Getting Down to FACTS

High School Coursetaking in California: A Primer

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Introduction

In recent years, California policymakers have prioritized strengthening alignment across the K–12 system, higher education, and workforce demand as a strategy for promoting statewide economic growth and expanding economic mobility. Central to these efforts are students' academic experiences in high school, which play a decisive role in shaping postsecondary attainment and early career trajectories (Arbona & Nora, 2007; College Futures Foundation & California Education Lab, 2025). Strengthening students' academic preparation in high school has been at the heart of multiple policy measures in California, including legislation supporting students' access to and success in college preparatory coursework (A-G Completion Improvement Grant Program, 2021),[1] expanding dual enrollment opportunities (College and Career Access Pathways Partnerships, 2019; College and Career Access Pathways Grant Program, 2023),[2] increasing the diversity of advanced math offerings (California Mathematics Readiness Challenge Initiative, 2016),[3] and improving education-to-workforce pathways and participation (Golden State Pathways Program, 2022; Regional K-16 Education Collaboratives Grant Program, 2021; Master Plan for Career Education, 2025).[4] Along with changes to college admissions requirements, course placement policies, and the expansion of direct admissions programs (e.g., Senate Bill 640),[5] efforts across the state emphasize a commitment to expand and bolster opportunities that can better prepare all California students for college and career.

These policy efforts are supported by extant research that indicates advanced or college-level high school coursework is associated with improved student outcomes, including high school graduation, college enrollment, performance in college courses, and degree completion (Adelman, 1999, 2006; An & Taylor, 2019; Allen & Dadgar, 2012; Avery et al., 2018; Chajewski et al., 2011; DiBenedetto, 2018; Evans, 2018; Horn & Kojaku, 2001; Jackson, 2014; Lee, 2002; Lee et al., 1997; Morgan & Klaric, 2007; Patrick et al., 2020; Rose & Betts, 2004; Scott et al., 2010; Speroni, 2011; Velasco et al., 2025; Woods et al., 2018), particularly for historically underrepresented students (An, 2013; Lee et al., 2022; Long et al., 2012). Yet, little research to-date has examined the high school

[1] https://www.cde.ca.gov/fg/aa/ca/agcigp.asp
[2] https://www.cde.ca.gov/ci/gs/hs/duenconstgs.asp; https://www.cde.ca.gov/fg/fo/r17/ccap23rfa.asp
[3] https://www.cde.ca.gov/fg/fo/profile.asp?id=3923
[4] https://www.cde.ca.gov/ci/gs/hs/gspp.asp; https://k16collaborative.org; https://www.gov.ca.gov/wp-content/uploads/2025/04/2025-CA-Master-Plan-for-Career-Education.pdf
[5] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202520260SB640

coursetaking patterns of California public high school students in the wake of these policy efforts, and the postsecondary outcomes of students who enroll in and complete college and preparatory coursework. Using detailed administrative data from California on students who were expected to complete high school in 2022, along with existing research evidence, we synthesize our current knowledge of college and career preparatory coursetaking among California public high school students. Specifically, we explore participation and/or completion for each of the following college and career preparatory pathways (individually and in combination): A–G course completion (a sequence of 15 courses required for admissions eligibility to California's public 4-year colleges); the highest level math course taken (a single course indicative of a full math sequence) college-credit coursework, including Advanced Placement (AP) and dual enrollment (individual courses); as well as career technical education (CTE) pathway completion (a sequence of two to three courses and a capstone course in any one of 15 industries). In addition to examining overall patterns, this work examines how course enrollment varies by students' demographic characteristics (e.g., race/ethnicity, gender identity, SED status, English learner status), students' prior academic achievement (performance on the state standardized assessment), and school characteristics (e.g., enrollment size, proportion SED). Finally, this study investigates the relationship between participation in each of these course types (independently and in combination) and later postsecondary enrollment at both 2-year and 4-year colleges.

Academic Opportunity: Course Access and Enrollment

Prior to an examination of coursetaking, it is critical to understand the numerous factors—including, but not limited to, individual preferences, practices within schools, and policy and resource differences between schools—that shape students' academic opportunities in high school. This includes both course access (do students attend schools that offer a particular course?) as well as enrollment (given that a course is offered, who enrolls in the course?)—both factors in students' educational trajectories (Price, 2021). The practices, beliefs, and culture within schools, including differences in expectations, biases, prejudices, and perceived demand, may influence the courses available to students (Attewell & Domina, 2008; Gamoran, 1987; Iatarola et al., 2011; Oakes & Guiton, 1995). Additionally, structural differences, including resource constraints (such as funding or classroom space available) and the number and qualifications of teachers, can impact whether or not a school

offers a course and when it is scheduled (Clotfelter et al., 2010; Gagnon & Mattingly, 2016; Hanushek et al., 2004; Iatarola et al., 2011; Peske & Haycock, 2006). For example, rural districts often serve a smaller number of students and therefore may only be able to offer one section of a course, even if there is proportionally more demand than at an urban or suburban school (Cisneros et al., 2014; Gagnon & Mattingly, 2016; Grant, 2022). Moreover, evidence also indicates that high schools primarily serving lower-income students and students of color are less likely to offer a breadth of advanced coursework relative to those serving more affluent students (Adelman, 1999; Carbonaro et al., 2024; Conger et al., 2009; Klopfenstein, 2004; Klugman, 2013; Moore & Slate, 2008; Ogut & Circi, 2023; Solórzano & Ornelas, 2004). At the individual level, students and families might seek out and enroll in schools that offer a particular curriculum (e.g., career technical education offerings, International Baccalaureate, or Early or Middle College High Schools) (Adan et al., 2024; Calhoun et al., 2019; Edmunds et al., 2020).

Beyond access to courses, enrollment is also mediated by factors at both the school and student level. Within schools, policies that group students by ability may guide the courses students take in high school, particularly if space and resources are limited (Carbonaro et al., 2024). For example, in some districts, elementary and middle school educational opportunities and academic performance may influence the level of math in which ninth-graders enroll. Such policies potentially limit students from more accelerated coursework (Kelly, 2009; Lucas & Berends, 2002; Oakes & Guiton, 1995). Course placements may also be driven by personnel biases based on class, race, or language, even when students are high-performing, preventing lower-income students, students of color, and students learning English from taking more advanced coursework (Ainsworth-Darnell & Downey, 1998; Downey & Pribesh, 2004; Francis et al., 2019; Gershenson et al., 2016; Kozlowski, 2015; Kanno & Kangas, 2014; Lewis & Diamond, 2015; Morris et al., 2025; Oakes & Guiton, 1995; Umansky, 2016). Scheduling policies may also inhibit course enrollment, as conflicts between limited availability courses may restrict the courses students are able to take. This is often the case for students designated as English learners (EL), as they must balance EL program requirements with those for graduation as well as college preparatory coursetaking sequences (Estrada, 2014; Lee, 2023), sometimes precluding space for more advanced coursework (Callahan & Shifrer, 2016). In addition to school-level policies, internal and external factors at the student level influence the courses students take during high school. If given the opportunity to enroll in a particular course, students may opt in (or out) for various reasons, including

motivation (Perna et al., 2013), self-efficacy (Bandura, 1997; Peguero & Shaffer, 2015), perceived utility of the course (Griffin & Allen, 2006; Hamilton & Sumner, 2017), and signaling from peers, school personnel, and family (Britner & Pajares, 2006; Bursztyn & Jensen, 2015; Francis et al., 2019; Grissom & Redding, 2016; Lavy & Sand, 2018), among other factors. In all, course enrollment pathways represent a set of constrained choices (Kurlaender & Hibel, 2018), reflecting a complex interplay between both institutional and individual factors beyond students' preferences.

