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APPENDIXES
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Using High School Data to Predict College Readiness and Early College Success on Guåhan (Guam)

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See https://go.usa.gov/xstj5 for the full report.

Appendix A. Additional context for the study

This appendix begins with an overview of contextual issues related to the academic preparation of students attending public elementary, middle, and high schools on Guåhan. It then provides additional context on postsecondary education on Guåhan and stakeholder concerns related to college readiness and early college success among students enrolling in Kulehon Kumunidåt Guåhan (Guam Community College) and Unibetsedåt Guåhan (University of Guam). Finally, it summarizes previous research on college readiness and early college success and highlights the need for this study.

Academic preparation of students attending public schools on Guåhan

Guåhan has one school district that oversees the operation of 40 primary and secondary level schools. During the 2018/19 school year the Guam Department of Education provided services to 29,680 students in grades K–12 (Guam Department of Education, 2020). Guam's 26 public elementary schools served 13,686 students, the 8 public middle schools served 6,458 students, and the 6 public high schools served 9,536 students (Guam Department of Education, 2020).

The unique context of Guåhan and its K–12 student population could contribute to challenges in adequately preparing students for college readiness and early college success. Guåhan is multicultural and multilingual, with more than 21 race/ethnicities represented in its school system. About 45 percent of students are indigenous CHamoru students (Guam Department of Education, 2019).[1] Although CHamoru and English are the official languages of Guåhan, about 50 percent of its students are enrolled in English language learning programs, so about half of Guåhan's K–12 students are not being taught in their home language (Guam Department of Education, 2015). This suggests a possible misalignment between the language of instruction and the students' home language. Further, many schools have limited access to culturally appropriate instructional materials (Burger et al., 2007). These factors might make it challenging for the public education system on Guåhan to adequately build students' English language abilities to prepare them for college readiness and early college success.

[1] CHamoru is the official spelling for the Indigenous language and people of Guåhan. In other texts it may be spelled Chamorro.

Student performance on the ACT Aspire—a standardized test administered annually in grades 3–10—suggests that although a large percentage of students are graduating from high school on Guåhan, they might not be prepared for college. Performance on the ACT Aspire is measured as the percentage of grade-level benchmarks that students meet. Students who meet or exceed the ACT readiness benchmarks are considered on target for college course success (Guam Department of Education, 2019). On average, Guåhan high school students' math and English ACT Aspire performance ranked below the national average (Sanchez, 2016). For example, Guåhan's grade 9 students ranked, on average, at the 14th percentile in math in 2014/15 (Hernandez, 2015). More recently, grade 9 and 10 high school students met or exceeded an average of 5 percent of math benchmarks and 41 percent of English benchmarks in 2018/19 (Guam Department of Education, 2019). Despite meeting fewer than half the grade-level benchmarks, on average, about 87 percent of grade 12 students graduated from public high schools on Guåhan in 2019 (Guam Department of Education, 2019). A better understanding of how the academic preparation of Guåhan public high school students relates to their college readiness and early college success could inform changes to policy and practice earlier in the education pipeline to help ensure that students are prepared for future academic success.

Postsecondary education on Guåhan and stakeholder concerns about college readiness and early college success

Kulehon Kumunidåt Guåhan and Unibetsedåt Guåhan are the two public college-level institutions on Guåhan. In 2017/18 they served 6,135 students (Guam Community College, 2019; University of Guam, 2018).

Kulehon Kumunidåt Guåhan. Kulehon Kumunidåt Guåhan serves a diverse population of postsecondary students seeking two-year degrees in career and technical workforce development. Of the 2,078 students enrolled in fall 2018, about 15 percent were first-time students (Guam Community College, 2019). More than 95 percent of students were Guåhan residents. About 94 percent of students were Asian or Pacific Islander. About 55 percent of students were female. About 45 percent of students were enrolled full-time. And about 62 percent of students were age 25 or younger.

A high percentage of students entering Kulehon Kumunidåt Guåhan are placed in developmental math and English courses, suggesting that many students are not ready for college when they enroll. Between 2013 and 2017 an average of 88 percent of incoming students were placed in developmental math, and an average of 73 percent were placed in developmental English (Guam Community College, 2018). Studies in the mainland United States suggest that students who enroll in non-credit-bearing courses are generally less successful throughout college than students who enroll in credit-bearing courses. Students who enroll in non-credit-bearing courses often take longer to graduate and have lower graduation rates than students who meet indicators of college readiness and early college success (Bailey, 2009a, 2009b; Jaggars & Stacey, 2014). Further, many students who enroll in non-credit-bearing courses face additional financial burdens because they must bear the cost of, and successfully complete, supplemental courses before they can proceed with credit-bearing courses. Stakeholders are concerned that the high percentage of students placed in developmental math and English courses when they enroll at Kulehon Kumunidåt Guåhan could increase the risk of later college failure.

Unibetsedåt Guåhan. Unibetsedåt Guåhan, an accredited, regional land-grant institution, also serves a unique population of students. During the 2017/18 school year, Unibetsedåt Guåhan offered four-year degree, graduate degree, and professional degree programs to 3,917 students (University of Guam, 2018). About 11 percent of the enrolled students were first-time students (University of Guam, 2018). About 92 percent of students were Asian or Pacific Islander, and 58 percent of students were female. About 74 percent of students were enrolled full-time. The average undergraduate student was 23 years old.

As at Kulehon Kumunidåt Guåhan, a high percentage of Unibetsedåt Guåhan students enroll in at least one developmental course, suggesting that many incoming students are not adequately prepared to take college-level

courses. The two developmental math courses and one developmental English course offered by Unibetsedåt Guåhan before 2017 were designed to prepare students for credit-bearing courses. (In 2017 Unibetsedåt Guåhan stopped offering non-credit-bearing English courses.) In 2016 about 70 percent of incoming students were placed in developmental math and English courses—so, a large proportion of incoming students were enrolled in courses focusing on instructional support, rather than on degree attainment (O'Connor, 2016). Given the risks associated with enrollment in developmental courses and the potential financial burdens associated with additional tuition costs, stakeholders at Unibetsedåt Guåhan expressed a need to understand predictors of college readiness and early college success. This information could help them support students who might be at risk of college failure (University of Guam, 2020).

Research on factors associated with college readiness and early college success

Research in the mainland United States and in the Commonwealth of the Northern Mariana Islands suggests that student demographic characteristics are associated with college readiness and early college success. Research in both contexts shows that lower socioeconomic status and racial/ethnic minority status tend to be associated with more frequent placement in developmental courses, lower college persistence, and lower average grades in the first year of college (Byun et al., 2012; Chen, 2016; Herman, Scanlan, et al., 2017; Plucker et al., 2006; Wolniak & Engberg, 2010). In addition, being a first-generation college student has been associated with lower college persistence among some students in the mainland United States (Chen, 2016; Ishitani, 2006). Another study of mainland United States college students found that female students demonstrated higher academic achievement at the end of their first year of college than male students did (Wolniak & Engberg, 2010). Still another study in the mainland United States found that Asian students designated as English learner students were more likely than other Asian students to enroll in developmental courses in college (Flores & Drake, 2014).

Although several studies of college readiness and early college success in the mainland United States have focused on demographic charateristics, their results might not be generalizable to students on Guåhan due to Guåhan's unique education context. For example, most students who enroll in Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan are either Asian or Pacific Islander, and about 66 percent of 2014/15 public high school students on Guåhan were not considered proficient in English. Those contextual issues could create unique challenges for students enrolling in postsecondary education (Guam Community College, 2019; Guam Department of Education, 2015; University of Guam, 2018). A misalignment between the language of instruction and students' home language could affect Guåhan students' placement in and successful completion of credit-bearing courses, which in turn could be associated with other aspects of college readiness and early college success.

Research suggests that in addition to demographic characteristics, academic preparation during high school might be associated with college readiness and early college success in some contexts. Studies across the mainland United States and in the Commonwealth of the Northern Mariana Islands suggest that high school graduates with higher standardized test scores and high school grade point averages were more likely to be college ready and to succeed in college than their lower-performing peers (Geiser & Santelices, 2007; Harackiewics et al., 2002; Herman, Carreon, et al., 2017; Herman, Scanlan, & Carreon, 2017; Stephan et al., 2015; Wiley et al., 2010). But some researchers caution against using standardized tests scores to predict college readiness for nontraditional and racial/ethnic minority students and recommend using a combination of high school course grades and standardized tests (Muir, 2005; Sanchez, 2016). Other research in the mainland United States suggests that taking higher-level math courses (such as precalculus and calculus) in high school might be associated with college math performance (Ferenstein & Hershbein, 2013; Hein et al., 2013; Pugh & Lowther, 2004) and that passing an Advanced Placement exam might also be associated with early college success (Herman, Carreon, et al., 2017 Stephan et al., 2015). Even so, the literature on advanced high school coursework in relation to college outcomes such as college success, academic achievement, and time to graduation is still inconclusive (College Board, 2007;

Geiser & Santelices, 2004). Finally, research in the mainland United States suggests that having fewer high school absences predicts early college success (Stephan et al., 2015).

The need for more research on Guåhan

Since previous studies have found relationships between academic preparation characteristics and college readiness and early college success in the mainland United States and the Commonwealth of the Northern Mariana Islands, examining these relationships in the unique context of Guåhan is important. Although studies from the mainland United States have identified plausible predictors of college readiness and early college success, it is unclear whether those predictors also apply on Guåhan. Knowing plausible predictors of college readiness and early college success on Guåhan is vital so that early interventions and supports can be put in place while students are still in high school. Identifying those predictors can allow educators to assess where students stand, track their progress, and provide supports as soon as risk factors emerge.

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Appendix B. Methods

This appendix provides further details on the study's data sources; student demographic variables, academic preparation variables, and college attended variable; college readiness and early college success indicators, data processing and determination of analytic sample; missing data; and analysis methods.

Data sources

The Guam Department of Education, Kulehon Kumunidåt Guåhan (Guam Community College), and Unibetsedåt Guåhan (University of Guam) provided data for the study. The Guam Department of Education provided student demographic data (gender, race/ethnicity, and primary language spoken at home) and student high school data (high school attended, high school graduation cohort, absence rate across math and English courses in high school, high-level math courses, Advanced Placement math courses, and Advanced Placement English courses). Kulehon Kumunidåt Guåhan and Unibetsedåt Guåhan provided student demographic data (Pell Grant status), student high school data (cumulative high school grade point average), and all outcome indicator data (whether a student enrolled in only credit-bearing math and English courses during the first year of college, whether a student earned all attempted credits during the first semester of college, and whether a student persisted to a second year of college).

Student demographic, academic preparation, and college attended variables

The analyses included the following student demographic, academic preparation, and college attended variables:

High school graduation cohort. The year a student graduated from high school. The study included the cohorts of students who graduated from high school in spring of the following years: 2012, 2013, 2014, and 2015.

High school attended. The name of the Guåhan public high school from which a student graduated. The study included students from five schools: George Washington High School, John F. Kennedy High School, Okkodo High School, Simon Sanchez High School, and Southern High School.[2]

College attended. Whether a student enrolled in Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan.

