable, such that nearly all "unscheduled" courses had an online modality. Statistically speaking, this would have made it difficult to evaluate the difference between online and on-ground modalities if day/evening status were included.

Results

Overall findings

A summary of the findings, and replication across courses, can be found in *Table 4* below and descriptive success rates can be found in *Table 5* thereafter. In *Table 4*, a plus symbol indicates a statistically significant positive association and a minus sign indicates a significant negative association. A blank value/cell indicates no significant association. For example, in the "Unable to Determine" row for income in the table, there is a minus sign in the ENGWR 300 column, indicating that students with indeterminate income had significantly lower success rates than students with "Middle and Above Income". However, we might be inclined to be skeptical of the generality of this finding – since the cells were blank for the same variable in the other three courses. These students did not have significantly lower successful completion rates in STAT 300, PSYC 300, or COMM 301. Tables summarizing each statistical model can be found in tables 6 through 9 below.

One variable was positively correlated with success across all courses:

1. Students with higher prior success – as measured by success score - tended to have higher success rates.

[4] This is intended to provide an intuition of the issue being described – e.g. statistical inference and standard error. This is not intended to be a textbook description of significance testing and nuances therein.
[5] e.g., C., A., Collin & D., L., Miller (2015). A Practitioner's Guide to Cluster-Robust Inference. *The Journal of Human Resources 50*(2). This article provides a good high-level summary. You may also find it useful to google the "sandwich estimator".

Several student groups were disproportionately impacted across three or more of the courses:

1. New students and new transfer students were disproportionately impacted relative to continuing students.
2. African American and Hispanic/Latino(a) students were disproportionately impacted relative to non-African American and non-Hispanic/Latino(a) students, respectively.
3. Students with low or below poverty income were disproportionately impacted relative to students who were not low-income.

Three variables were associated with successful course completion in just two courses:

1. Hybrid courses had lower success rates than online courses in two of the courses analyzed.
2. On-ground courses had higher success rates than online courses in two of the courses analyzed.
3. Unemployed students had higher success rates in two of the courses.

All other associations were either mixed across courses or only present in one course.

Table 4. Summary of Significant Associations

Predictor	ENGWR 300	STAT 300	PSYC 300	COMM 301
Number of Terms Teaching	+	-		+
Modality (Baseline: Online)				
Hybrid		-		-
On-Ground	+			+
Session (Baseline: Full Term)				
First-Eight Weeks		**N/A**	+	**N/A**
Second-Eight Weeks		**N/A**		-
Evening Courses (Compared to Daytime Courses)			**N/A**	
Age				
Hispanic/Latinx	-	-		-
Black/African American	-	-	-	
Pacific Islander		-		
White				
Native American				
Filipino				
Asian				+
Income (Baseline: Middle and Above Income)				
Below Poverty	-	-	-	
Low Income	-	-	-	
Unable to Determine	-			
First Generation				-

Single Parent Status	-			
Enrollment Status (Baseline: Continuing Student)				
First Time Student (New)	-	-	-	-
First Time Transfer Student	-	-	-	-
Returning Student				
Special Admit			-	
Gender (Baseline: Female)				
Male				
Unknown Gender				
Success Score	+	+	+	+
Employment (Baseline: Full-Time)				
Part-Time			+	
Unemployed	+			+

Table 5. Success Rates for Discrete Variables by Course

Variable	ENGWR 300	STAT 300	PSYC 300	COMM 301
Day	72.8%	55.1%	64.1%	76.0%
Evening	72.3%	60.4%		73.5%
Unscheduled	61.1%	78.5%	75.5%	72.7%
Fully Online	61.2%	61.0%	75.8%	75.0%
Hybrid	56.8%	45.8%		62.5%
On-Ground	75.3%	55.7%	63.0%	74.4%
Full Term	67.0%	58.2%	65.3%	75.0%
First-Eight Weeks	66.9%		86.1%	
Second-Eight Weeks	54.6%		75.2%	42.1%
Not Hispanic/Latinx	68.4%	62.4%	72.6%	77.4%
Hispanic/Latinx	59.8%	49.0%	68.0%	68.8%
Not Black/African American	68.0%	60.9%	74.1%	76.6%
Black/African American	51.7%	40.9%	57.2%	64.5%
Not Pacific Islander	65.7%	58.7%	71.2%	75.0%
Pacific Islander	60.7%	39.7%	71.4%	66.1%
Not White	63.9%	56.3%	69.5%	74.0%
White	69.0%	63.0%	74.6%	76.4%
Not Filipino	65.4%	57.2%	70.7%	74.4%
Filipino	67.5%	66.2%	75.4%	79.2%
Not Asian	62.0%	52.7%	68.0%	71.1%
Asian	71.5%	66.3%	77.0%	81.0%