In addition to course offerings and student enrollment, the level of rigor of college preparatory courses is critically important for students' outcomes (Lee, 2002; Lee et al., 1997; Rose & Betts, 2004). In this case, advanced or college-level coursework that is more academically demanding is associated with increased likelihood of high school graduation; college enrollment (including at 4-year institutions) and completion; better first-year college performance; and reduced college costs (Adelman, 1999, 2006; An & Taylor, 2019; Allen & Dadgar, 2012; Avery et al., 2018; Chajewski et al., 2011; DiBenedetto, 2018; Evans, 2018; Horn & Kojaku, 2001; Jackson, 2014; Morgan & Klaric, 2007; Patrick et al., 2020; Scott et al., 2010; Speroni, 2011; Velasco et al., 2025; Woods et al., 2018), particularly for historically underrepresented students (An, 2013; Lee et al., 2022; Long et al., 2012). Prior research indicates that students who take even one advanced course in high school are more likely to enroll in college than students who do not enroll in an advanced course at all (Long et al., 2012), while a more recent study in Texas found that participating in accelerated coursework leads to both an increased likelihood of college enrollment and higher earnings (Velasco et al., 2025). Relatedly, taking at least one dual enrollment course is positively associated with going to college and persisting to the second year (Lee et al., 2022). Earning college credit in high school is found to lower students' cumulative loan debt, with ten credits earned from AP courses associated with a reduction of about $1,000 (likely driven by reduced time to degree) (Evans, 2018). Given the strength of the association between advanced courses and future outcomes, it is important to examine students' access to and participation in such coursework during high school.

Academic Opportunities in California

In California, there has been increased attention towards academic preparation for some time, as education policy in the state has focused on strengthening students' academic preparation ahead of college matriculation. These efforts include initiatives aimed at both the K–12 and college level to strengthen state content standards and related assessments, as well as expand and diversify the coursework and early college experiences available to students.

The adoption of the Common Core State Standards (CCSS) in 2010 was an early indicator of the state's increased attention toward students' readiness for college-level work. Substantially more rigorous than the previous state standards (Schmidt & Houang, 2012), the CCSS integrated subjects to expand the skills students would develop to prepare them for college and beyond (Kurlaender et al., 2019). In 2014–15, the state then implemented the CCSS-aligned Smarter Balanced Assessments (often referred to as SBAC) to measure students' standards-based proficiency in grades 3–8 and 11 for English and math. In 11th grade, the assessment results are also considered early signals of students' readiness for college-level coursework through the Early Assessment Program, one of several measures used in the course placement process for CSU and the California Community Colleges (CCC) after admission.

The state also implemented a new school accountability system, the California School Dashboard in 2017, to measure students' readiness for college and career through its College/Career Indicator (CCI), as calculated by the proportion of students deemed prepared or approaching prepared across eleven metrics/pathways, eight of which highlight coursework.[6] Most of the metrics rely on a combination of standardized assessments, high school coursework, and workforce or leadership experiences. Measures include proficiency in math and English Language Arts (ELA) as measured through the Smarter Balanced Assessments, demonstration of literacy in two or more languages, completion of the A-G course requirements, AP and International Baccalaureate (IB) test taking, successful completion of college-credit courses (dual enrollment), completion of a CTE pathway, military leadership experience, and apprenticeships, among other measures. Altogether, the state's intentional alignment of its standards, assessments, and accountability framework reflect California's comprehensive commitment to support students' preparation for college and career.

[6] To learn more about California's College/Career Indicator and the California School Dashboard, see https://www.cde.ca.gov/ta/ac/cm/dashboardccr.asp

In addition to these efforts, the number and type of courses California public high school students take to prepare themselves for college and career are shaped by state and local graduation policies, as well college admissions and course placement practices. Specifically, California requires students to complete a minimum set of courses to graduate high school and receive a diploma,[7] which LEAs may expand,[8] while the state's public 4-year university systems—the University of California (UC) and California State University (CSU)—require students to complete an accelerated, more expanded course of study (known as the A-G course requirements) for college admissions[9] (see Table 1 for an overview of these requirements).

Table 1. Graduation and A-G Course Requirements

Subject Area	State Graduation Requirements[10]	Sample District Graduation Requirements[a]	A-G Course Requirements
A. History/Government[b]	3 yrs	3.5 yrs	2 yrs
B. English	3 yrs	4 yrs	4 yrs
C. Mathematics	2 yrs	2 yrs	3 yrs
D. Science[c]	2 yrs	2 yrs	2 yrs
E. Foreign Language	-	-	2 yrs
F. Visual/Performing Arts[d]	1 yr	1 yr	1 yr
G. College Prep Elective	-	-	1 yr
Health	-	.5 yr	-
Physical Education	2 yrs	2 yrs	-
CTE/Practical Arts	-	.5 yr	-

[a] This is an example of how a school districts' graduation requirements exceed the state minimum requirements.
[b] State graduation requirements for history include one year each of World Civilization and US History, AND one semester each of Economic and American Government. A-G requirements include World History and US History.
[c] To meet A-G requirements, the two years of science must include lab science.
[d] The state graduation requirement for Visual/Performing Arts can be substituted with foreign language or CTE.

[7] For more information on minimum state requirements for high school graduation, see https://www.cde.ca.gov/ci/gs/hs/hsgrmin.asp
[8] High school graduation requirements can differ locally and may exceed state minimums. See https://www.cde.ca.gov/ci/gs/hs/cefhsgradreq.asp
[9] https://www.cde.ca.gov/ci/gs/hs/hsgrtable.asp
[10] State graduation requirements will be broadened to include one semester of Ethnic Studies beginning with the graduating class of 2030 and one semester of Personal Finance beginning with the graduating class of 2031. For more information, see https://www.cde.ca.gov/ci/gs/hs/hsgrmin.asp

Given that state and school-level policy encourage participation in a variety of college and career preparatory coursework, we examine students' participation patterns across five key course types: A-G course completion; advanced math (beyond Algebra 2 – the minimum threshold for public 4-year college eligibility in CA); AP courses; college coursetaking at a California Community College (dual enrollment courses); and CTE pathway completion.

A-G Course Requirements

In California, college preparatory coursework chiefly includes the high school courses students are required to complete in order to be eligible for admissions to the UC and CSU systems. The A–G course requirements include 15 courses across academic and elective subjects, as enumerated in Table 1. Prior to receiving the A-G distinction/label, courses are reviewed by the UC and assessed for quality and rigor to ensure they prepare students for college-level work, aligning what high schools teach with college expectations.[11] High school personnel typically track students' progress towards completion of the A-G course requirements throughout high school (Lee, 2023), often with the support of UC Compass or the California College Guidance Initiative, which evaluate students' transcripts.

State and local efforts have focused on increasing the percentage of high school students who meet these requirements by graduation and to improve equity in the rates of A-G course completion across racial/ethnic, socioeconomic, and English proficiency subgroups. Moreover, local educational agencies throughout the state have taken steps to increase A-G completion rates by eliminating courses that were not A-G approved, expanding A-G course offerings and/or adjusting the sequence of courses, and aligning graduation requirements with A-G requirements, among others (Hurtt et al., 2023; Lee, 2023). In 2022, the California Legislature established the A–G Completion Improvement Grant Program to support equity in A-G completion statewide. This allocation provided LEAs with funding for efforts related to increasing the number of students completing the full A–G course sequence.

[11] Local educational agencies submit course descriptions to the A-G Course Management Portal (https://hs-articulation.ucop.edu/agcmp) for review and approval for an A-G designation. This process aims to ensure that students who aspire to attend a 4-year college are engaged in rigorous coursework that prepares them for the academic demands of college

Mathematics

Within college and career preparatory coursework, math plays a particularly important role. Taking more math courses, particularly advanced math courses, in high school is positively correlated with college and career outcomes. Students who take more math courses are more likely to enroll and persist in college (Aughinbaugh, 2012; Black et al., 2021; Byun et al., 2014; Finkelstein et al., 2012; Wainstein et al., 2023), pursue a STEM career, and earn higher wages (Adelman, 1999; Black et al., 2021; Rose & Betts, 2001).