Gender. Whether a student is reported as male or female.

Race/ethnicity. A student's race/ethnicity: Asian, CHamoru, Federated States of Micronesia, Filipino, Palauan, or other.

Home language. A student's primary language spoken at home: CHamoru/Refaluwasch (Carolinian), Chuukese, English, Tagalog, other Micronesian languages, other Philippine languages, or other languages.

Pell Grant status. Whether a student received a Pell Grant while enrolled at Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan. Federal Pell grants are awarded to undergraduate students with exceptional financial need (Federal Student Aid, 2020).

Cumulative high school grade point average (continuous). A student's cumulative high school grade point average. The cumulative grade point average reflects the average of all final course grades throughout a student's time in high school. The scale is weighted to reflect differences in course difficulty. For a typical course, earning an A would correspond to 4.00, B to 3.00, C to 2.00, D to 1.00, and F to 0.00. The scale for Advanced Placement and honors courses gives additional weight to these courses based on their difficulty. For Advanced Placement and honors courses the scale ranges from 0.00 to 5.00. Grade point average was included as a continuous variable in

[2] The sample excluded three students from a sixth public high school, Tiyan High School for privacy reasons, because the small sample could make it possible to identify individual students.

the models predicting whether students met college readiness and early college success indicators to maximize the statistical power of the analyses, to utilize information about all values of grade point average along the continuous scale, and to avoid any loss of information that could occur by converting it into a categorical variable.

Cumulative high school grade point average (categorical). A student's cumulative high school grade point average using categories of 1.00–1.99, 2.00–2.99, 3.00–3.99, and 4.00 and above. (There were no cumulative high school grade point averages below 1.00.) The analyses for research question 1, on the percentage of students who met the composite indicator and the percentage who met each individual indicator of college readiness and early college success, included cumulative high school grade point average as a categorical variable so stakeholders could see how many students fell into categories reflecting grades scaled as A, B, C, D or F. Although the logistic regression analyses for research question 2, on how students' characteristics predicted meeting the composite indicator and meeting each individual indicator of college readiness and early college success, used a continuous measure of cumulative high school grade point average, the calculation of average probabilities used categorical values. See appendix C for more information.

Absence rate across math and English courses (continuous). The extent to which a student was absent from high school math and English courses. The absence rate was calculated as the percentage of days a student was absent in math classes and the percentage of days a student was absent in English classes during the student's years of enrollment in high school. For this calculation the study team first identified the number of course days for each math and English course by determining the days per semester or summer term (if applicable) for each school year of interest. Next, each student's math and English course absence rates were calculated by dividing the number of days a student was absent from each course by the total number of course days. To calculate one overall absence rate for each student across all math and English courses, the absence rates across the student's math and English courses were averaged.

Absence rate across math and English courses (categorical). A student's absence rate across high school math and English courses was categorized as low, medium, and high using 33rd and 66th percentile cutpoints from the distribution of all students' absence rates for math and English courses. Those cutpoints correspond to being absent from fewer than 1.38 percent or more than 3.12 percent of the days the courses met. The range of absences across math and English courses was 0 to 25 percent. Categorical values of this variable were used in calculating average predicted probabilities. See appendix C for more information.

Completed a high-level math course. A binary (yes/no) variable denoting whether a student received full credit for at least one 400-level math course during high school. Classes in this designation included Elementary Functions, Elementary Functions Honors, Pre-Calculus, Pre-Calculus Honors, Advanced Placement Calculus AB, and Advanced Placement Statistics.

Completed an Advanced Placement math course. A binary (yes/no) variable denoting whether a student received full credit for at least one Advanced Placement math course. Guåhan public schools offer Advanced Placement Statistics and Advanced Placement Calculus.[3]

[3] Kulehon Kumunidåt Guåhan awards credit for a score of 3 or higher on the associated Advanced Placement exam at the discretion of the registrar in consultation with other college officials (Guam Community College, 2014). Unibetsedåt Guåhan requires a minimum score of 3 for a student to earn credit for Advanced Placement Statistics or Advanced Placement Calculus. At Unibetsedåt Guåhan, Advanced Placement Statistics is equivalent to MA-151, a three-credit course (University of Guam, 2019); Advanced Placement Calculus is equivalent to MA-203, a five-credit course.

Completed an Advanced Placement English course. A binary (yes/no) variable denoting whether a student received full credit for at least one Advanced Placement English course. Guåhan public schools offer Advanced Placement English Literature and Composition and Advanced Placement English Language and Composition.[4]

College readiness and early college success indicators

Demonstrating college readiness and early college success was defined as meeting the study's composite indicator of college readiness and early college success. To meet the composite indicator, a student had to meet all three of the individual indicators of college readiness and early college success:

- *Enrolled in only credit-bearing math and English courses during the first year of college.* A binary (yes/no) variable denoting whether a student received credit for only credit-bearing math and English courses and not for any remedial or developmental math or English courses during the semesters that made up the first year of college.
- *Earned all attempted credits during the first semester of college.* A binary (yes/no) variable denoting whether a student earned all attempted credits during the first semester of college.
- *Persisted to second year of college.* A binary (yes/no) variable denoting whether a student persisted to a second year of college.

Data processing and determination of analytic sample

Several steps were taken to process the data and determine the study's analytic sample. The analytic sample included students who graduated from one of five Guåhan public high schools from spring 2012 through spring 2015 and enrolled at Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan during the fall immediately following their high school graduation (between fall 2012 and fall 2015). To be included in the sample, students had to be first-time students seeking an associate or bachelor's degree.[5]

First, the study team cleaned data from all three datasets (Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan). Certain categories in the race/ethnicity and primary language spoken at home data were combined to make larger categories. Race/ethnicity data were combined as follows: Asian (Chinese, Japanese, Korean, and Vietnamese), CHamoru (CHamoru, CHamoru from Rota, CHamoru from Saipan, and CHamoru from Tinian), Federated States of Micronesia (Chuukese, Kosraean, Pohnpeian, and Yapese), Filipino, Palauan, and other (Alaska Native, African American, American Indian, Hawaiian, Hispanic, Indonesian, Marshallese, Samoan, White Non-Hispanic, other Pacific Islander, and other). Language data were combined as follows: CHamoru/Refaluwasch (Carolinian), Chuukese, English, Tagalog, other Micronesian languages (Kosraean, Marshallese, Palauan, Pohnpeian, Pulusuk, Puluwat, and Yapese), other Philippine languages (Ilocano, Visayan, and other Filipino languages), and other (Cantonese, Japanese, Mandarin, Vietnamese, other Chinese languages, and other languages).

Next, the study team merged the Kulehon Kumunidåt Guåhan and Unibetsedåt Guåhan data with data from the Guam Department of Education. Students were matched on name, gender, high school, and graduation cohort using a multistep process. Because student names across the three datasets were not identical (because of misspellings or slight name changes from year to year), inexact matches that met a threshold of similarity were

[4] Kulehon Kumunidåt Guåhan awards credit for a score of 3 or higher on the associated Advanced Placement exam at the discretion of the registrar in consultation with other college officials (Guam Community College, 2014). Unibetsedåt Guåhan requires a minimum score of 3 for a student to earn credit for Advanced Placement English Language and Composition (equivalent to EN-110/EN-111, a three-credit course). It requires a score of 4 or 5 for a student to earn credit for Advanced Placement English Literature and Composition (equivalent to EN-210, a three-credit course; University of Guam, 2019).

[5] Because most students attending Kulehon Kumunidåt Guåhan and Unibetsedåt Guåhan pursue either an associate or bachelor's degree, this criterion was not considered a major constraint.

created using fuzzyjoin (Robinson, 2019). Fuzzyjoin, an R package (R Core Team, 2019), matched students on first and last name using a probability of likely matches. The study team examined gender and high school attended of all students joined using this process to confirm that matches on name were correct.[6] In addition, high school graduation cohort and college enrollment cohort were examined to ensure that the matches aligned chronologically. Incorrect matches—as indicated by a difference in at least two of the key variables (such as student name, gender, or high school attended)—were deleted, and the original unmatched pair of students remained in the sample.

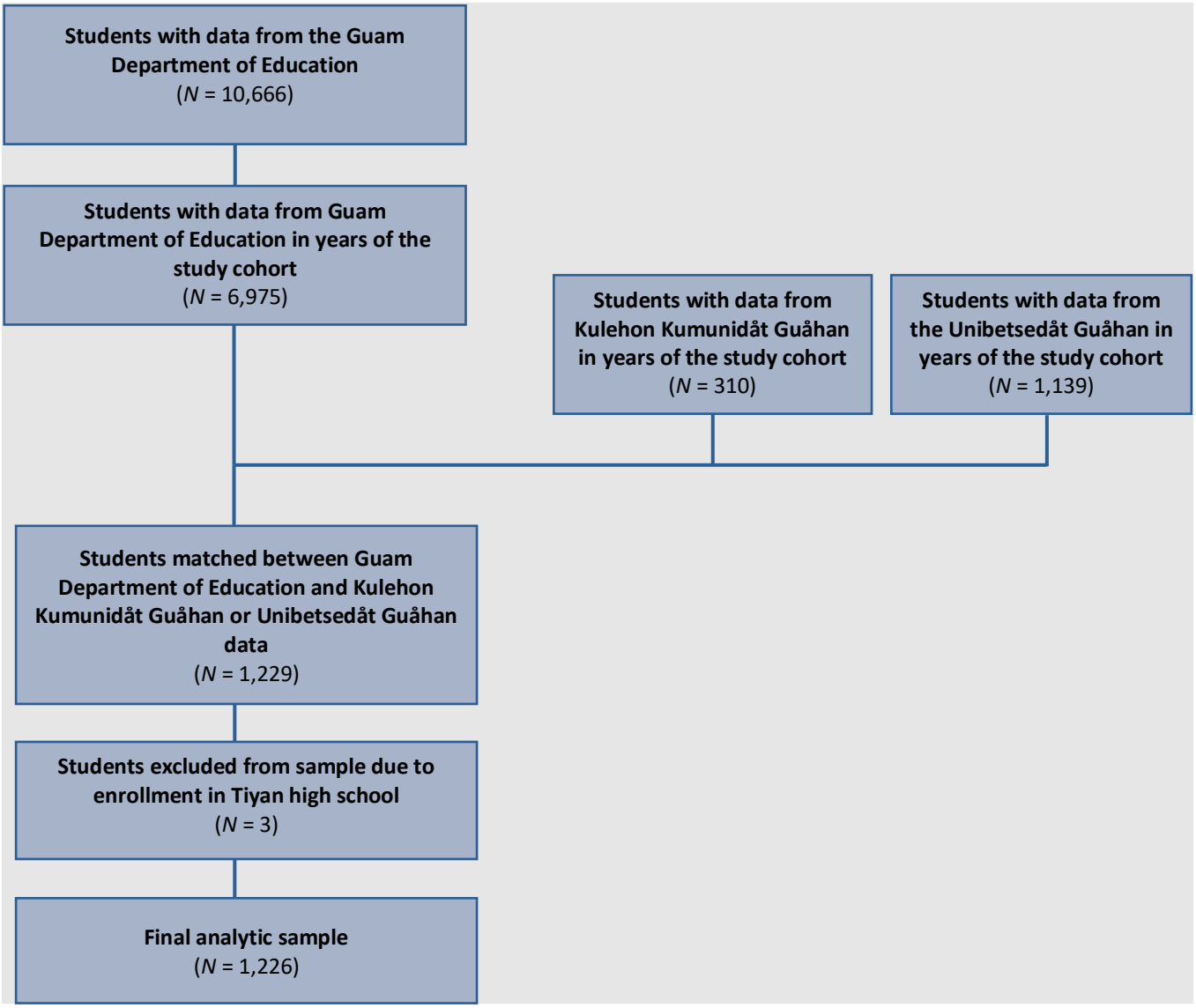
After the three datasets were combined, 1,229 students were identified who had matching high school and college data. An additional 5,746 students from the Guam Department of Education dataset could not be matched across the datasets. Many of these students were likely not matched because they did not enroll in either Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan following high school graduation, so they were not included in the study.[7] Twenty-three percent of students in the Kulehon Kumunidåt Guåhan dataset and 13 percent of students in the Unibetsedåt Guåhan dataset could not be matched with students in the Guam Department of Education dataset. It is possible that these students did not graduate from a public high school on Guåhan or could not be matched for reasons such as inconsistent name spellings across the datasets.[8] The sample excluded three students from a sixth public high school, Tiyan High School, for privacy reasons, because the small sample could make it possible to identify individual students.