Not Native American	65.7%	58.7%	71.2%	74.9%
Native American	63.9%	40.3%	69.5%	71.3%
Below Poverty	70.8%	64.3%	78.6%	77.5%
Low	60.4%	52.9%	60.7%	72.2%
Middle income and Above	63.2%	54.5%	69.6%	73.5%
Unable to Determine	64.2%	55.8%	72.4%	74.5%
Female	65.2%	58.1%	71.1%	74.3%
Male	66.1%	58.3%	71.3%	75.6%
Other/Unknown	67.6%	56.3%	72.0%	71.1%
First Generation	67.0%	59.1%	72.3%	76.2%
Not First Generation	61.9%	55.6%	68.1%	70.9%
Not a Single Parent	66.3%	58.7%	72.0%	75.4%
Single Parent	51.0%	46.9%	57.5%	62.4%
Continuing Student	68.8%	64.0%	77.2%	78.0%
First Time Student (New)	65.0%	50.3%	65.8%	69.2%
First Time Transfer Student	61.3%	53.8%	67.2%	73.2%
Returning Student	58.1%	52.8%	63.1%	67.7%
Special Admit	82.8%	62.5%	75.0%	85.5%
Full-Time	54.8%	53.1%	61.9%	65.7%
Part-Time	64.2%	56.2%	73.0%	73.6%
Unemployed	68.8%	61.7%	70.8%	78.0%

Odds Ratios

When thinking about the aforementioned associations, it's helpful to have a measure of the relative "size" of an effect. In logistic regression, the most commonly used measures of effect size are odds ratios. Odds ratios can be found in the logistic regression results presented in *Table 6, Table 7*, *Table 8*, and *Table 9*. An odds ratio that is above the value of one indicates a positive association – the larger the value the stronger the effect. An odds ratio below the value of one indicates a negative effect – the stronger the negative effect, the smaller the odds ratio.

Not surprisingly, the variables with the strongest negative (below one) effect sizes were those that had the most consistent results across courses. That is to say, student groups who were disproportionately impacted across three or four courses also had the lowest odds ratios. The strongest positive associations could be found for success score and unemployed status.

Table 6. ENGWR 300 Logistic Regression Findings

Predictor	Slope	SE	*z*	*p*-value	Adjusted *p*-value	Odds Ratio
(Intercept)	1.135	0.170	6.682	0.000	0.000	3.111
Number of Terms Teaching	0.137	0.035	3.856	0.000	0.009	1.146