There have been several state and local efforts in the past decade focused on high school math coursetaking among California high school students. The California Mathematics Readiness Challenge Initiative (CMRCI), a competitive grant opportunity administered by the California Department of Education (CDE) beginning in 2016, aimed to increase math coursetaking among high school seniors by offering funds to develop new 12th grade math courses (CDE, 2022). These college preparatory math courses were developed by local K12 and higher education partnerships. Also in 2016, college-level math course options expanded for many high school students when the California Legislature enacted Assembly Bill 288, reducing some barriers associated with dual enrollment at a CCC (Rodriguez et al., 2025). Moreover, the updated California Mathematics Framework, adopted in 2023, encourages school districts to provide diverse opportunities for students to enroll in accelerated math coursework. In addition to statewide efforts, many local school districts are working to increase math coursetaking and attainment. For example, about half of public school districts in California include a total of three or four years of high school math in their local graduation requirements (Gao et al., 2017). Local efforts have also included the implementation of new math courses (Reed et al., 2023a).

Advanced Placement (AP)

Advanced Placement (AP) courses, developed by the College Board, provide college-level curricula in 38 different courses across six subject areas. The extent of these offerings varies across schools (Gagnon & Mattingly, 2016; Kolluri, 2018), leading to disparities in access (Grant, 2022; Kim-Christian & McDermott, 2022; Patrick et al., 2022; Xu et al., 2021). Each AP course culminates in an exam, which is administered for a fee (often subsidized for low-income students), and with a passing

score may allow students to earn college credit or bypass other college requirements depending on university policy. AP courses are often viewed as signals of academic rigor and can add additional weight in students' grade point averages (Dutkowsky et al., 2009; Geiser & Santelices, 2004; Solórzano & Ornelas, 2004), offering a potential advantage in college admissions (Klopfenstein, 2010).

Dual Enrollment

Dual enrollment is another college preparatory option that allows students to take college courses while enrolled in high school to earn both high school and college credit upon completion of the course (Schaller et al., 2023). In contrast to AP courses where students are required to pass an exam in order to earn college credit, students earn high school and college credit after successful completion of a dual enrollment course. Taught in a variety of subjects by college faculty or qualified high school teachers,[12] dual enrollment courses may be offered at a high school, college campus, or online through a local college partnership. Evidence suggests that participating in dual enrollment is associated with several positive outcomes, including increased college enrollment, retention, and completion; higher wages; and reduced cost and time to degree (An, 2013; Dhaliwal et al., 2025; Giani et al., 2014; Henneberger et al., 2020; Lee et al., 2022; Ryu et al., 2023; Velasco et al., 2025).

In recent years, California has increasingly invested in dual enrollment, aiming to broaden access and eliminate administrative barriers for students. This includes $200 million in annual apportionment funding for high school students enrolled in community college courses in addition to grants supporting Middle College and Early College (MCEC) High School Programs and $200 million in competitive grant funding allocated through AB 181 in 2022, among other financial investments.[13,14] Additionally, AB 288 (2016), extended by AB 30[15] in 2019, increases access to dual enrollment opportunities by encouraging the creation of formal partnerships between community colleges and

[12] The minimum requirements for teaching academic courses at California Community Colleges include a master's degree in the discipline of the teaching assignment; and for teaching career technical education courses, requirements include a bachelor's degree (in any major) and two years of experience in the occupational area of the course assignment. These requirements apply to instructors of dual enrollment courses offered by California Community Colleges. See https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/Educational-Services-and-Support/What-we-do/Educational-Programs-and-Professional-Development/Minimum-Qualifications

[13] https://www.cde.ca.gov/ci/gs/hs/duenconstgs.asp

[14] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB181

[15] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201920200AB30

high schools (known as College and Career Access Pathways Partnerships);[16] authorizes college classes to be taught on high school campuses; exempts high school students from any costs related to taking college courses; and aims to increase participation, particularly among historically underserved students. These investments and policies are underscored by messaging from the Governor's Office and California Community Colleges Chancellor's Office (CCCCO), as both the Master Plan for Career Education[17] and Vision 2030[18] include commitments to ensure students have the opportunity to enroll in college courses and earn credit while in high school.

Career Technical Education

Career technical education (CTE) encompasses a broad spectrum of courses that provide students the opportunity to build the technical skills necessary for postsecondary education and the workforce. Despite historic views of CTE as a vocational pathway distinctly separate from a college-bound pathway (Ogden, 1990), CTE is instrumental in providing preparation for both college and career. Prior research finds that participation in CTE is associated with increased likelihood of high school graduation, enrollment in 2-year colleges, and higher earnings (Dougherty, 2018; Dougherty et al., 2019; Lindsey et al., 2024).

California Governor Gavin Newsom and the State Legislature continue to emphasize the importance of CTE, investing in programs and adopting policies to enhance coordination at the secondary and postsecondary levels. Recent investments include annual funding for programs related to CTE: the CTE Incentive Grants (CTEIG)[19] and the K12 Strong Workforce Program (K12 SWP)[20] which aim to equip K-12 students with the knowledge and skills needed for employment or postsecondary education, and the Strong Workforce Program (SWP)[21] which intends to improve the availability and quality of CTE programs in community colleges and their alignment with regional labor markets.

[16] https://www.cde.ca.gov/ci/gs/hs/duenconstgs.asp
[17] https://www.gov.ca.gov/wp-content/uploads/2025/04/2025-CA-Master-Plan-for-Career-Education.pdf
[18] https://www.cccco.edu/About-Us/Vision-2030
[19] https://www.cde.ca.gov/ci/ct/ig/
[20] https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/Workforce-and-Economic-Development/K12-Strong-Workforce
[21] https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/Workforce-and-Economic-Development/Strong-Workforce-Program

Similarly, the Golden State Pathways Program (2022)[22] aims to create and enhance career pathways in critical industry sectors identified by the state that offer high-paying jobs and require advanced skills, and that are also experiencing significant growth. In addition to financial investment, the recent Master Plan for Career Education,[23] released in 2025, outlines strategies to strengthen coordination and reduce barriers across California systems, including the accessibility of career pathway opportunities, workforce training and hands-on learning, and the affordability of these pathways.

Data & Methods

Data

In order to fully describe the complexity of college and career preparatory coursetaking among California's public high school students, we construct a novel dataset by merging student-level data from three sources. Data from the California Department of Education (CDE) include students' demographic characteristics and subgroup inclusion (e.g., race/ethnicity, gender identity, socioeconomically disadvantaged status, English learner status, among other measures), course enrollment and CTE pathway completion data, indicators of college and career readiness, and performance on standardized assessments of mathematics and ELA. These data are merged with data from the CCCCO to explore college coursetaking during high school (dual enrollment) and National Student Clearinghouse (NSC) data to observe postsecondary enrollment for students who matriculated from California public high schools.

Sample

The population for this study consists of the census of California public high school seniors. The sample is limited to students enrolled as 12th graders in spring 2022 who are included in CDE's High School Completer data file in 2022, included in the College/Career Indicator of the California School Dashboard for the 2021, 2022, or 2023 accountability cohorts, and for whom four years of high school course completion data are recorded in the Course Completion data files from the California Longitudinal Pupil Achievement Data System (CALPADS). Student-level observations in the analytical

[22] https://www.cde.ca.gov/ci/gs/hs/gspp.asp
[23] https://careereducation.gov.ca.gov/master-plan-engage/

sample total 381,385. For the school analysis, the sample is restricted to include traditional high schools[24] and schools that enroll 15 or more seniors. Student-level school enrollment is determined by primary enrollments as of April 15th, 2022.

It is important to acknowledge that this cohort was in high school at the onset of the COVID-19 pandemic (spring 2020) and the year following (2020-21), years in which instruction was frequently interrupted and classes in many schools were hybrid or fully online. In other work, we tracked trends over time to include pre-pandemic and post-pandemic time periods; we refer to these studies where appropriate. It is also important to note that there is currently no high school graduating cohort for which we have postsecondary enrollment data that was unaffected by the pandemic.