[6] The primary source of demographic data was the Guam Department of Education. Demographic data from Kulehon Kumunidåt Guåhan and Unibetsedåt Guåhan were used to verify matches.

[7] About 18 percent of Guåhan public high school students from the Guam Department of Education dataset could be matched with corresponding data in the Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan datasets. Students with both high school and college data were more likely to have taken high-level math courses and Advanced Placement math and English courses than students who did not have college data. In addition, students with both high school and college data had a lower average absence rate across math and English courses than students who did not have college data. See tables C9–C12 in appendix C for more information.

[8] More than 95 percent of Kulehon Kumunidåt Guåhan students and about 90 percent of Unibetsedåt Guåhan students are from Guåhan (College Factual, 2020; Guam Community College, 2019). There are numerous private secondary schools on Guåhan, but this study included only students who had attended public high schools on Guåhan, which might contribute to the number of students from the higher education institutions who could not be matched to high school data provided by the Guam Department of Education. Furthermore, when this study was conducted, Guam did not have a longitudinal data system that connected student data across Guam's secondary and postsecondary education systems through a unique identifier. In 2020 Guam received a grant from the Institute of Education Sciences to develop a longitudinal data system, known as the Guam One Stop Data Village, that would connect student data across the Guam Department of Education, Kulehon Kumunidåt, and Guåhan Unibetsedåt Guåhan.

Figure B1. Number of students in each step of the determination of the analytic sample



Note. Some 393 students from Kulehon Kumunidåt Guåhan and 37 students from Unibetsedåt Guåhan were removed from the sample because they were missing enrollment data, which were needed for one of the outcome variables.
Source: Authors' compilation.

Missing data

Some 393 students from Kulehon Kumunidåt Guåhan and 37 students from Unibetsedåt Guåhan were removed from the sample because of missing outcome enrollment data. Of the 1,226 students included in the final analytic sample, 550 students had complete outcome and student demographic and academic preparation characteristics data and 676 had missing data for one or more demographic or academic preparation characteristics (table B1).[9]

[9] The total number of students included in the final sample (n = 1,226) likely does not represent the full number of students who graduated from Guåhan public high schools and then went on to enroll in either Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan. The study's sample was limited by available data provided by the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan. The sample was further restricted by the number of students with available outcome data and the number of students who could be matched between the datasets by their first and last names.

Table B1. Percentage of missing records by variable

Student characteristic	Percent missing data
High school attended	0.20
High school graduation cohort	0.00
College attended	0.00
Gender	0.00
Race/ethnicity	0.00
Home language	36.50
Pell Grant status	0.00
Absence rate across math and English courses in high school	0.00
Cumulative high school grade point average	19.00
Completed a high-level math course	0.00
Completed an Advanced Placement math course	0.00
Completed an Advanced Placement English course	0.00

Source: Authors' compilation.

Missing data analyses were conducted to determine whether students with missing data differed from those with no missing data on the study's demographic, academic preparation, and college attended characteristics of interest. Chi-square tests were used to determine whether categorical characteristics were related to whether a student had missing data (table B2), and sample *t*-tests were used to determine whether continuous variables were related to whether a student had missing data (table B3). These analyses showed that students with missing data differed from students with no missing data in high school graduation cohort, college attended, Pell Grant status, Advanced Placement English course completion, absence rate across math and English courses, and whether they demonstrated college readiness and early college success (met all three indicators).

Table B2. Chi-square results comparing characteristics of Guåhan public high school graduates enrolled as first-time students at Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan based on whether a student had missing data, 2012–15

Student characteristic	Chi-square value
High school attended	7.762
High school graduation cohort	576.085***
College attended	205.973***
Gender	2.385
Race/ethnicity	1.958
Primary language spoken at home	20.783
Pell Grant status	4.334*
Completed a high-level math course	3.515
Completed an Advanced Placement math course	1.127
Completed an Advanced Placement English course	9.632**
Indicator	**Chi-square value**
Demonstrated college readiness and early college success (met all three indicators)	4.969*
Enrolled in only credit-bearing math and English courses during the first year of college	0.420
Earned all attempted credits during the first semester of college	1.437
Persisted to a second year of college	0.909

* Significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table B3. Independent *t*-test results comparing characteristics of Guåhan public high school graduates enrolled as first-time students at Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan based on whether a student had missing data, 2012–15

Student characteristic	Degrees of freedom	*t-test*
Absence rate across math and English courses in high school	1220.261	−6.096***
Cumulative high school grade point average	992.000	0.752

*** Significant at $p < .001$.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

To preserve the sample size and allow students with missing data to be included in the analysis, multiple imputation was conducted using the *mice: Multivariate Imputation by Chained Equations* package (van Buuren & Groothuis-Oudshoorn, 2011) in R (R Core Team, 2019). MICE is appropriate for imputing continuous, binary, and ordered and unordered categorical data. The imputation models included student demographic and academic predictor variables and the college readiness and early college success indicators examined in this study. The imputation procedures created 37 versions, equal to the highest percentage of missingness in the data (White, et al., 2011), of complete datasets by using existing values to predict missing variables. Analyses were then performed across datasets, and results were pooled to yield one set of results for each analysis. Findings from these analyses were presented in the main report. To determine whether the study findings differed based on methods used to address missing data, sensitivity analyses were conducted using the sample of 550 students who had complete data. The findings from those analyses are presented in appendix D.

Analysis methods

This section describes the analysis methods used to answer the research questions.

Descriptive analyses. As part of preliminary analyses to describe the final analytic sample, IBM SPSS Statistics software, Version 24 (IBM Corp., 2016), was used to calculate means and percentages to describe the characteristics of students in the study sample. The variables included in these descriptive analyses are described in the variables section above. In addition, to address research question 1, the study team calculated means and percentages of students who demonstrated college readiness and early college success based on meeting the indicators examined in this study.

Logistic regression analyses. To address research questions 2 and 3, the R program (R Core Team, 2019) was used to run logistic regression analyses, which are appropriate for examining categorical and continuous predictors of a binary outcome. One variable (home language) was excluded from the logistic regression analyses because it was too highly correlated with race/ethnicity. The final regression models included the following predictor variables:

- High school attended.
- High school graduation cohort.
- College attended.
- Gender.
- Race/ethnicity.
- Pell Grant status.
- Absence rate across math and English courses in high school (continuous).
- Cumulative high school grade point average (continuous).
- Completed a high-level math course.

- Completed an Advanced Placement math course.
- Completed an Advanced Placement English course.

Each continuous predictor was centered around its mean in preparation for the logistic regression analyses. In addition, the R program (R Core Team, 2019) was used to deviation-code categorical predictors to support the interpretation of findings. Deviation coding compares outcomes among students with specific characteristics with the grand mean outcome, rather than with outcomes for an arbitrary reference group. For categorical variables, statistical significance indicated that a specific level of a given categorical variable was significantly different from the mean of the means of the outcomes at all values of that variable. For example, for findings regarding the year in which students graduated from high school, deviation coding permitted a comparison of outcomes for students who graduated from high school in 2012 with the mean of the means of the outcomes at all graduation years for the typical student in the study sample.

After completing the final data preparations, four binary logistic regression models were run using the R program (R Core Team, 2019). The first regression model used student demographic and academic preparation characteristics, as well as college attended, to predict the log odds of a student demonstrating college readiness and early college success by meeting the composite indicator. This model was considered the main model. The remaining three models each used student characteristics to predict the log odds of a student meeting each individual indicator of college readiness and early college success.

The logistic regression models predicting the log odds of meeting each indicator of interest, given the predictors described above, are summarized as follows:

$$\ln[P_i / ([1 - P_i)] = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} \ldots \beta_k X_{ki}$$

in which P_i is the probability of meeting the composite indicator of college readiness and early college success (or meeting each individual indicator of interest) for student *i*; β_0 is the estimated log odds of meeting the college readiness and early college success indicator of interest when the values of all demographic, academic preparation, and college attended variables take on the value of 0; β_1 through β_k are the coefficients for capturing the relationships between the demographic, academic preparation, and college attended variables and the log odds of meeting the college readiness and early college success indicator of interest; and X_{1i} through X_{ki} are the values of the demographic, academic preparation, and college attended variables.

For each regression model, the student demographic, academic preparation, and college attended variables were entered simultaneously. Each model was run twice to allow all values of categorical variables to be included. Specifically, the first time a model was run, a given value of the categorical variable was excluded, and the second time each model was run, a different value was excluded to serve as the omitted group. After these analyses, the student characteristics were examined for evidence of multicollinearity. Multicollinearity occurs where correlations among predictor variables can affect the results of the analysis. A common way to detect multicollinearity is to examine the variance inflation factors of predictor variables. A variance inflation factor estimates the extent to which a regression coefficient's variance is inflated because of multicollinearity among predictor variables. As a general practice, variance inflation factors that are greater than 5 suggest high multicollinearity (Mansfield & Helms, 1982). In some instances, the variance inflation factors were greater than 5 when home language and race/ethnicity were both included in the regression models. As a result, home language was removed from the models because it was correlated with and conceptually similar to race/ethnicity. Findings regarding race/ethnicity should thus be interpreted as reflecting both race/ethnicity and home language.

After logistic regression analysis was run, odds ratios were calculated for each demographic, academic preparation, and college attended predictor variable. For categorical predictors the odds ratio reflects the likelihood of meeting the composite indicator of college readiness and early college success (or meeting each individual indicator of interest) for participants at each value of the predictor variable when compared with the

mean of the mean likelihoods for participants at all values of the predictor variable. For continuous predictors the odds ratios reflect how a one-unit increase in the variable corresponds to a change in the likelihood of meeting the composite indicator of college readiness and early college success (or meeting each individual indicator of interest) while all other variables are held constant.