Modality (Baseline: Online)						
Hybrid	-0.052	0.150	-0.346	0.730	0.864	0.949
On-Ground	0.650	0.081	8.036	0.000	0.000	1.915
Session (Baseline: FT)						
8W1	0.315	0.155	2.030	0.042	0.258	1.371
8W2	-0.240	0.107	-2.240	0.025	0.155	0.786
Evening Class	0.064	0.214	0.299	0.765	0.858	1.066
Student Age	0.065	0.044	1.489	0.136	0.142	1.067
Hispanic/Latinx	-0.294	0.090	-3.288	0.001	0.001	0.745
Black/African American	-0.534	0.105	-5.091	0.000	0.000	0.586
Pacific Islander	-0.158	0.209	-0.758	0.448	0.456	0.853
White	0.129	0.085	1.512	0.131	0.140	1.137
Native American	0.142	0.178	0.799	0.424	0.417	1.152
Filipino	-0.177	0.123	-1.447	0.148	0.132	0.837
Asian	0.178	0.102	1.743	0.081	0.060	1.195
Income (Baseline: Middle and Above Income)						
Below Poverty	-0.401	0.090	-4.476	0.000	0.000	0.669
Low Income	-0.261	0.090	-2.899	0.004	0.007	0.771
Unable to Determine	-0.359	0.113	-3.180	0.001	0.003	0.698
First Generation	-0.138	0.078	-1.767	0.077	0.084	0.871
Single Parent Status	-0.389	0.167	-2.329	0.020	0.026	0.678
Enrollment Status (Baseline: Continuing Student)						
First Time Student (New)	-0.892	0.098	-9.135	0.000	0.000	0.410
First Time Transfer Student	-0.820	0.137	-5.997	0.000	0.000	0.441
Returning Student	0.111	0.152	0.729	0.466	0.523	1.117
Special Admit	0.397	0.298	1.332	0.183	0.235	1.487
Gender (Baseline: Female)						
Male	-0.069	0.070	-0.985	0.325	0.319	0.934
Unknown Gender	0.070	0.231	0.302	0.763	0.762	1.072
Employment (Baseline: Full-Time)						
Part-Time	0.263	0.129	2.046	0.041	0.068	1.301
Unemployed	0.430	0.130	3.315	0.001	0.002	1.537
Success Score	0.601	0.041	14.616	0.000	0.000	1.825

Table 7. STAT 300 Logistic Regression Findings

Predictor	Slope	SE	*z*	*p*-value	Adjusted *p*-value	Odds Ratio
(Intercept)	1.071	0.222	4.821	0.000	0.000	2.920
Number of Terms Teaching	-0.281	0.048	-5.798	0.000	0.000	0.755
Modality (Baseline: Online)						
Hybrid	-0.285	0.483	-0.589	0.556	0.027	0.752

On-Ground	-0.081	0.100	-0.807	0.420	0.648	0.923
Evening Class	0.177	0.122	1.460	0.144	0.305	1.194
Student Age	0.044	0.059	0.756	0.449	0.391	1.045
Hispanic/Latinx	-0.370	0.128	-2.883	0.004	0.004	0.691
Black/African American	-0.551	0.151	-3.660	0.000	0.001	0.576
Pacific Islander	-0.923	0.268	-3.446	0.001	0.000	0.397
White	0.199	0.124	1.601	0.109	0.088	1.220
Native American	-0.559	0.275	-2.035	0.042	0.062	0.572
Filipino	0.039	0.159	0.243	0.808	0.801	1.039
Asian	0.191	0.141	1.355	0.175	0.171	1.211
Income (Baseline: Middle and Above Income)						
Below Poverty	-0.441	0.125	-3.527	0.000	0.001	0.644
Low Income	-0.309	0.121	-2.558	0.011	0.009	0.734
Unable to Determine	-0.322	0.151	-2.132	0.033	0.055	0.725
First Generation	0.007	0.108	0.067	0.947	0.948	1.007
Single Parent Status	-0.172	0.240	-0.717	0.474	0.495	0.842
Enrollment Status (Baseline: Continuing Student)						
First Time Student (New)	-1.247	0.119	-10.451	0.000	0.000	0.287
First Time Transfer Student	-1.097	0.202	-5.431	0.000	0.000	0.334
Returning Student	0.280	0.174	1.608	0.108	0.126	1.324
Special Admit	-0.178	0.376	-0.474	0.635	0.538	0.837
Gender (Baseline: Female)						
Male	0.061	0.095	0.647	0.518	0.528	1.063
Unknown Gender	-0.058	0.335	-0.174	0.862	0.873	0.943
Employment (Baseline: Full-Time)						
Part-Time	-0.050	0.172	-0.294	0.769	0.780	0.951
Unemployed	0.284	0.177	1.602	0.109	0.107	1.328
Success Score	0.963	0.057	16.761	0.000	0.000	2.620