In this report, we explore differences in coursetaking patterns and postsecondary enrollment across key student subgroups. We construct subgroups using the racial/ethnic categories (American Indian, Asian, Black, Filipino, Hispanic, Pacific Islander, white, and two or more races or ethnicities), gender indicators,[25] socioeconomically disadvantaged (SED) status,[26] and English learner status[27] identifiers provided by the CDE. Additionally, we construct subgroups based on students' academic proficiency as demonstrated on the Smarter Balanced Assessments (SBAC)—mathematics and

[24] Traditional high schools include those with a CDE School Ownership Code (SOC) of 65 (K-12 Schools), 66 (High Schools), and 67 (High Schools in 1 School District). They include charter schools, and exclude alternative schools of choice, special education schools, county community schools, youth authority facilities, opportunity schools, juvenile court schools, state special schools, continuation high schools, district community day schools as well as elementary, intermediate/middle, and junior high schools.

[25] The CDE uses three gender categories: female, male, and non-binary. CDE began collecting data for students who identify as non-binary in 2020. However, the recorded numbers are small (28 in the 2020 cohort, 116 in 2021, 338 in 2022, 586 in 2023, and 729 in 2024) and accuracy is uncertain. As such, we do not report coursetaking patterns for non-binary students in this report.

[26] The CDE designates a student as socioeconomically disadvantaged (SED) if the student is either eligible for free/reduced-price lunch or neither of the student's parents/guardians graduated high school.

[27] English learner status is defined as current English learner as indicated in the Cumulative Enrollment data files for April 15, 2022. Given this designation during senior year, English learners in our sample are likely recent newcomers to the U.S. or long-term English learners, though that information is unavailable in these data files. We acknowledge that many more students graduating from California public high schools were identified as English learners at some point in their educational trajectories and that further research is necessary to better understand the educational outcomes of students who were ever English learners.

ELA—universally administered in spring of students' 8th grade year.[28] See Appendix Table A1 for a breakdown of our sample by student subgroups.

Coursetaking measures

A-G and CTE pathway completion measures are drawn from the College/Career Indicator data where a dichotomous variable—based on school reporting—indicates whether or not students completed the full set of A-G courses and/or whether or not students completed a CTE pathway. As such, these measures represent a set, or sequence of courses, rather than a single course experience, collected at one point in time: the end of senior year. The full set of A-G courses include 15 courses (Table 1). Requirements for CTE pathway completion vary across the nearly 57 CTE pathways in 15 industry sectors statewide,[29] but generally consist of two or three sequenced courses and a capstone course.

AP course enrollment and advanced math course enrollment are derived from analysis of the CDE's Course Completion data files, which provide student-course records for every course all students take during a given academic term.[30] In contrast to A-G and CTE pathway completion measures, AP and advanced math measures represent single courses, typically spanning a full year (though we count students if we observe enrollment in one or more terms). For simplicity and brevity in this analysis,[31]

[28] California uses the Smarter Balanced Assessment System (SBAC) for summative measures of students' proficiency in mathematics and ELA. The assessments are administered each spring to all students statewide in grades three through eight and eleven. The Smarter Balanced Assessments are part of the California Assessment of Student Performance and Progress (CAASPP) System, which also includes the California Alternate Assessments, the California Spanish Assessments, and the California Science Test. For more information on the Smarter Balanced Assessment System and the California Assessment of Student Performance and Progress System see: https://www.cde.ca.gov/ta/tg/sa/ and https://www.cde.ca.gov/ta/tg/ai/cefcaaspp.asp

[29] Not all pathways or industries are available in every school. The 15 industry sectors include Agriculture and Natural Resources; Arts, Media, and Entertainment; Building and Construction Trades; Business and Finance; Education, Child Development, and Family Services; Energy, Environment, and Utilities; Engineering and Architecture; Fashion and Interior Design; Health Science and Medical Technology; Hospitality, Tourism, and Recreation; Information and Communication Technologies; Manufacturing and Product Development; Marketing, Sales, and Services; Public Services; Transportation.

[30] We report course enrollment rather than completion due to data availability and quality limitations. Information about the term (1st term vs. 2nd term; fall vs. spring) and the variation in terms (semesters, quarters, hexmesters, among others) is unreliable and inconsistent across schools. Moreover, grading scales vary substantially across schools and courses, with some recorded as letter grades, others on a numerical scale and still others as grade points. These inconsistencies, along with validation rules related to math sequencing (i.e., passing a course in 2nd semester validates a failed 1st semester in the same course), make it difficult to ascertain if a student *successfully* completed a course. Therefore, we report on course enrollment only.

[31] For a more complete discussion on math course enrollment, including careful consideration of statistics and other types of advanced math courses, see Dykeman et al. (2026b). Additionally, see the companion Getting Down to Facts III report on

we define advanced math as enrollment in a precalculus or equivalent course (i.e., trigonometry) or a higher class in the calculus-track (Calculus AB, Calculus BC, AP Calculus, among others)[32]—an indicator that students have reached at least precalculus while in high school. It is important to note that this analysis excludes courses outside of the calculus-track that students may take after Algebra 2, such as statistics. The course completion data uses standardized statewide codes, which accurately identify all AP courses. As identification of advanced math courses is more complex, we generally follow the course categorizations outlined in our prior work (Dykeman et al., 2026b). To determine participation rates, we use four years of Course Completion data (2018-19, 2019-20, 2020-21, 2021-22) to account for students' coursetaking inclusive of 9th through 12th grade.

Dual enrollment participation is determined by merging individual student observations for the census of the 2022 cohort to four years of course enrollment data from the CCCCO. We count students as participating in dual enrollment if they take at least one credit-bearing course through any CCC campus statewide.[33] Using this method, dual enrollment counts and rates include college courses taken through formal dual enrollment programs (i.e., CCAP or Early College & Middle College programs) or those taken by students who independently enroll in a CCC. It also includes courses for which students obtain (or do not obtain) credit for their course at both the college and high school level. This method yields a much higher dual enrollment participation rate than the college-credit indicator included in the CCI which requires the high school to have knowledge of the CCC coursetaking and report only courses in which students earned a grade of C- or better. Dual enrollment in this report does not include college courses taken by high school students at a CSU, UC, private, or out-of-state college program.

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math coursetaking for a discussion on the relationship between advanced math enrollment in high school and college-going (Dykeman et al., 2026a).

[32] Categorization of high school math courses in California is quite complicated, as not all courses offered in local high schools fit neatly into state course categories or broader categories used for analysis. For a more detailed discussion of math course categorization and a list of courses included in our broad analysis categories, see Dykeman et al. (2026b).

[33] Dual enrollment participation is included in the CCI as "College Credit Courses", which is fulfilled if a students complete two semesters, three quarters, or three trimesters of college coursework during high school with a grade of C− or better in academic/Career Technical Education (CTE) subjects where college credits are awarded. These courses can be completed through CCC, CSU, UC and private institutions.

Postsecondary outcome measures

For the purposes of this report, postsecondary outcome measures are limited to college enrollment—*enrollment at any college, enrollment in a 2-year college, enrollment in a 4-year college*—which includes enrollment in any institution of higher education within 16 months of high school graduation. College enrollment is derived from NSC data by matching individual students who completed high school in 2022 to college enrollment records obtained by the NSC from 95%+ institutions of higher education nationwide (Dynarski et al. 2013). We report college enrollment in any institution and rates of enrollment at 2-year and 4-year institutions.[34]

Methods

We rely on descriptive statistics and correlational analysis to report the coursetaking and postsecondary enrollment patterns of the 2022 cohort. Frequency counts allow us to compare subgroup participation rates, as well as the variation in participation rates across schools, for all coursetaking measures.