Next, the emmeans package (Lenth, 2019) in the R program (R Core Team, 2019) was used to calculate average predicted probabilities for each demographic, academic preparation, and college attended predictor variable. First, one predicted probability was calculated for each student for each value of the categorical variable, while other characteristics were kept fixed. Next, an average of those predicted probabilities was calculated across students for each value of the categorical variable. For categorical predictor variables the average predicted probabilities reflect the predicted probability of meeting the college readiness and early college success indicator at each value of the predictor variable, while the other predictor variables are held constant at the average of the average predicted values for each value of categorical variables and at the average value for continuous variables. For continuous predictor variables average predicted probabilities were calculated at specific values of the predictor variable. Specifically, cumulative high school grade point averages ranged from 1.44 to 4.58. Because few students scored below a 2.00 (3 percent of students) or above a 4.50 (fewer than 1 percent), average predicted probabilities were calculated for cumulative grade point averages of 2.00, 3.00, 4.00, and 4.50. Thus, the average predicted probabilities for continuous predictor variables reflect the predicted probability that a student would meet the college readiness and early college success indicator at the specified value of that variable, while other predictor variables are held constant.

The findings section of the main report focuses on the differences in average probabilities across all values of a characteristic when the logistic regression result for a given value of that categorical variable was statistically significant. Group differences on binary outcome variables were considered major when they were statistically significant and 5 percentage points or larger in magnitude (based on average predicted probabilities). They were considered minor when they were statistically significant but less than 5 percentage points in magnitude. For continuous variables differences were considered major if they were statistically significant and the Hedges' *g* effect size (calculated by determining the difference between the two groups divided by the pooled within-group standard deviation) corresponding to the group difference reflected at least a 5 percentage point difference. When differences were statistically significant but the Hedges' *g* effect size corresponding to the difference reflected less than a 5 percentage point difference, they were considered minor. A 5 percentage point difference was chosen because stakeholders would likely view a difference of this magnitude as meaningful.

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Appendix C. Supporting analyses

This appendix provides additional information about the study's analyses. First, it provides descriptive statistics for the final analytic sample (tables C1–C2). Next, it presents detailed results for the three research questions (tables C3–C8). Finally, it presents detailed results from analyses comparing students who enrolled in Kulehon Kumunidåt Guåhan and students who enrolled in Unibetsedåt Guåhan with students who did not enroll in either institution (tables C9–C10).

Detailed results of analyses to describe the final study sample

This section provides descriptive statistics (percentages, means, and standard deviations) for student characteristics across all cohorts of students in the final analytic sample (tables C1–C2).

The public high schools included in this study varied by enrollment, student–teacher ratios, and geographic location. Specifically, enrollment at each high school ranges from 1,297 to 1,876 students, and student–teacher ratios range from 14.88 to 20.40 (U.S. Department of Education, 2016). All but one, Southern High School, have a geographic location classified as "town: remote," with Southern High School classified as "rural: fringe" (U.S. Department of Education, 2016). Both John F. Kennedy High School and George Washington High School are centrally located. Okkodo High School and Simon Sanchez High School are located in the northern region, and Southern High School is located in the southern region. All the high schools follow the same course curriculum and have similar student demographics. In addition, all the schools are accredited by the Western Association of Schools and Colleges, a regional accrediting agency recognized by the United States Department of Education (Accrediting Commission for Schools Western Association of Schools and Colleges, 2020).

Table C1. Percentages and numbers of students in the analytic sample for each categorical demographic, academic preparation, and college attended variable of interest, 2012–15

Student characteristic	Percent of students	Number of students
High school attended		
George Washington High School	24.1	296
John F. Kennedy High School	26.0	319
Okkodo High School	17.9	219
Simon Sanchez High School	20.2	247
Southern High School	11.8	145
High school graduation cohort		
2012	22.1	271
2013	25.3	310
2014	27.3	335
2015	25.3	310
College attended		
Kulehon Kumunidåt Guåhan	19.6	240
Unibetsedåt Guåhan	80.4	986
Gender		
Female	56.9	697
Male	43.1	529

Student characteristic	Percent of students	Number of students
Race/ethnicity		
Asian	4.2	52
CHamoru	33.5	411
Federated States of Micronesia	6.3	77
Filipino	49.2	603
Palauan	2.8	34
Other	4.0	49
Primary language spoken at home		
CHamoru/Refaluwasch	2.9	35
Chuukese	2.3	28
English	61.9	759
Tagalog	21.3	261
Other Micronesian languages	3.3	40
Other Philippine languages	5.1	63
Other languages	3.3	41
Pell Grant status		
Yes	75.1	921
No	24.9	305
Cumulative high school grade point average (categorical)		
0.00–0.99	0	0
1.00–1.99	3.2	39
2.00–2.99	26.9	330
3.00–3.99	53.7	659
4.00–4.49	15.7	192
4.50 and above	0.5	7
Absence rate across math and English courses in high school (categorical)[a]		
Low	33.9	416
Medium	33.0	404
High	33.1	406
Completed a high-level math course		
Yes	14.0	172
No	86.0	1,054
Completed an Advanced Placement math course		
Yes	4.8	59
No	95.2	1,167
Completed an Advanced Placement English course		
Yes	12.5	153
No	87.5	1,073

a. Absence rates were categorized as low, medium, and high using 33rd and 66th percentile cutpoints from the distribution of all students' absence rates for math and English courses.

Note: *n* = 1,226. Percentages may not sum to 100 because of rounding.

Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table C2. Means and standard deviations of continuous academic preparation variables for students in the analytic sample, 2012–15

Student characteristic	Mean	Standard deviation
Average absence rate across math and English courses in high school (continuous)	2.9	0.03
Cumulative high school grade point average (continuous)	3.31	0.65

Note: *n* = 1,226.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Detailed results of analyses for research question 1

This section provides descriptive statistics (percentage and numbers) across all cohorts of students in the final analytic sample for indicators of college readiness and early college success (research question 1).

Table C3. Percentages and numbers of students in the analytic sample who met various Indicators of college readiness and early college success, 2012–15

Indicator	Percent	Number
Demonstrated college readiness and early college success (met all three indicators)		
Yes	22.6	277
No	77.4	949
Enrolled in only credit-bearing math and English courses during the first year of college		
Yes	29.6	363
No	70.4	863
Earned all attempted credits during the first semester of college		
Yes	42.6	522
No	57.4	704
Persisted to second year of college		
Yes	74.2	910
No	25.8	316

Note: *n* = 1,226. Percentages may not sum to 100 because of rounding.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Detailed results of analyses for research questions 2 and 3

This section presents estimated coefficients, standard errors, *p*-values, and odds ratios for the logistic regression analyses that examined demographic characteristics, academic preparation characteristics, and college attended as predictors of meeting the composite indicator of college readiness and early college success, along with analyses for each individual indicator of college readiness and early college success: enrolling in only credit-bearing courses during the first year of college, earning all attempted credits during the first semester of college, and persisting to a second year of college (tables C4–C7).

For continuous academic preparation characteristics in the model, each estimated coefficient reflects the expected change in the log odds of meeting the composite indicator of college readiness and early college success (or meeting each individual indicator of interest) corresponding to a one-unit increase in the variable of interest, with other predictors in the model held constant. Each odds ratio reflects how a one-unit increase in the variable corresponds to a change in the likelihood of meeting the composite indicator of college readiness and early college success (or meeting each individual indicator of interest) compared with the average for that variable. For example, as cumulative high school grade point average increases by one point, the log odds of meeting the composite indicator of college readiness and early college success are expected to increase by 2.8, and the odds of demonstrating college readiness and early college success would be 16.9 times as large.

For categorical demographic, academic preparation, and college attended characteristics, each estimated coefficient reflects the expected change in the log odds of the average student meeting the composite indicator of college readiness and early college success (or meeting each individual indicator of interest) as a result of having a particular value of a characteristic when compared with the mean of the mean outcome at all values of that characteristic for the average student. Each odds ratio reflects how the likelihood of meeting the composite indicator of college readiness and early college success (or meeting each individual indicator of interest) changes as a result of having that characteristic compared with the average student in the population. For example, being in the 2015 graduation cohort is associated with a 0.05 decrease in the log odds of meeting the composite indicator of college readiness and early college success compared with the average student in the analytic sample, and a student who graduated in that cohort would be 0.95 times as likely as the average student to demonstrate college readiness and early college success.

Table C4. Coefficients, standard errors, statistical significance, and odds ratios for logistic regression models predicting college readiness and early college success (by meeting the composite indicator) among students in the analytic sample, 2012–15

Student characteristic	Coefficient[a]	Standard error	Odds ratio
Constant			
Intercept	−1.787	0.290	0.168
High school attended			
George Washington High School	−0.361	0.195	0.697
John F. Kennedy High School	0.393*	0.170	1.482
Okkodo High School	−0.162	0.198	0.851
Simon Sanchez High School	0.089	0.187	1.093
Southern High School	0.040	0.250	1.041
High school graduation cohort			
2012	0.138	0.164	1.148
2013	−0.023	0.151	0.977
2014	−0.061	0.149	0.941
2015	−0.053	0.157	0.948
College attended			
Kulehon Kumunidåt Guåhan	−0.144	0.125	0.866
Unibetsedåt Guåhan	0.144	0.125	1.154
Gender			
Female	−0.248*	0.097	0.780
Male	0.248*	0.097	1.282
Race/ethnicity			
Asian	−0.057	0.374	0.945
CHamoru	0.103	0.225	1.108
Federated States of Micronesia	−0.372	0.446	0.689
Filipino	−0.268	0.203	0.765
Palauan	−0.317	0.535	0.728
Other	0.912	0.405	2.489
Pell Grant status			
Yes	0.096	0.104	1.101
No	−0.096	0.104	0.909

Student characteristic	Coefficient[a]	Standard error	Odds ratio
Absence rate across math and English courses in high school (continuous)			
Absence rate	−4.041	4.020	0.018
Cumulative high school grade point average (continuous)			
Grade point average	2.827***	0.265	16.897
Completed a high-level math course			
Yes	0.616***	0.133	1.852
No	−0.616***	0.133	0.540
Completed an Advanced Placement math course			
Yes	−0.254	0.207	0.776
No	0.254	0.207	1.289
Completed an Advanced Placement English course			
Yes	0.088	0.125	1.092
No	−0.088	0.125	0.916

* Significant at $p < .05$; *** significant at $p < .001$.
a. Represents the log of the odds ratio for meeting the outcome of interest for one value of the covariate compared with one unit lower.
Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The Benjamini-Hochberg correction was used to account for multiple comparisons.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table C5. Coefficients, standard errors, statistical significance, and odds ratios for logistic regression models predicting enrolling in only credit-bearing math and English courses in the first year of college among students in the analytic sample, 2012–15