Table 8. PSYC 300 Logistic Regression Findings

Predictor	Slope	SE	*z*	*p*-value	Adjusted *p*-value	Odds Ratio
(Intercept)	1.444	0.249	5.809	0.000	0.000	4.236
Number of Terms Teaching	-0.152	0.073	-2.072	0.038	0.148	0.859
Modality (Baseline: Online)						
On-Ground	-0.215	0.138	-1.556	0.120	0.221	0.807
Session (Baseline: FT)						
8W1	1.105	0.22	5.125	0.000	0.002	3.018
8W2	0.345	0.16	2.112	0.035	0.073	1.412
Student Age	-0.053	0.057	-0.922	0.356	0.470	0.948
Hispanic/Latinx	-0.064	0.129	-0.496	0.620	0.592	0.938

Black/African American	-0.424	0.145	-2.933	0.003	0.001	0.654
Pacific Islander	0.111	0.273	0.406	0.684	0.700	1.118
White	0.035	0.123	0.282	0.778	0.763	1.035
Native American	0.094	0.254	0.371	0.711	0.708	1.099
Filipino	-0.106	0.181	-0.588	0.557	0.513	0.899
Asian	0.117	0.150	0.781	0.435	0.374	1.124
Income (Baseline: Middle and Above Income)						
Below Poverty	-0.847	0.128	-6.600	0.000	0.000	0.428
Low Income	-0.411	0.133	-3.082	0.002	0.001	0.663
Unable to Determine	-0.331	0.165	-2.009	0.045	0.089	0.718
First Generation	-0.016	0.113	-0.141	0.888	0.893	0.984
Single Parent Status	-0.149	0.217	-0.688	0.491	0.569	0.862
Enrollment Status (Baseline: Continuing Student)						
First Time Student (New)	-1.036	0.128	-8.079	0.000	0.000	0.355
First Time Transfer Student	-1.056	0.196	-5.376	0.000	0.000	0.348
Returning Student	0.067	0.183	0.367	0.713	0.761	1.069
Special Admit	-1.373	0.377	-3.644	0.000	0.002	0.253
Gender (Baseline: Female)						
Male	0.012	0.104	0.113	0.910	0.902	1.012
Unknown Gender	0.123	0.352	0.350	0.726	0.702	1.131
Employment (Baseline: Full-Time)						
Part-Time	0.402	0.187	2.152	0.031	0.041	1.496
Unemployed	0.360	0.190	1.899	0.058	0.066	1.434
Success Score	0.834	0.058	14.480	0.000	0.000	2.302

Table 9. COMM 301 Logistic Regression Findings

Predictor	Slope	SE	*z*	*p*-value	Adjusted *p*-value	Odds Ratio
(Intercept)	1.333	0.177	7.534	0.000	0.000	3.791
Number of Terms Teaching	0.193	0.044	4.437	0.000	0.001	1.213
Modality (Baseline: Online)						
Hybrid	-0.610	0.465	-1.311	0.190	0.000	0.543
On-Ground	0.422	0.106	3.968	0.000	0.008	1.525
Session (Baseline: FT)						
8W2	-1.107	0.501	-2.210	0.027	0.000	0.331
Evening Class	0.144	0.121	1.193	0.233	0.463	1.155
Age	0.084	0.048	1.756	0.079	0.074	1.087
Hispanic/Latinx	-0.203	0.100	-2.035	0.042	0.046	0.816
Black/African American	-0.226	0.118	-1.918	0.055	0.076	0.798
Pacific Islander	-0.304	0.223	-1.362	0.173	0.179	0.738
White	0.043	0.098	0.442	0.658	0.645	1.044

Native American	0.123	0.205	0.601	0.548	0.544	1.131
Filipino	-0.039	0.147	-0.267	0.790	0.793	0.961
Asian	0.262	0.115	2.274	0.023	0.019	1.300
Income (Baseline: Middle and Above Income)						
Below Poverty	-0.186	0.102	-1.829	0.067	0.061	0.830
Low Income	-0.063	0.104	-0.605	0.545	0.522	0.939
Unable to Determine	-0.217	0.125	-1.737	0.082	0.068	0.805
First Generation	-0.233	0.090	-2.581	0.010	0.015	0.792
Single Parent Status	-0.245	0.194	-1.267	0.205	0.251	0.782
Enrollment Status (Baseline: Continuing Student)						
First Time Student (New)	-0.907	0.100	-9.041	0.000	0.000	0.404
First Time Transfer Student	-0.657	0.151	-4.355	0.000	0.000	0.519
Returning Student	-0.003	0.131	-0.023	0.982	0.983	0.997
Special Admit	0.435	0.395	1.100	0.271	0.445	1.544
Gender (Baseline: Female)						
Male	0.052	0.079	0.652	0.515	0.518	1.053
Unknown Gender	-0.206	0.261	-0.788	0.431	0.460	0.814
Employment (Baseline: Full-Time)						
Part-Time	0.175	0.140	1.252	0.211	0.177	1.191
Unemployed	0.356	0.144	2.476	0.013	0.011	1.428
Success Score	0.760	0.042	17.984	0.000	0.000	2.138