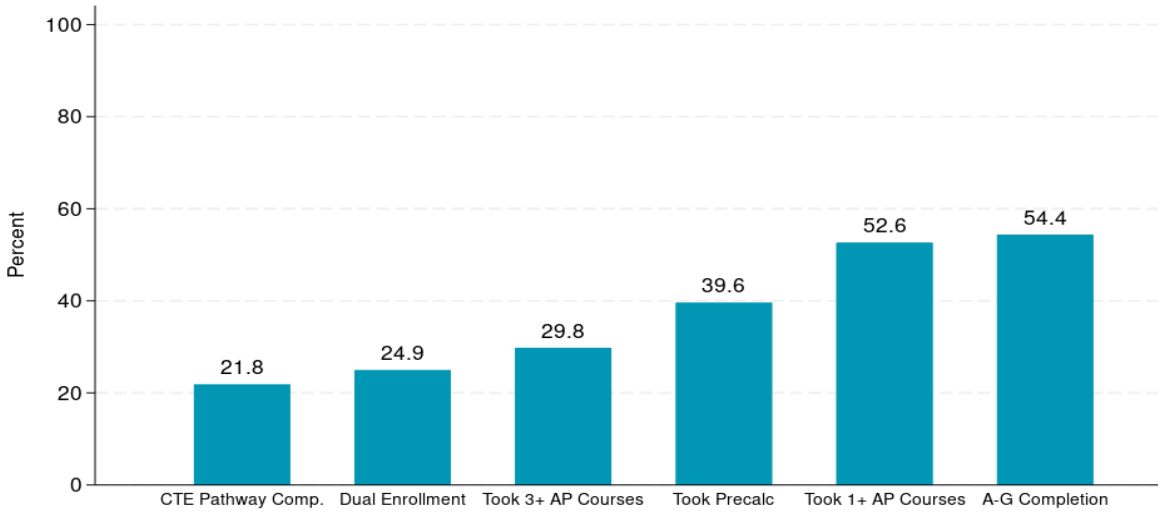
In addition to describing average course participation rates across subgroups, we examine the relationship between different types of high school coursetaking and enrollment in college the year following high school graduation. To do this, we calculate the *conditional probability* of enrolling in college *given* participation in a particular college or career course. For example, we know that 33% of students enrolled in a 4-year college or university within 16 months of graduation. On the other hand, we know that 56% of students who completed their A-G requirements enrolled in a 4-year institution post-graduation. This 56% is the conditional probability that students enroll at a 4-year institution, given that they finished their A-G requirements. To construct this conditional probability, we find the number of students who both completed the A-G requirement and enrolled at a 4-year institution within 16 months of graduation, then divide by the number of students who completed their A-G requirements.

[34] California Community Colleges that offer baccalaureate programs are included in the 2-year college category, as these programs are a very small portion of colleges' overall program offerings and students' intention to pursue an associate degree or bachelor's degree is unknown in the NSC college enrollment data that we use in this study.

Enrollment in College & Career Readiness Coursetaking

Statewide, over half of students enrolled in or completed at least one college and career preparatory course or pathway before graduating from high school. Figure 1 compares participation in the college and career preparatory courses and course pathways among all California public high school graduates in 2022 (these results are also included in tabular form in Appendix Table A2). Just over half (54%) of seniors completed the A-G course requirements, a rate that has increased over time. Among graduates in 2016, about 46% of the cohort completed the A-G courses (Reed et al., 2023b), and in the early 2000s, fewer than 40% of high school graduates completed A to G coursework (Gao, 2016).[35] On the other end of the spectrum, 22% of 2022 graduates completed a CTE pathway—a rate that has remained fairly stable for the last seven cohorts (Boochever et al., 2023).[36]

Figure 1. Statewide course enrollment and pathway completion rates



Note. Rates represent the percent of high school seniors enrolled in a California public high school on April 15, 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available. N = 381,385.

[35] It is important to note that rates from prior work may use slightly different rules for constructing the graduating cohort samples. As such, rates should not be directly compared, but rather used to understand general trends.
[36] This rate is about 3 percentage points higher than the rate reported in prior work by some of the same authors (Boochever et al., 2023). The different rates are the result of different samples. In this report we use a more restrictive sample which includes only students in the 2022 cohort for whom we have four years of coursetaking data.

Turning from pathway completion, participation rates in AP, advanced math, and dual enrollment courses ranged from 25% to over 50%. For math course requirements included in the A-G framework,[37] a large majority (81%) of students in the 2022 graduation cohort took Algebra 2 or equivalent at some point in high school (not pictured).[38] Going beyond the minimum requirements for admission to a 4-year college, half of the students who took Algebra 2 (40% of the cohort) continued to precalculus, calculus or another advanced math course. The proportion of students in the cohort that take Algebra 2 during high school has remained relatively stable in the last decade (Dykeman et al., 2026b). In contrast, the proportion of high school graduates who took precalculus and calculus has declined over time (Dykeman et al., 2026b). In addition to these calculus-track math courses, many students took AP Statistics as part of their college and career preparation; coursetaking patterns for these courses is explored in detail in prior research (Dykeman et al., 2026b).

Many students enrolled in college coursework while in high school through dual enrollment and AP courses, allowing them to engage in college-level classes and potentially receiving credit towards a college degree or exemptions from courses/prerequisites in some postsecondary programs of study. Nearly a quarter of the 2022 graduating class participated in dual enrollment (Figure 1). The rate of participation in dual enrollment has steadily increased since 2016 when 13% of students in the graduation cohort took at least one community college course (Dykeman et al., 2024).[39] Over half of the students in the 2022 cohort took at least one AP course (53%) and 30% took three or more AP courses during high school. AP coursetaking appears to be on the rise, as the proportion of seniors who took at

[37] The A-G framework requires "three years of college-preparatory mathematics, including or integrating topics covered in: elementary algebra, two-and three-dimensional geometry, [and] advanced algebra." Many students meet these requirements through one of two standardized sequences: 1) Algebra 1, Geometry, Algebra 2; or 2) Integrated Math I, Integrated Math II, Integrated Math III. As such, enrollment in Algebra 2/IM 3 serves as a proxy for completing the math course requirements in the A-G framework, though there may be a few students who take Algebra 2/IM 3 but fail to successfully complete a prior course and consequently do not meet the A-G requirements. Additionally, students who enroll in Algebra 2/IM 3 but do not pass with a C or better also do not satisfy A-G requirements. We do not account for student grades in this report.

[38] In this report, the proportion of students in the 2022 cohort who took Algebra 2 or precalculus or higher differs from the figures reported by the same authors (Dykeman et al., 2026b) due to differences in sample construction. We use a more restrictive sample in this paper.

[39] In this report, the proportion of students in the 2022 cohort who participated in dual enrollment differs from the proportion reported by the same authors (Dykeman et al., 2024) due to differences in sample construction. We use a more restrictive sample in this paper.

least one AP test in high school was just 37% of the 2016 cohort and 43% of the 2019 cohort (Reed et al., 2023b).[40]