Student characteristic	Coefficient[a]	Standard error	Odds ratio
Constant			
Intercept	−0.540	0.252	0.583
High school attended			
George Washington High School	−0.091	0.162	0.913
John F. Kennedy High School	0.514***	0.147	1.672
Okkodo High School	−0.358	0.175	0.699
Simon Sanchez High School	0.016	0.162	1.016
Southern High School	−0.081	0.219	0.922
High school graduation cohort			
2012	0.110	0.143	1.116
2013	−0.123	0.133	0.885
2014	−0.046	0.129	0.955
2015	0.058	0.133	1.060
College attended			
Kulehon Kumunidåt Guåhan	−0.041	0.103	0.960
Unibetsedåt Guåhan	0.041	0.103	1.042
Gender			
Female	−0.280***	0.082	0.756
Male	0.280***	0.082	1.323

Student characteristic	Coefficient[a]	Standard error	Odds ratio
Race/ethnicity			
Asian	0.067	0.330	1.069
CHamoru	−0.052	0.185	0.949
Federated States of Micronesia	−0.230	0.340	0.794
Filipino	−0.280	0.169	0.756
Palauan	−0.097	0.415	0.907
Other	0.593	0.337	1.809
Pell Grant status			
Yes	−0.096	0.089	0.908
No	0.096	0.089	1.101
Absence rate across math and English courses in high school (continuous)			
Absence rate	−0.309	3.313	0.734
Cumulative high school grade point average (continuous)			
Grade point average	1.894***	0.187	6.644
Completed a high-level math course			
Yes	0.582***	0.126	1.789
No	−0.582***	0.126	0.559
Completed an Advanced Placement math course			
Yes	−0.096	0.211	0.909
No	0.096	0.211	1.100
Completed an Advanced Placement English course			
Yes	0.223	0.118	1.250
No	−0.223	0.118	0.800

*** Significant at $p < .001$.

a. Represents the log of the odds ratio for meeting the outcome of interest for one value of the covariate compared with one unit lower.

Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The Benjamini-Hochberg correction was used to account for multiple comparisons.

Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table C6. Coefficients, standard errors, statistical significance, and odds ratios for logistic regression models predicting earning all attempted credits during the first semester of college among students in the analytic sample, 2012–15

Student characteristic	Coefficient[a]	Standard error	Odds ratio
Constant			
Intercept	0.654	0.221	1.923
High school attended			
George Washington High School	−0.340	0.144	0.711
John F. Kennedy High School	0.164	0.134	1.179
Okkodo High School	0.084	0.151	1.088
Simon Sanchez High School	−0.042	0.144	0.959
Southern High School	0.134	0.194	1.143
High school graduation cohort			
2012	0.507***	0.129	1.661
2013	0.157	0.117	1.170
2014	−0.469***	0.118	0.626
2015	−0.195	0.122	0.823

Student characteristic	Coefficient[a]	Standard error	Odds ratio
College attended			
Kulehon Kumunidåt Guåhan	0.773***	0.091	2.167
Unibetsedåt Guåhan	−0.773***	0.091	0.461
Gender			
Female	−0.127	0.072	0.880
Male	0.127	0.072	1.136
Race/ethnicity			
Asian	0.531	0.306	1.701
CHamoru	0.152	0.163	1.165
Federated States of Micronesia	−0.362	0.274	0.696
Filipino	−0.393*	0.153	0.675
Palauan	−0.124	0.365	0.883
Other	0.196	0.308	1.216
Pell Grant status			
Yes	0.096	0.082	1.101
No	−0.096	0.082	0.908
Absence rate across math and English courses in high school (continuous)			
Absence rate	−4.579	3.037	0.010
Cumulative high school grade point average (continuous)			
Grade point average	1.300***	0.149	3.671
Completed a high-level math course			
Yes	0.481***	0.126	1.618
No	−0.481***	0.126	0.618
Completed an Advanced Placement math course			
Yes	−0.079	0.200	0.924
No	0.079	0.200	1.082
Completed an Advanced Placement English course			
Yes	0.196	0.115	1.217
No	−0.196	0.115	0.822

* Significant at $p < .05$; *** significant at $p < .001$.
a. Represents the log of the odds ratio for meeting the outcome of interest for one value of the covariate compared with one unit lower.
Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The Benjamini-Hochberg correction was used to account for multiple comparisons.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table C7. Coefficients, standard errors, statistical significance, and odds ratios for logistic regression models predicting persisting to a second year of college among students in the analytic sample, 2012–15

Student characteristic	Coefficient[a]	Standard error	Odds ratio
Constant			
Intercept	1.200	0.293	3.319
High school attended			
George Washington High School	−0.018	0.149	0.982
John F. Kennedy High School	−0.130	0.144	0.878
Okkodo High School	−0.016	0.163	0.984
Simon Sanchez High School	0.130	0.153	1.139
Southern High School	0.034	0.206	1.035

Student characteristic	Coefficient[a]	Standard error	Odds ratio
High school graduation cohort			
2012	−0.183	0.134	0.833
2013	0.146	0.128	1.157
2014	0.078	0.124	1.081
2015	−0.040	0.128	0.961
College attended			
Kulehon Kumunidåt Guåhan	−0.167	0.091	0.847
Unibetsedåt Guåhan	0.167	0.091	1.181
Gender			
Female	−0.156	0.076	0.856
Male	0.156	0.076	1.169
Race/ethnicity			
Asian	−0.451	0.309	0.637
CHamoru	0.043	0.162	1.044
Federated States of Micronesia	−0.245	0.241	0.783
Filipino	0.318	0.154	1.374
Palauan	−0.083	0.345	0.920
Other	0.418	0.318	1.519
Pell Grant status			
Yes	0.115	0.085	1.122
No	−0.115	0.085	0.891
Absence rate across math and English courses in high school (continuous)			
Absence rate	−4.297	2.915	0.014
Cumulative high school grade point average (continuous)			
Grade point average	1.206***	0.138	3.339
Completed a high-level math course			
Yes	0.402	0.201	1.495
No	−0.402	0.201	0.669
Completed an Advanced Placement math course			
Yes	−0.133	0.314	0.875
No	0.133	0.314	1.143
Completed an Advanced Placement English course			
Yes	0.057	0.152	1.058
No	−0.057	0.152	0.945

*** Significant at $p < .001$.

a. Represents the log of the odds ratio for meeting the outcome of interest for one value of the covariate compared with one unit lower.

Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The Benjamini-Hochberg correction was used to account for multiple comparisons.

Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Detailed results from calculation of estimated mean predicted probabilities

This section presents the average predicted probabilities, standard errors, and statistical significance for the demographic, academic preparation, and college attended characteristics included in the logistic regression analyses as predictors of meeting the composite indicator of college readiness and early college success as well as each individual indicator of college readiness and early college success (table C8).

Average predicted probabilities estimate the probability of a given outcome if all students in the dataset had the specified value for the categorical variable being described, while the original values are retained for their other characteristics. For cumulative high school grade point average, average predicted probabilities are presented for various values: 2.00, 3.00, 4.00, and 4.50. For absence rates, probabilities are presented for values indicating low,

medium, and high rates. For example, a student with a cumulative high school grade point average of 4.00 would have a 54 percent probability of meeting the college readiness and early college success indicator, when all other variables are held constant. When student characteristics are represented by categorical variables, average predicted probabilities are presented at each value of the predictor variable and represent the predicted probability that a student would meet the college readiness and early college success indicator, while other predictor variables were held constant. For example, students who graduated from high school in 2015 would have a 14 percent probability of demonstrating college readiness and early college success, when all other variables were held constant.

Table C8. Average predicted probabilities for demographic and academic preparation predictors of college readiness and early college success (by meeting the composite indicator) among students in the analytic sample, 2012–15

Student characteristic	Demonstrated college readiness and early college success	Enrolled in only credit-bearing courses	Earned all attempted credits	Persisted to a second year of college
High school attended				
George Washington High School	0.105	0.348	0.578	0.765
John F. Kennedy High School	0.199	0.494	0.694	0.745
Okkodo High School	0.125	0.290	0.677	0.766
Simon Sanchez High School	0.155	0.372	0.649	0.791
Southern High School	0.149	0.350	0.688	0.775
High school graduation cohort				
2012	0.162	0.395	0.762	0.734
2013	0.141	0.341	0.693	0.794
2014	0.136	0.358	0.546	0.782
2015	0.137	0.382	0.613	0.761
College attended				
Kulehon Kumunidåt Guåhan	0.127	0.359	0.807	0.738
Unibetsedåt Guåhan	0.162	0.378	0.470	0.797
Gender				
Female	0.116	0.306	0.629	0.740
Male	0.177	0.436	0.686	0.795
Race/ethnicity				
Asian	0.137	0.384	0.766	0.679
CHamoru	0.157	0.357	0.692	0.776
Federated States of Micronesia	0.104	0.317	0.573	0.722
Filipino	0.114	0.306	0.565	0.820
Palauan	0.109	0.346	0.630	0.753
Other	0.295	0.514	0.701	0.835
Pell Grant status				
Yes	0.156	0.346	0.679	0.789
No	0.132	0.391	0.636	0.747
Absence rate across math and English courses in high school (categorical)[a]				
Low	0.159	0.371	0.688	0.790
Medium	0.144	0.369	0.658	0.769
High	0.064	0.353	0.411	0.562

Student characteristic	Demonstrated college readiness and early college success	Enrolled in only credit-bearing courses	Earned all attempted credits	Persisted to a second year of college
Cumulative high school grade point average (categorical)				
4.50	0.828	0.847	0.900	0.933
4.00	0.540	0.682	0.825	0.884
3.00	0.065	0.244	0.562	0.695
2.00	0.004	0.046	0.259	0.406
Completed a high-level math course				
Yes	0.237	0.511	0.757	0.832
No	0.083	0.246	0.543	0.690
Completed an Advanced Placement math course				
Yes	0.115	0.347	0.640	0.744
No	0.178	0.391	0.676	0.791
Completed an Advanced Placement English course				
Yes	0.155	0.422	0.701	0.779
No	0.133	0.318	0.613	0.758

a. Absence rates were categorized as low, medium, and high using 33rd and 66th percentile cutpoints from the distribution of all students' absence rates for math and English courses.
Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The multivariate *t* adjustment was used to account for multiple comparisons.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Detailed results of analyses to provide additional context comparing Guåhan public high school graduates who enrolled in either Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan with those who did not enroll in either instiution

This section provides descriptive statistics (percentages, means, and standard deviations) for supporting analyses comparing students who enrolled in either Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan with students who did not enroll in either institution (tables C9–C12).

About 18 percent of Guåhan public high school graduates (*n* = 1,229) in the study's cohorts of interest enrolled in either Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan, and 82 percent (*n* = 5,749) likely did not.[10] It is possible that students who did not enroll in either institution enrolled in college elsewhere. Results indicate that Guåhan public high school students who graduated between 2012 and 2015 and went on to enroll in either Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan differed from students who did not on every demographic and academic preparation characteristic examined (tables C9–C12). Pell Grant status and cumulative high school grade point average could not be examined for students who did not enroll in Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan because these data were not available from the Guam Department of Education.

[10] These students were not matched across the Guam Department of Education datasets and the college datasets. However, since students were matched across datasets by their name, it is also possible that some students could not be matched because their names varied due to misspellings or name changes from year to year.