Discussion and Conclusions

Aside from modality, most of the course and instructor features (number of years teaching the course, online/on-ground modality, day/evening, etc.) evaluated in this report had mixed/inconsistent associations across courses. For example, the number of instructional terms was positively correlated with success in two courses, negatively in another, and uncorrelated in the forth. The findings are therefore not easily generalized to other courses/circumstances.

On the other hand, the present investigation found evidence for several associations between successful course completion and demographic/student-level variables. African American, low-income/below poverty, transfer students, and new students were disproportionately impacted across at least three of the courses. On the other hand, students with higher prior academic success were more likely to succeed, and there was some evidence that students who are unemployed are more likely to successfully complete a course. These variables were found to be statistically significant *while holding all other variables in the model constant*.

Correlation, Causation, and Error

At this point it is important to note that the presence of a significant association does not imply a causal relationship between variables – even for variables for which an obvious causal

explanation is present (e.g. income or employment status). The findings presented here are the result of an exploratory evaluation intended to drive initial discussion around course success. They should therefore be used as a starting point in discussing the causal mechanisms (explanations) and barriers that students may face. Relatedly, the statistical models described here would not be useful in making exact projections or determinations for an individual student. That is to say, assumptions should not be made about a student's capacity to pass a course on the basis of any of the demographic associations reported here. For example, there are likely *many* students who face the challenges (e.g. being full-time employed and low-income) described within this report who excel in their courses.

Small Sample Sizes

It is also worth noting that statistical power may be a possible explanation for the lack of consistency in findings for some demographic variables. Specifically, single parents constituted only a small portion of the samples described here. In recent years, there have been statewide initiatives to improve tracking, reporting, and support of student parents. As such, future analyses involving student parents and single parents may have larger sample sizes.

Multicollinearity

The reader may also note that, in reviewing *Table 5*, there are many student groups with lower/higher than average success rates that did not reach statistical significance. If these differences were tested without holding other variables constant, it is possible that they may statistically significant. When conducting a regression analysis (as described in the analysis methods) with a multitude of independent variables (age, gender, modality, etc.), it is likely that many of these variables will be correlated with each other. The intercorrelation of variables makes it difficult to attribute the "effect/association" to a specific variable. For example, suppose we were testing the effect of a basketball intervention, and we assigned all the tallest players to this intervention. When the results are tallied, we couldn't be certain that the players in the intervention were successful because the training they received or because they were taller. Similarly, for example, if higher income students consistently enroll in a given course type, it is difficult to attribute a difference in success to the course type or to the preponderance of high-income students. The prevalence of intercorrelations between variables is called *multicollinearity*. It may be the case that a particular variable is predictive/impactful, but in this circumstance, it is difficult to tell because of its intercorrelations with other variables.

Future Research and the Need for Research Based Best Practices

Future investigations should focus effective practices that improve course success (particularly for disproportionately impacted groups). Indeed, it is a challenge, both for our students and staff, to view persistent negative (and positive) associations for certain student groups without a clear/delineated mechanism for impacting equity gaps. The findings reported here should, of course, act as a starting point for campus discussions around course success. Given the lack of consistent associations for scheduling/course features, and the persistence of disproportionate

impact across courses, some may wonder how we ultimately address the barriers faced by students. It is the Research Office's recommendation that the college discusses and provides professional development on *research based and established* practices for instruction, and that faculty engage in self-reflective discussion about their own practices.