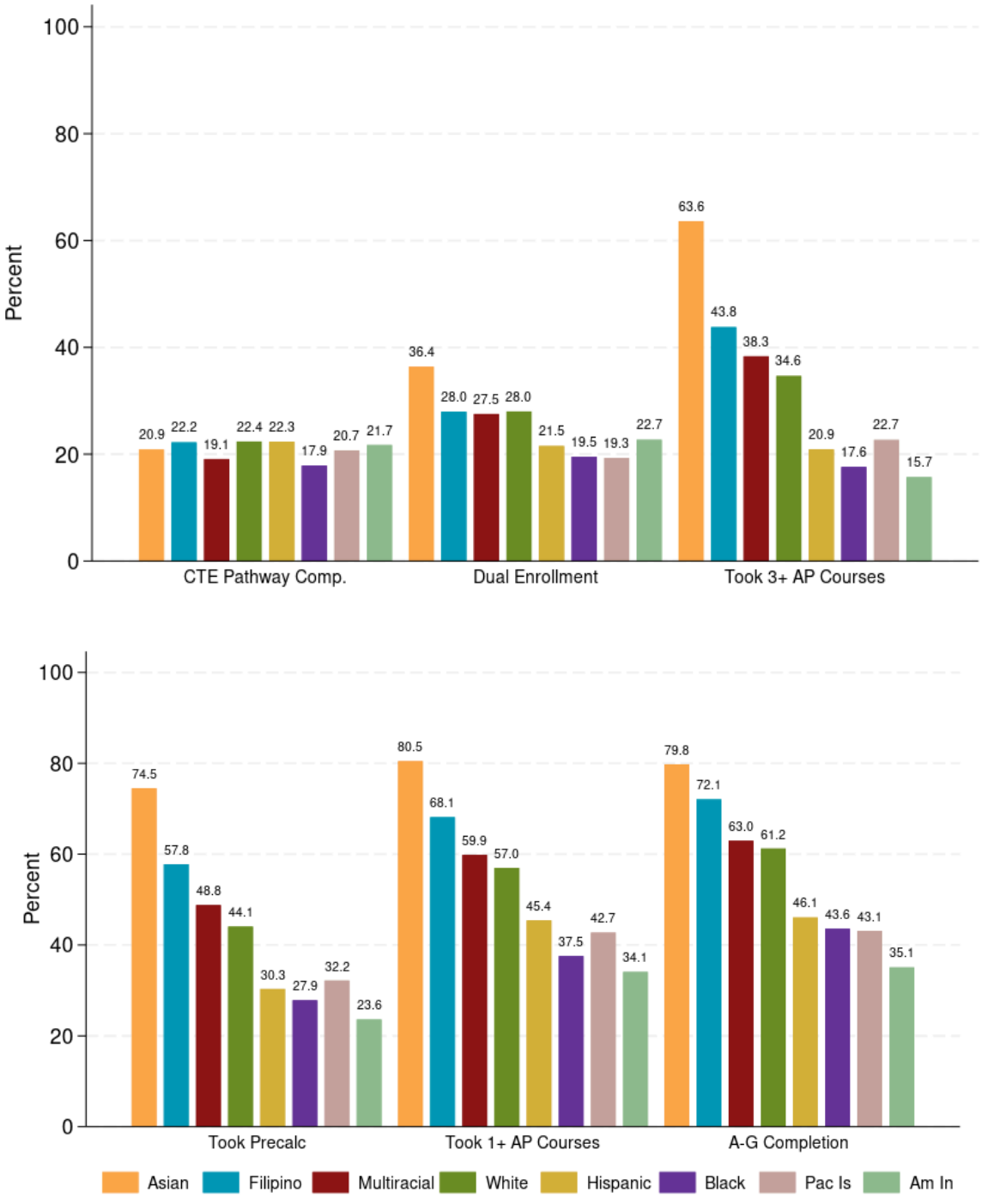
Participation by racial/ethnic subgroups

There were important disparities in college and career preparatory coursework across racial/ethnic groups (Figure 2). Asian, Filipino, white, and multiracial students in the 2022 cohort were generally more likely than their peers to enroll in preparatory courses or complete the A-G course sequence. The gap between Asian students and their peers was particularly large for A-G completion, where they were 10 to 20 percentage points more likely to complete A-G coursework than their multiracial or white peers, and about 30 percentage points more likely to complete the A-G course requirements than their Black, American Indian, Hispanic, and Pacific Islander peers. There are similar patterns by race for advanced math enrollment and AP coursetaking.

The differences in dual enrollment participation across racial/ethnic subgroups were much smaller in magnitude (with a range of just 17 percentage points). About 36% of Asian students in the 2022 cohort participated in dual enrollment, as did about 28% of Filipino, white, and multiracial students. American Indian (23%), Hispanic (22%), Black (20%), and Pacific Islander (19%) students participated in dual enrollment at somewhat lower rates. Interestingly, the disparities across racial/ethnic groups diverge somewhat from the patterns observed for A-G completion and advanced math and AP coursetaking. In this case, Filipino, white and multiracial students had similar participation rates in dual enrollment, whereas Filipino students had higher rates of enrollment in the other course types (except CTE) than multiracial students and white students. Also of note, American Indian students had the lowest rates of participation in the other course types (except CTE), but their participation surpassed Hispanic, Black and Pacific Islander students for dual enrollment.

[40] Although not all students who enroll in AP courses take the associated AP tests, and vice versa, the sharp contrast in AP course enrollment among the 2022 graduating cohort compared to AP test-taking rates in 2019 likely indicates that AP coursetaking is continuing to grow.

Figure 2. Course enrollment/completion by race/ethnicity



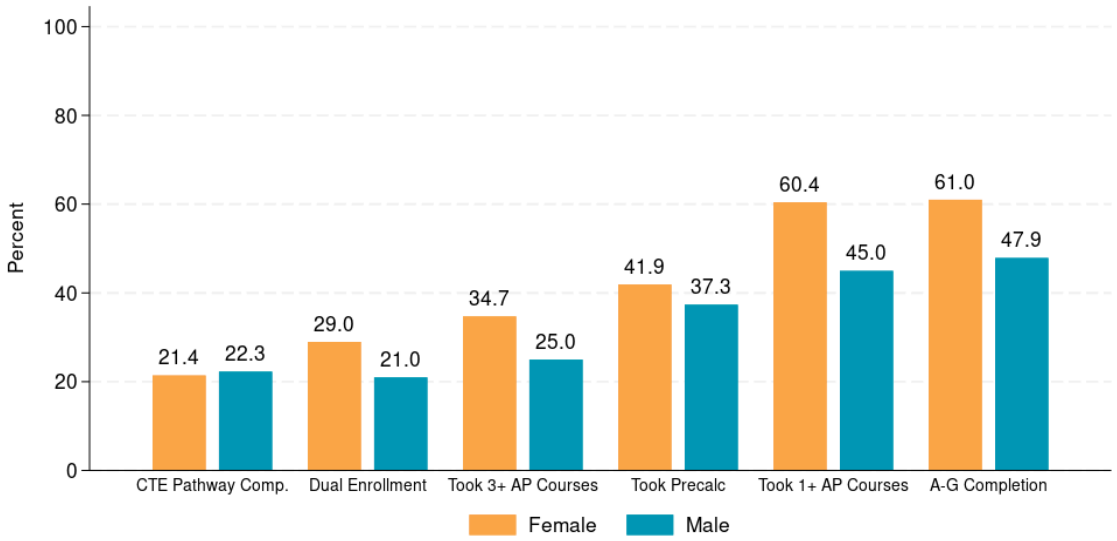
Note. Rates represent the percent of high school seniors enrolled in a California public high school on April 15. 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available. N = 381,385. Bars are sorted by A-G Completion percentages. Racial/ethnic subgroups defined by the California Department of Education.

In contrast to the other coursetaking measures, CTE pathway completion was relatively even across racial/ethnic subgroups, ranging from 18% and 22%. Although overall rates of CTE pathway completion were remarkably similar, prior research illuminated noteworthy differences when considering specific industries. Asian students were overrepresented in Information & Communication Technology (by 178%) and Energy, Environment & Utilities (by 94%), whereas Asian, Black and Filipino students were largely underrepresented (by 76%, 73%, 69% respectively) in Agriculture & Natural Resources (Boochever et al., 2023).

Participation by gender

In general, female students were more likely to enroll in college and career preparatory courses and complete the full set of A-G course requirements, than male students (Figure 3). For example, about 60% of female students in the 2022 cohort took at least one AP course compared to 45% of male students. For CTE, however, female and male students completed a pathway at similar rates—21% and 22%, respectively—though prior work revealed substantial differences by gender within CTE industries. Females were remarkably overrepresented in Fashion & Interior Design and Education & Child Development and vastly underrepresented in the Transportation and Building & Construction industries (Boochever et al., 2023).