Table C9. Percentages of students with various student demographic and academic characteristics, by enrollment in the study's institutions of interest, 2012–15

Student characteristic	Students who enrolled in Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan	Students who did not enroll in Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan
High school attended		
George Washington High School	24.0	24.8
John F. Kennedy High School	25.3	23.0
Okkodo High School	17.8	13.6
Simon Sanchez High School	20.1	18.9
Southern High School	11.7	17.1
Missing high school name	0.8	2.0
High school graduation cohort		
2012	22.1	26.4
2013	25.2	25.1
2014	27.3	25.0
2015	25.5	23.4
Gender		
Female	56.9	48.0
Male	43.1	52.0
Missing gender	0.0	0.0
Race/ethnicity		
Asian	4.2	1.9
CHamoru	33.7	51.5
Federated States of Micronesia	6.3	11.7
Filipino	49.1	28.7
Palauan	2.8	4.1
Other	4.0	0.0
Missing race/ethnicity	0.0	0.0
Primary language spoken at home		
CHamoru/Refaluwasch	1.9	4.4
Chuukese	1.5	2.6
English	20.4	24.1
Tagalog	12.5	8.0
Other Micronesian languages	2.4	2.2
Other Philippine languages	4.0	2.5
Other languages	2.4	0.9
Missing language	54.8	55.4
Completed a high-level math course		
Yes	14.3	5.6
No	85.7	94.4
Completed an Advanced Placement math course		
Yes	4.5	2.1
No	95.5	97.9

Student characteristic	Students who enrolled in Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan	Students who did not enroll in Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan
Completed an Advanced Placement English course		
Yes	12.4	4.9
No	87.6	95.1

Note: *n* = 5,749. Percentages may not sum to 100 because of rounding.
Source: Authors' analysis of data from the Guam Department of Education.

Table C10. Means and standard deviations of average absence rate across math and English courses, by enrollment in the study's institutions of interest, 2012–15

	Students who enrolled in Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan		Students who did not enroll in Kulehon Kumunidåt Guåhan or Unibetsedåt Guåhan	
Student characteristic	Mean	Standard deviation	Mean	Standard deviation
Average absence rate across math and English courses in high school (continuous)	2.9	.03	3.6	.04

Note: *n* = 5,749.
Source: Authors' analysis of data from the Guam Department of Education.

Table C11. Chi-square test results for analyses comparing characteristics of students, by enrollment in the study's institutions of interest, 2012–15

Student characteristic	Chi-square value
High school attended	44.836***
High school cohort	11.323*
Gender	32.129***
Race/ethnicity	249.906***
Primary language spoken at home	78.309***
Completed a high-level math course	115.526***
Completed an Advanced Placement math course	22.188***
Completed an Advanced Placement English course	97.298***

* Significant at $p < .05$; *** significant at $p < .001$.
Source: Authors' analysis of data from the Guam Department of Education.

Table C12. Simple logistic regression results for the relationship between student average absence rate across math and English courses and student enrollment in the study's institutions of interest, 2012–15

Student characteristic	β	Standard error
Absence rate across math and English courses in high school (continuous)	−5.968***	1.079

*** Significant at $p < .001$.
Source: Authors' analysis of data from the Guam Department of Education.

References

Accrediting Commission for Schools Western Association of Schools and Colleges. (2020). Retrieved October 24, 2020, from https://www.acswasc.org/about/acs-wasc-commission/.

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. (2016). *Search for schools and colleges*. Retrieved October 24, 2020, from https://nces.ed.gov/globallocator/.

Appendix D. Sensitivity analyses

This appendix summarizes results of this study's sensitivity analyses. Sensitivity analyses were run to test the robustness of the findings to the methods used to handle missing data. The analyses described in the main report were run across the 37 imputed datasets, and results were pooled to yield one set of results for each analysis. The analyses described here were run on the dataset that included only students who had complete data (*n* = 550). Comparisons of findings indicate that the study's findings were sensitive to the methods used to handle data. For research question 1 the percentage of students meeting each indicator differed because each sample included different students. Specifically, in the main analyses 23 percent of students met the composite indicator of college readiness and early college success compared with 26 percent in the sensitivity analyses. Likewise, the percentages of students meeting each individual indicator were slightly higher in the sensitivity analyses than in the main analyses. Although there were some differences in demographic, academic preparation, and college attended characteristics between students in the sensitivity analyses and main analyses, their cumulative high school grade point averages were similar, suggesting that the two samples are similar academically.

For research questions 2 and 3, findings differed for all indicators of college readiness and early college success between the main analyses and the sensitivity analyses. The main analysis found that high school attended was a significant predictor of meeting the composite indicator of college readiness and early college success, but the sensitivity analysis did not. The main analysis found that high school attended was a significant predictor of enrollment in only credit-bearing courses during the first year of college, but the sensitivity analysis did not. Although Pell Grant status was not a significant predictor of enrolling in only credit-bearing courses in the main analysis, it was a significant predictor in the sensitivity analysis. The main analysis found that college attended, high school graduation cohort, race/ethnicity, and completed a high-level math course were significant predictors of earning all attempted credits during the first semester of college, but the sensitivity analysis did not. Finally, the main analyses did not find that gender was a predictor of persisting to a second year of college, but the sensitivity analyses did.

For most findings the regression coefficients generated from the main analyses are within two standard errors of the regression coefficients generated from the sensitivity analyses. The exception was the finding for the relationship between Pell Grant status and enrolling in only credit-bearing courses during the first year of college, for which the regression coefficient generated from the main analysis is more than two standard errors below the coefficient generated from the sensitivity analysis.

Various reasons could likely explain why the findings differed based on the methods used to address missing data. First, the main analyses (*n* = 1,226) included more students than the sensitivity analyses (*n* = 550), so it had more statistical power to detect potential relationships between student characteristics and college readiness and early college success indicators.

Statistical tests were conducted to examine the nature of the missing data. First, Little's Missing Completely at Random (MCAR) test (Little, 1988) was conducted, which revealed that data were not missing completely at random. Next, Kruskal-Wallis tests were conducted, and pairs plots generated using the GGally extension (Schloerke, 2020) of the ggplot2 package (Wickham, 2016) in R (R Core Team, 2019) were examined. The Kruskal-Wallis tests and examinations of the patterns of missing data suggested that data were likely missing at random. The missingness of data depended on other variables, but nothing appeared in the data patterns to suggest that the values of the missing data were not random. Because analyses suggested that the missing data were missing at random, multiple imputation was used to impute missing data, which is an appropriate approach for addressing data assumed to be missing at random.

Detailed results of descriptive statistics

This section presents descriptive statistics (percentages, means, and standard deviations) across all cohorts of students with complete data (research question 1) (tables D1–D3).

Table D1. Percentages of students in the analytic sample who met various indicators of college readiness and early college success, 2012–15

Indicator	Sensitivity analyses Percent of students	Main analyses Percent of students	Difference between sensitivity analyses and main analyses (percentage points)
Demonstrated college readiness and early college success (met the composite indicator)			
Yes	25.6	22.6	−3.00
No	74.4	77.4	3.00
Enrolled in only credit-bearing math and English courses during the first year of college			
Yes	30.5	29.6	−0.90
No	69.5	70.4	0.90
Earned all attempted credits during the first semester of college			
Yes	44.5	42.6	−1.90
No	55.5	57.4	1.90
Persisted to a second year of college			
Yes	75.6	74.2	−1.40
No	24.4	25.8	1.40

Note: *n* = 550. Percentages may not sum to 100 because of rounding.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table D2. Percentages of students in the analytic sample for each categorical demographic and academic preparation variable of interest, 2012–15

Student characteristic	Sensitivity analyses Percent of students	Main analyses Percent of students	Difference between sensitivity analyses and main analyses (percentage points)
High school attended			
George Washington High School	27.3	24.1	−3.2
John F. Kennedy High School	26.4	26.0	−0.4
Okkodo High School	17.6	17.9	0.3
Simon Sanchez High School	17.8	20.2	2.4
Southern High School	10.9	11.8	0.9
High school graduation cohort			
2012	41.3	22.1	−19.2
2013	44.0	25.3	−18.7
2014	7.8	27.3	19.5
2015	6.9	25.3	18.4
College attended			
Kulehon Kumunidåt Guåhan	1.5	19.6	18.1
Unibetsedåt Guåhan	98.5	80.4	−18.1
Gender			
Female	59.3	56.9	−2.4
Male	40.7	43.1	2.4

Student characteristic	Sensitivity analyses Percent of students	Main analyses Percent of students	Difference between sensitivity analyses and main analyses (percentage points)
Race/ethnicity			
Asian	4.7	4.2	−0.5
CHamoru	33.8	33.5	−0.3
Federated States of Micronesia	6.2	6.3	0.1
Filipino	47.8	49.2	1.4
Palauan	3.3	2.8	−0.5
Other	4.2	4.0	−0.2
Home language			
CHamoru/Refaluwasch	2.9	2.9	0.0
Chuukese	2.7	2.3	−0.4
English	52.0	61.9	9.9
Tagalog	24.5	21.3	−3.2
Other Micronesian languages	4.7	3.3	−1.4
Other Philippine languages	7.8	5.1	−2.7
Other languages	5.3	3.3	−2.0
Pell Grant status			
Yes	72.2	75.1	2.9
No	27.8	24.9	−2.9
Cumulative high school grade point average (categorical)			
0.00–0.99	0	0	0.0
1.00–1.99	3.1	3.2	0.1
2.00–2.99	27.6	26.9	−0.7
3.00–3.99	50.7	53.7	3.0
4.00–4.49	18.0	15.7	−2.3
4.50 and above	0.5	0.5	0.0
Absence rate across math and English courses in high school (categorical)			
Low	32.7	33.9	1.2
Medium	36.0	33.0	−3.0
High	31.3	33.1	1.8
Completed a high-level math course			
Yes	16.2	14.0	−2.2
No	83.8	86.0	2.2
Completed an Advanced Placement math course			
Yes	5.3	4.8	−0.5
No	94.7	95.2	0.5
Completed an Advanced Placement English course			
Yes	15.8	12.5	−3.3
No	84.2	87.5	3.3

Note: *n* = 550. Percentages may not sum to 100 because of rounding.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table D3. Means and standard deviations of continuous academic preparation variables for students in the analytic sample, 2012–15

Student characteristic	Sensitivity analyses		Main analyses	
	Mean	Standard deviation	Mean	Standard deviation
Average absence rate across math and English courses in high school (continuous)	2.4	0.02	2.9	0.03
Cumulative high school grade point average (continuous)	3.34	0.66	3.31	0.65

Note: *n* = 550.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Detailed results from logistic regression analyses

This section presents estimated coefficients, standard errors, *p*-values, and odds ratios for the logistic regression analyses that examined demographic, academic preparation, and college attended characteristics as predictors of meeting the composite indicator of college readiness and early college success. In addition, it presents this information for the logistic regression analyses examining demographic, academic preparation, and college attended characteristics as predictors of each individual indicator of college readiness and early college success: enrolling in only credit-bearing courses during the first year of college, earning all attempted credits during the first semester of college, and persisting to a second year of college (tables D4–D7). These analyses included the 550 students with complete data.