Figure 3. Course enrollment/completion by Gender

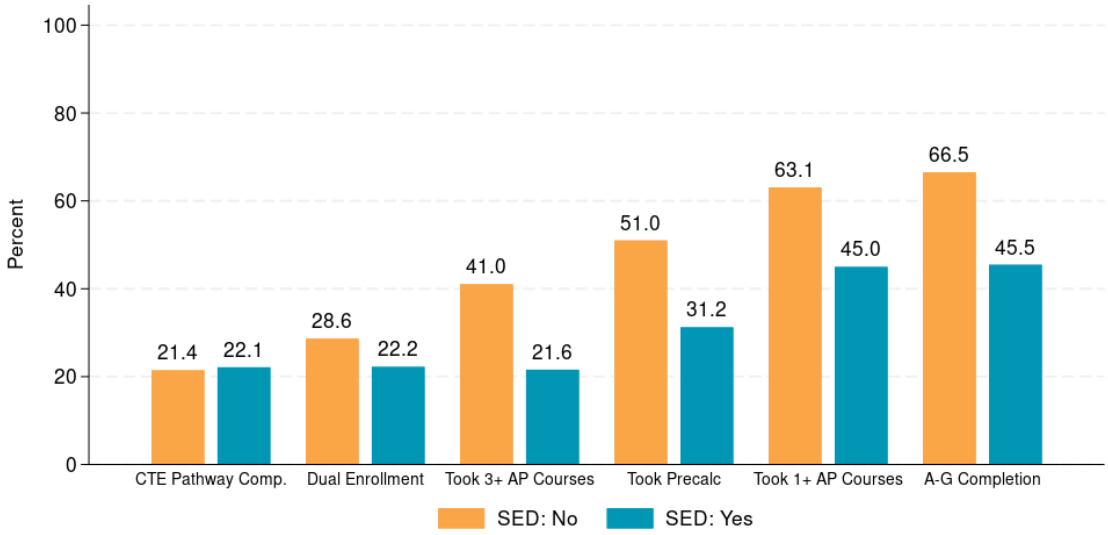


Note. Rates represent the percent of high school seniors enrolled in a California public high school on April 15, 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available. Gender subgroups defined by the California Department of Education; non-binary students are omitted from analysis due to the small sample size and uncertainty in the accuracy of the data.

Participation among socioeconomically disadvantaged subgroups

Students who are classified as socioeconomically disadvantaged (SED) were generally less likely to enroll in college and career preparatory courses compared to those students who are not SED (Figure 4). For example, two thirds (67%) of non-SED students completed the A-G course requirements compared to 45% of SED students. There was a similar-sized gap of approximately 20 points for enrollment in advanced math and AP courses, and a smaller gap—7 percentage points—for dual enrollment. However, SED and non-SED students completed CTE pathways at very similar rates, 22% to 21%, respectively.

Figure 4. Course enrollment/completion by socioeconomic disadvantage status

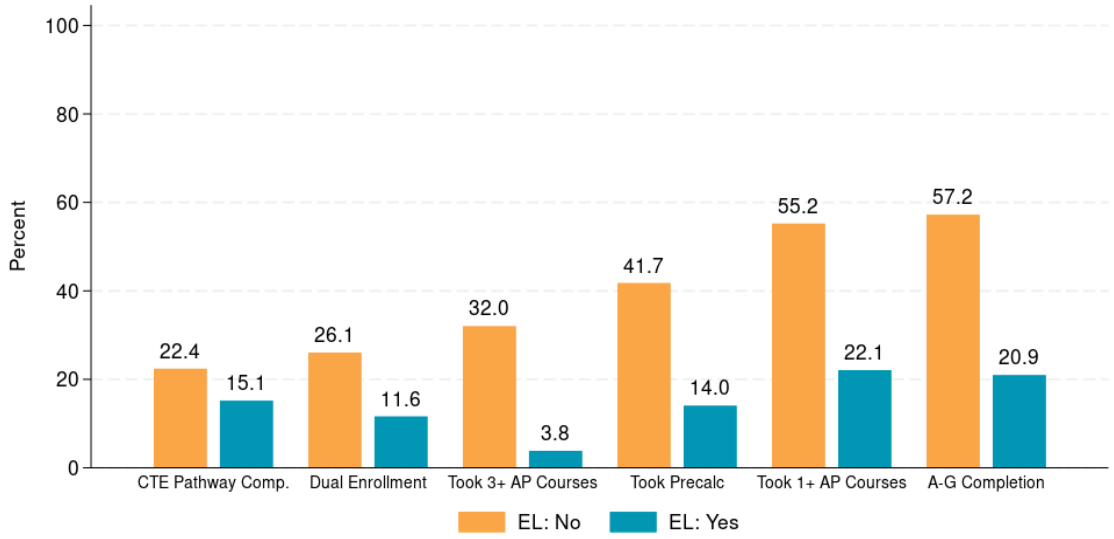


Note. Rates represent the percent of high school seniors enrolled in a California public high school on April 15. 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available. SED = socioeconomically disadvantaged. SED defined by the California Department of Education.

Participation among English learner subgroups

English learners, defined by their status as English Learners in 12th grade (i.e., not including reclassified students), were much less likely to enroll in or complete college preparatory courses and pathways compared to students who were not English learners (Figure 5). The differences between English learners and English proficient students were as much as 36 percentage points for A-G completion and approximately 30 percentage points for AP coursetaking, with just 4% of English learners taking three or more AP classes. English learners were also less likely to enroll in dual enrollment (12%) or complete a CTE pathway (15%) compared to their peers who were not English Learners (26% and 22%, respectively). Of note, the gap between English learners and their English proficient peers was larger than the gap between SED and non-SED students and the range of participation rates across racial/ethnic subgroups for both dual enrollment participation and CTE pathway completion.

Figure 5. College and career preparatory course enrollment completion by EL Status

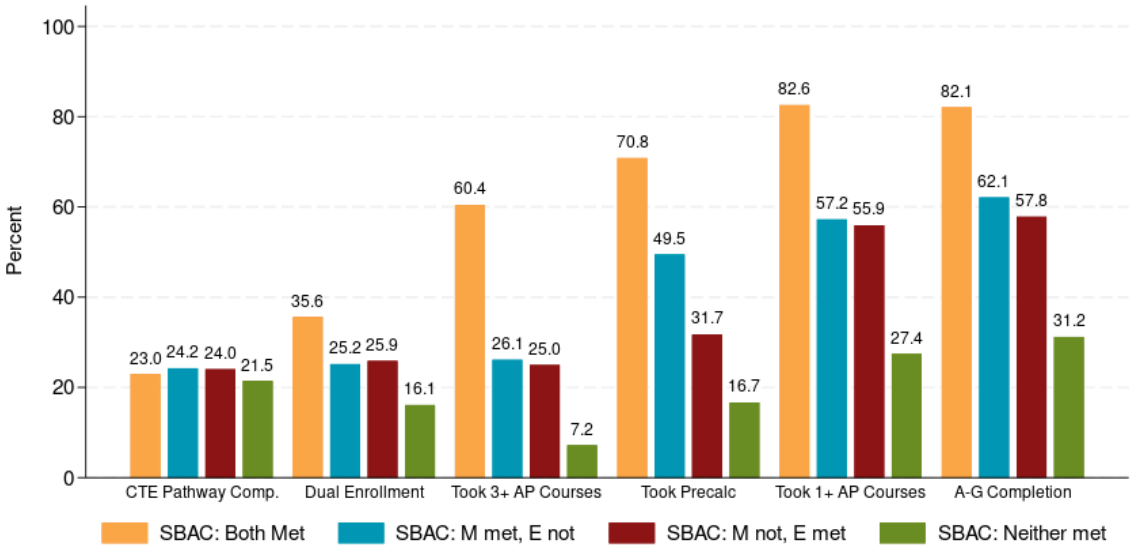


Note. Rates represent the percent of high school seniors enrolled in a California public high school on April 15, 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available. EL = English learner. EL status designated by the California Department of Education. Includes only students designated EL on April 15, 2022; does not include students who may have previously been designated EL (i.e., reclassified, ever-EL).