Table D4. Coefficients, standard errors, and statistical significance for logistic regression models from the study's sensitivity analyses predicting demonstrating college readiness and early college success (by meeting the composite indicator), 2012–15

Student characteristic	Sensitivity analyses		Main analyses	
	Coefficient[a]	Standard error	Coefficient[a]	Standard error
Constant				
Intercept	−1.007	0.586	−1.787	0.290
High school attended				
George Washington High School	−0.411	0.268	−0.361	0.195
John F. Kennedy High School	0.316	0.254	0.393*	0.170
Okkodo High School	−0.054	0.285	−0.162	0.198
Simon Sanchez High School	0.029	0.283	0.089	0.187
Southern High School	0.120	0.352	0.040	0.250
High school graduation cohort				
2012	0.133	0.244	0.138	0.164
2013	−0.117	0.226	−0.023	0.151
2014	0.256	0.361	−0.061	0.149
2015	−0.272	0.404	−0.053	0.157
College attended				
Kulehon Kumunidåt Guåhan	0.367	0.456	−0.144	0.125
Unibetsedåt Guåhan	−0.367	0.456	0.144	0.125
Gender				
Female	−0.344*	0.136	−0.248*	0.097
Male	0.344*	0.136	0.248*	0.097

Student characteristic	Sensitivity analyses		Main analyses	
	Coefficient[a]	Standard error	Coefficient[a]	Standard error
Race/ethnicity				
Asian	0.926	0.608	−0.057	0.374
CHamoru	−0.111	0.322	0.103	0.225
Federated States of Micronesia	−0.125	0.511	−0.372	0.446
Filipino	−0.249	0.660	−0.268	0.203
Palauan	−0.189	0.287	−0.317	0.535
Other	−0.253	0.731	0.912	0.405
Pell Grant status				
Yes	−0.112	0.144	0.096	0.104
No	0.112	0.144	−0.096	0.104
Absence rate across math and English courses in high school (continuous)				
Absence rate	−9.497	7.347	−4.041	4.020
Cumulative high school grade point average (continuous)				
Grade point average	2.770***	0.341	2.827***	0.265
Completed a high-level math course				
Yes	0.505*	0.202	0.616***	0.133
No	−0.505*	0.202	−0.616***	0.133
Completed an Advanced Placement math course				
Yes	−0.294	0.308	−0.254	0.207
No	0.294	0.308	0.254	0.207
Completed an Advanced Placement English course				
Yes	0.227	0.171	0.088	0.125
No	−0.227	0.171	−0.088	0.125

* Significant at $p < .05$; *** significant at $p < .001$.
a. Represents the log of the odds ratio for meeting the outcome of interest for one value of the covariate compared with one unit lower.
Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The Benjamini-Hochberg correction was used to account for multiple comparisons.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table D5. Coefficients, standard errors, statistical significance, and odds ratios for logistic regression models from the study's sensitivity analyses predicting enrolling in only credit-bearing math and English courses during the first year of college, 2012–15

Student characteristic	Sensitivity analyses		Main analyses	
	Coefficient[a]	Standard error	Coefficient[a]	Standard error
Constant				
Intercept	−0.043	0.543	−0.540	0.252
High school attended				
George Washington High School	−0.274	0.247	−0.091	0.162
John F. Kennedy High School	0.518	0.235	0.514***	0.147
Okkodo High School	−0.281	0.276	−0.358	0.175
Simon Sanchez High School	−0.052	0.269	0.016	0.162
Southern High School	0.090	0.325	−0.081	0.219

Student characteristic	Sensitivity analyses		Main analyses	
	Coefficient[a]	Standard error	Coefficient[a]	Standard error
High school graduation cohort				
2012	0.159	0.227	0.110	0.143
2013	−0.217	0.210	−0.123	0.133
2014	0.221	0.336	−0.046	0.129
2015	−0.163	0.364	0.058	0.133
College attended				
Kulehon Kumunidåt Guåhan	0.530	0.430	−0.041	0.103
Unibetsedåt Guåhan	−0.530	0.430	0.041	0.103
Gender				
Female	−0.395**	0.128	−0.280***	0.082
Male	0.395**	0.128	0.280***	0.082
Race/ethnicity				
Asian	0.927	0.533	0.067	0.330
CHamoru	−0.284	0.293	−0.052	0.185
Federated States of Micronesia	−0.124	0.489	−0.230	0.340
Filipino	−0.244	0.589	−0.280	0.169
Palauan	−0.200	0.264	−0.097	0.415
Other	−0.074	0.654	0.593	0.337
Pell Grant status				
Yes	−0.394*	0.133	−0.096	0.089
No	0.394*	0.133	0.096	0.089
Absence rate across math and English courses in high school (continuous)				
Absence rate	−5.983	6.629	−0.309	3.313
Cumulative high school grade point average (continuous)				
Grade point average	2.298***	0.287	1.894***	0.187
Completed a high-level math course				
Yes	0.447*	0.197	0.582***	0.126
No	−0.447*	0.197	−0.582***	0.126
Completed an Advanced Placement math course				
Yes	−0.283	0.313	−0.096	0.211
No	0.283	0.313	0.096	0.211
Completed an Advanced Placement English course				
Yes	0.421	0.171	0.223	0.118
No	−0.421	0.171	−0.223	0.118

* Significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$.

a. Represents the log of the odds ratio for meeting the outcome of interest for one value of the covariate compared with one unit lower.

Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The Benjamini-Hochberg correction was used to account for multiple comparisons.

Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table D6. Coefficients, standard errors, statistical significance, and odds ratios for logistic regression models from the study's sensitivity analyses predicting earning all attempted credits during the first semester of college, 2012–15

Student characteristic	Sensitivity analyses		Main analyses	
	Coefficient[a]	Standard error	Coefficient[a]	Standard error
Constant				
Intercept	0.701	0.549	0.654	0.221
High school attended				
George Washington High School	−0.407	0.197	−0.340	0.144
John F. Kennedy High School	0.205	0.197	0.164	0.134
Okkodo High School	0.176	0.227	0.084	0.151
Simon Sanchez High School	−0.041	0.215	−0.042	0.144
Southern High School	0.067	0.272	0.134	0.194
High school graduation cohort				
2012	0.419	0.194	0.507***	0.129
2013	0.005	0.178	0.157	0.117
2014	−0.066	0.295	−0.469***	0.118
2015	−0.359	0.316	−0.195	0.122
College attended				
Kulehon Kumunidåt Guåhan	0.656	0.456	0.773***	0.091
Unibetsedåt Guåhan	−0.656	0.456	−0.773***	0.091
Gender				
Female	−0.156	0.104	−0.127	0.072
Male	0.156	0.104	0.127	0.072
Race/ethnicity				
Asian	−0.231	0.456	0.531	0.306
CHamoru	0.066	0.235	0.152	0.163
Federated States of Micronesia	0.997	0.492	−0.362	0.274
Filipino	−0.405	0.415	−0.393*	0.153
Palauan	−0.440	0.222	−0.124	0.365
Other	0.013	0.485	0.196	0.308
Pell Grant status				
Yes	−0.001	0.113	0.096	0.082
No	0.001	0.113	−0.096	0.082
Absence rate across math and English courses in high school (continuous)				
Absence rate	−8.395	5.333	−4.579	3.037
Cumulative high school grade point average (continuous)				
Grade point average	1.290***	0.196	1.300***	0.149
Completed a high-level math course				
Yes	0.305	0.186	0.481***	0.126
No	−0.305	0.186	−0.481***	0.126
Completed an Advanced Placement math course				
Yes	−0.108	0.306	−0.079	0.200
No	0.108	0.306	0.079	0.200

Student characteristic	Sensitivity analyses		Main analyses	
	Coefficient[a]	Standard error	Coefficient[a]	Standard error
Completed an Advanced Placement English course				
Yes	0.197	0.163	0.196	0.115
No	−0.197	0.163	−0.196	0.115

* Significant at $p < .05$; significant at $p < .001$.

a. Represents the log of the odds ratio for meeting the outcome of interest for one value of the covariate compared with one unit lower.

Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The Benjamini-Hochberg correction was used to account for multiple comparisons.

Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table D7. Coefficients, standard errors, statistical significance, and odds ratios for logistic regression models from the study's sensitivity analyses predicting persisting to a second year of college, 2012–15

Student characteristic	Sensitivity analyses		Main analyses	
	Coefficient[a]	Standard error	Coefficient[a]	Standard error
Constant				
Intercept	1.128	0.605	1.200	0.293
High school attended				
George Washington High School	−0.171	0.215	−0.018	0.149
John F. Kennedy High School	0.311	0.233	−0.130	0.144
Okkodo High School	0.039	0.261	−0.016	0.163
Simon Sanchez High School	0.269	0.251	0.130	0.153
Southern High School	−0.448	0.302	0.034	0.206
High school graduation cohort				
2012	−0.168	0.221	−0.183	0.134
2013	0.095	0.206	0.146	0.128
2014	0.339	0.357	0.078	0.124
2015	−0.267	0.340	−0.040	0.128
College attended				
Kulehon Kumunidåt Guåhan	−0.540	0.424	−0.167	0.091
Unibetsedåt Guåhan	0.540	0.424	0.167	0.091
Gender				
Female	−0.285*	0.120	−0.156	0.076
Male	0.285*	0.120	0.156	0.076
Race/ethnicity				
Asian	0.653	0.500	−0.451	0.309
CHamoru	0.077	0.254	0.043	0.162
Federated States of Micronesia	−0.663	0.485	−0.245	0.241
Filipino	−0.265	0.380	0.318	0.154
Palauan	−0.079	0.241	−0.083	0.345
Other	0.276	0.539	0.418	0.318
Pell Grant status				
Yes	0.173	0.127	0.115	0.085
No	−0.173	0.127	−0.115	0.085
Absence rate across math and English courses in high school (continuous)				
Absence rate	0.540	5.302	−4.297	2.915

Student characteristic	Sensitivity analyses		Main analyses	
	Coefficient[a]	Standard error	Coefficient[a]	Standard error
Cumulative high school grade point average (continuous)				
Grade point average	1.478***	0.209	1.206***	0.138
Completed a high-level math course				
Yes	0.062	0.256	0.402	0.201
No	−0.062	0.256	−0.402	0.201
Completed an Advanced Placement math course				
Yes	0.074	0.458	−0.133	0.314
No	−0.074	0.458	0.133	0.314
Completed an Advanced Placement English course				
Yes	0.223	0.235	0.057	0.152
No	−0.223	0.235	−0.057	0.152

* Significant at $p < .05$; *** significant at $p < .001$.
a. Represents the log of the odds ratio for meeting the outcome of interest for one value of the covariate compared with one unit lower.
Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The Benjamini-Hochberg correction was used to account for multiple comparisons.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Detailed results from calculation of estimated mean predicted probabilities

This section presents the average probabilities, standard errors, and statistical significance for the demographic, academic preparation, and college attended characteristics for the logistic regression analyses that examined student characteristics as predictors of meeting the composite indicator of college readiness and early college success. It also presents this information for the logistic regression analyses that examined student characteristics as predictors of each individual indicator of college readiness and early college success: enrolling in only credit-bearing courses during the first year of college, earning all attempted credits during the first semester of college, and persisting to a second year of college (tables D8–D11).

Table D8. Average predicted probabilities and standard errors for demographic and academic preparation predictors of college readiness and early college success (by meeting the composite indicator) among students in the study's sensitivity analysis sample, 2012–15

Student characteristic	Sensitivity analyses		Main analyses	
	Average predicted probability	Standard error	Average predicted probability	Standard error
High school attended				
George Washington High School	0.195	0.103	0.105	0.034
John F. Kennedy High school	0.334	0.134	0.199	0.048
Okkodo High School	0.257	0.127	0.125	0.039
Simon Sanchez High School	0.273	0.121	0.155	0.043
Southern High School	0.292	0.151	0.149	0.052
High school graduation cohort				
2012	0.295	0.119	0.162	0.045
2013	0.245	0.114	0.141	0.041
2014	0.321	0.153	0.136	0.038
2015	0.218	0.129	0.137	0.039

Student characteristic	Sensitivity analyses		Main analyses	
	Average predicted probability	Standard error	Average predicted probability	Standard error
College attended				
Kulehon Kumunidåt Guåhan	0.345	0.220	0.127	0.040
Unibetsedåt Guåhan	0.202	0.064	0.162	0.036
Gender				
Female	0.206	0.099	0.116	0.032
Male	0.340	0.134	0.177	0.043
Race/ethnicity				
Asian	0.244	0.136	0.137	0.053
CHamoru	0.246	0.107	0.157	0.040
Federated States of Micronesia	0.222	0.166	0.104	0.053
Filipino	0.232	0.103	0.114	0.029
Palauan	0.221	0.174	0.109	0.065
Other	0.480	0.208	0.295	0.102
Pell Grant status				
Yes	0.246	0.109	0.156	0.038
No	0.290	0.128	0.132	0.038
Absence rate across math and English courses in high school (categorical)[a]				
Low	0.314	0.136	0.159	0.043
Medium	0.268	0.115	0.144	0.036
High	0.077	0.087	0.064	0.055
Cumulative high school grade point average (categorical)				
4.50	0.901	0.056	0.828	0.044
4.00	0.695	0.123	0.540	0.065
3.00	0.125	0.068	0.065	0.020
2.00	0.009	0.007	0.004	0.002
Completed a high-level math course				
Yes	0.377	0.142	0.237	0.057
No	0.181	0.094	0.083	0.024
Completed an Advanced Placement math course				
Yes	0.214	0.127	0.115	0.044
No	0.329	0.123	0.178	0.039
Completed an Advanced Placement English course				
Yes	0.314	0.136	0.155	0.046
No	0.226	0.103	0.133	0.032

a. Absence rates were categorized as low, medium, and high using 33rd and 66th percentile cutpoints from the distribution of all students' absence rates for math and English courses.

Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The multivariate *t* adjustment was used to account for multiple comparisons.

Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table D9. Average predicted probabilities and standard errors for demographic and academic preparation predictors of enrolling in only credit-bearing math and English courses during the first year of college among students in the study's sensitivity analysis sample, 2012–15

	Sensitivity analyses		Main analyses	
Student characteristic	Average predicted probability	Standard error	Average predicted probability	Standard error
High school attended				
George Washington High School	0.421	0.148	0.348	0.068
John F. Kennedy High school	0.616	0.132	0.494	0.066
Okkodo High School	0.420	0.152	0.290*	0.065
Simon Sanchez High School	0.476	0.144	0.372	0.068
Southern High School	0.512	0.166	0.350	0.081
High school graduation cohort				
2012	0.529	0.134	0.395	0.069
2013	0.435	0.141	0.341	0.066
2014	0.544	0.163	0.358	0.064
2015	0.449	0.170	0.382	0.066
College attended				
Kulehon Kumunidåt Guåhan	0.619	0.214	0.359	0.070
Unibetsedåt Guåhan	0.360	0.085	0.378	0.055
Gender				
Female	0.392	0.132	0.306	0.057
Male	0.587	0.135	0.436	0.064
Race/ethnicity				
Asian	0.458	0.175	0.384	0.095
CHamoru	0.419	0.132	0.357	0.061
Federated States of Micronesia	0.429	0.214	0.317	0.096
Filipino	0.439	0.134	0.306	0.053
Palauan	0.471	0.227	0.346	0.120
Other	0.708	0.152	0.514	0.107
Pell Grant status				
Yes	0.392	0.130	0.346	0.056
No	0.587	0.139	0.391	0.068
Absence rate across math and English courses in high school (categorical)				
Low	0.525	0.145	0.371	0.064
Medium	0.489	0.136	0.369	0.059
High	0.273	0.222	0.353	0.174
Cumulative high school grade point average (categorical)				
4.50	0.932	0.037	0.847	0.037
4.00	0.814	0.083	0.682	0.054
3.00	0.305	0.120	0.244	0.051
2.00	0.042	0.029	0.046	0.018
Completed a high-level math course				
Yes	0.600	0.136	0.511	0.070
No	0.380	0.139	0.246	0.053

Student characteristic	Sensitivity analyses		Main analyses	
	Average predicted probability	Standard error	Average predicted probability	Standard error
Completed an Advanced Placement Math course				
Yes	0.419	0.176	0.347	0.093
No	0.560	0.126	0.391	0.051
Completed an Advanced Placement English course				
Yes	0.593	0.143	0.422	0.075
No	0.386	0.129	0.318	0.053

* Significant at $p < .05$.
Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The multivariate *t* adjustment was used to account for multiple comparisons.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table D10. Average predicted probabilities and standard errors for demographic and academic preparation predictors of earning all attempted credits during the first semester of college among students in the study's sensitivity analysis sample, 2012–15

Student characteristic	Sensitivity analyses		Main analyses	
	Average predicted probability	Standard error	Average predicted probability	Standard error
High school attended				
George Washington High School	0.573	0.144	0.578	0.064
John F. Kennedy High school	0.712	0.116	0.694	0.051
Okkodo High School	0.706	0.127	0.677	0.060
Simon Sanchez High School	0.659	0.127	0.649	0.059
Southern High School	0.683	0.136	0.688	0.066
High school graduation cohort				
2012	0.754	0.102	0.762	0.047
2013	0.670	0.126	0.693*	0.055
2014	0.654	0.144	0.546	0.061
2015	0.585	0.160	0.613	0.059
College attended				
Kulehon Kumunidåt Guåhan	0.795	0.155	0.807	0.041
Unibetsedåt Guåhan	0.511	0.082	0.470	0.052
Gender				
Female	0.633	0.129	0.629	0.054
Male	0.702	0.117	0.686	0.050
Race/ethnicity				
Asian	0.845	0.098	0.766	0.067
CHamoru	0.683	0.120	0.692	0.050
Federated States of Micronesia	0.573	0.176	0.573	0.088
Filipino	0.565	0.135	0.565	0.054
Palauan	0.671	0.170	0.630	0.109
Other	0.615	0.167	0.701	0.082
Pell Grant status				
Yes	0.668	0.122	0.679	0.048
No	0.669	0.126	0.636	0.058

Student characteristic	Sensitivity analyses		Main analyses	
	Average predicted probability	Standard error	Average predicted probability	Standard error
Absence rate across math and English courses in high school (categorical)				
Low	−0.024	0.711	0.688	0.052
Medium	0.000	0.668	0.658	0.050
High	0.156	0.352	0.411	0.169
Cumulative high school grade point average (categorical)				
4.50	0.900	0.052	0.900	0.024
4.00	0.825	0.080	0.825	0.033
3.00	0.565	0.137	0.562	0.057
2.00	0.264	0.123	0.259	0.061
Completed a high-level math course				
Yes	0.732	0.111	0.757	0.046
No	0.598	0.142	0.543	0.064
Completed an Advanced Placement math course				
Yes	0.644	0.166	0.640	0.086
No	0.692	0.110	0.676	0.043
Completed an Advanced Placement English course				
Yes	0.710	0.122	0.701	0.058
No	0.623	0.129	0.613	0.052

* Significant at $p < .05$.

Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The multivariate *t* adjustment was used to account for multiple comparisons.

Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

Table D11. Average predicted probabilities and standard errors for demographic and academic preparation predictors of persisting to a second year of college among students in the study's sensitivity analysis sample, 2012–15

Student characteristic	Sensitivity analyses		Main analyses	
	Average predicted probability	Standard error	Average predicted probability	Standard error
High school attended				
George Washington High School	0.722	0.129	0.765	0.058
John F. Kennedy High school	0.808	0.096	0.745	0.058
Okkodo High School	0.763	0.123	0.766	0.061
Simon Sanchez High School	0.802	0.101	0.791	0.055
Southern High School	0.664	0.156	0.775	0.065
High school graduation cohort				
2012	0.723	0.120	0.734	0.062
2013	0.773	0.110	0.794	0.053
2014	0.813	0.112	0.782	0.054
2015	0.703	0.149	0.761	0.058
College attended				
Kulehon Kumunidåt Guåhan	0.643	0.215	0.738	0.064
Unibetsedåt Guåhan	0.841	0.062	0.797	0.046

Student characteristic	Sensitivity analyses		Main analyses	
	Average predicted probability	Standard error	Average predicted probability	Standard error
Gender				
Female	0.699	0.129	0.740	0.058
Male	0.804	0.098	0.795	0.049
Race/ethnicity				
Asian	0.614	0.176	0.679	0.087
CHamoru	0.769	0.110	0.776	0.053
Federated States of Micronesia	0.703	0.154	0.722	0.077
Filipino	0.741	0.118	0.820	0.044
Other	0.856	0.099	0.835	0.063
Palauan	0.803	0.137	0.753	0.092
Pell Grant status				
Yes	0.786	0.102	0.789	0.048
No	0.722	0.126	0.747	0.060
Absence rate across math and English courses in high school (categorical)				
Low	0.753	0.118	0.790	0.051
Medium	0.755	0.112	0.769	0.052
High	0.771	0.168	0.562	0.170
Cumulative high school grade point average (categorical)				
4.50	0.900	0.052	0.933	0.020
4.00	0.825	0.080	0.884	0.031
3.00	0.565	0.137	0.695	0.064
2.00	0.264	0.123	0.406	0.086
Completed a high-level math course				
Yes	0.767	0.114	0.832	0.049
No	0.744	0.129	0.690	0.078
Completed an Advanced Placement math course				
Yes	0.769	0.168	0.744	0.105
No	0.741	0.098	0.791	0.041
Completed an Advanced Placement English course				
Yes	0.794	0.112	0.779	0.064
No	0.712	0.126	0.758	0.052

Note: Analyses were run using the aggregate sample of the four student cohorts of interest. The multivariate *t* adjustment was used to account for multiple comparisons.
Source: Authors' analysis of data from the Guam Department of Education, Kulehon Kumunidåt Guåhan, and Unibetsedåt Guåhan.

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