Participation by 8th grade academic achievement

Students who demonstrated better academic performance on the SBAC in 8th grade were generally more likely to enroll in and complete college preparatory courses and course sequences (Figure 6) (see Appendix Table A1 for the percentage of students in each 8th grade performance category). Specifically, students who met the state standards in both ELA and Math were about 20 percentage points more likely to complete the A-G course sequence compared to students who met only the ELA or the math requirement. Those students who met neither standard were 50 percentage points less likely to complete A-G than students who met both subject state standards. There was a similar pattern for AP coursetaking and dual enrollment. Not surprisingly, advanced math enrollment was higher for those who met at least the math standard on the SBAC, though enrollment was still much higher for students who met both ELA and math standards. Lastly, CTE pathway completion was between 21% and 24% for students regardless of their performance on the 8th grade SBAC.

Figure 6: College/career course enrollment/completion by grade 8 SBAC performance



Note. Rates represent the percent of high school seniors enrolled in a California public high school on April 15, 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available. SBAC = Smarter Balanced Assessments. M = math SBAC. E = ELA SBAC. SBAC proficiency levels determined from performance on 8th grade assessments.

Overlapping College & Career Readiness Coursetaking

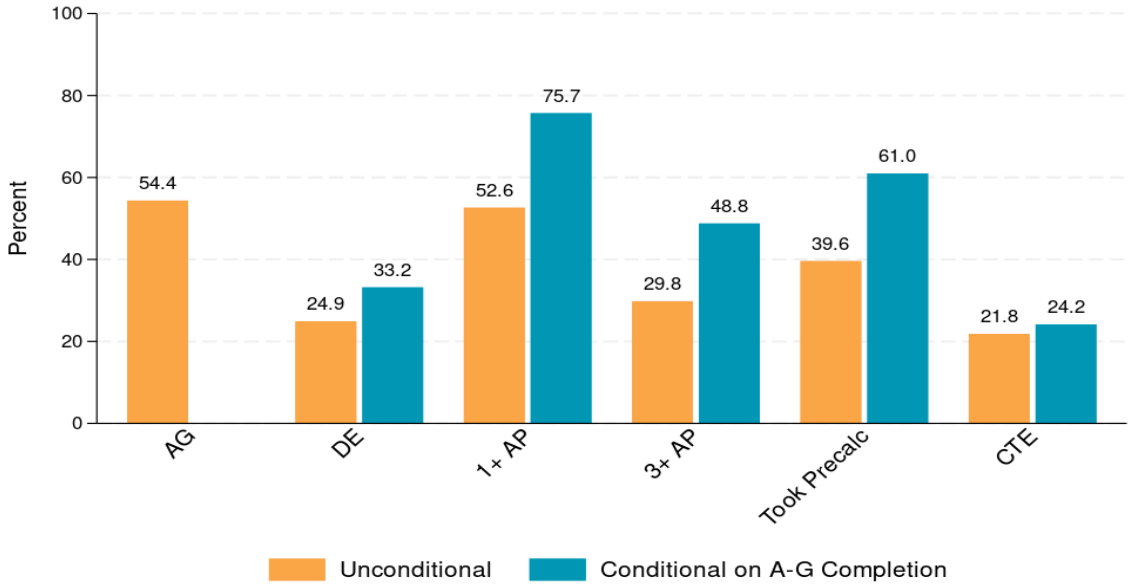
As described in the sections above, both statewide and local efforts aimed at expanding access to college and career preparatory coursework are paying off as participation in, and successful completion of, college preparatory coursework is increasing over time. Yet, preparation for college and career through high school coursework is not always a function of engagement in a singular course type or pathway, nor is increased participation among high school students the function of a singular policy effort. Rather, college and career preparation is driven by individual choice amongst a complex web of intersecting and overlapping course opportunities within the boundaries of school-level constraints including, but not limited to, course offering, master scheduling, and both prerequisite and placement policies.

Some statewide policy efforts aim to improve intersegmental coordination so that students have clearly articulated pathways from high school through college and into the workforce. In this case, the Golden State Pathways Program (2022), the Regional K-16 Education Collaboratives Grant Program

(2021), and California's Master Plan for Career Education (2025) all seek to align high school coursetaking, higher education and workforce sectors. Moreover, the CDE's College and Career Indicator accountability framework also promotes alignment of college and career preparatory coursetaking. Many local policies and practices intend to streamline college and career preparatory opportunities so that students have multiple postsecondary options, regardless of which college and career preparatory program of study they elected in high school. For example, some districts have worked to ensure CTE courses are A-G approved (Hurtt et al., 2023; Lee, 2023), providing students with the opportunity to complete both a CTE pathway and A-G course requirements while gaining career-specific skills and eligibility to attend a public 4-year university in California.

Efforts focused on alignment and coordination—along with other efforts to increase access to, participation in, and successful completion of college and career preparatory coursework—may result in some students participating in more than one course pathway (see Appendix Table A3). Among the 2022 cohort, just over half of students (54%) completed the A-G course sequence, readying them for postsecondary education and making them minimally eligible for admission to a public 4-year university (Figure 7). Separately, students also enrolled in other college and career preparation courses: 25% took Dual Enrollment courses, 53% enrolled in one AP course, 30% enrolled in 3 or more AP courses, 40% took precalculus or higher, and 22% completed a CTE course sequence. There was considerable overlap between these groups, especially for those who completed the A-G course sequence. Those students were more likely to enroll in other college and career readiness coursework. For example, about a quarter of all 2022 graduates participated in dual enrollment, but among the students who completed the full set of A-G courses, 33% of students participated in dual enrollment. Similarly, the rates of AP coursetaking and advanced math coursetaking were higher among students who completed A-G courses, with 76% of A-G completers taking one or more AP courses, 48.8% taking three or more AP courses, and 61% taking a precalculus or higher math course, respectively. Appendix Table A4 shows course participation and pathway completion conditional on A-G completion by student subgroups.

Figure 7. Likelihood of taking AP, dual enrollment & advanced math courses or completing a CTE pathway, conditional on complete A-G course requirements



Note. Rates represent the probability of participation among high school seniors enrolled in a California public high school on April 15, 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available.

Beyond the combination of A-G and other college and career preparatory courses, there are some noteworthy areas of overlap. For example, among those who participated in dual enrollment, more than half (54%) also took at least one AP course and 62% enrolled in advanced math courses at their high school.

CTE pathway completion stands in contrast to other opportunities in that it is only loosely associated with A-G course completion and AP coursetaking. In this case, 22% of all high school graduates completed a CTE pathway; among the students who completed the full A-G sequence, 24% also completed a CTE pathway. Importantly, our data also show that just over half of all CTE pathway completers met the admissions requirements for a California 4-year public university.

Efforts to increase access to, and successful completion of, college and career preparatory coursework may also result in expansion of opportunities to more students. For example, dual enrollment—for which there has been ample investment to increase participation—may be opening access to college-level coursework for some students. Statewide, 25% of 2022 graduates took at least

one dual enrollment course. Not all students had access to dual enrollment as a result of limited course offerings within a high school, geographic isolation from a community college, or lack of transportation to attend a college course, among other reasons. Similarly, although 53% of students statewide took at least one AP course, some students did not have access to AP courses due to limited availability of school offerings. Between both dual enrollment and AP coursetaking, 60% of students took a college-level course of some type, indicating that the availability of both course options expands access to college coursework during high school years. In another example, efforts to expand dual enrollment opportunities have opened access to career technical education pathways as well. Recent research that explored dual enrollment in conjunction with CTE finds that dual enrollment indeed expanded access to CTE coursework, with an additional 6% of the 2022 cohort taking CTE coursework at a community college (Boochever et al., 2025).

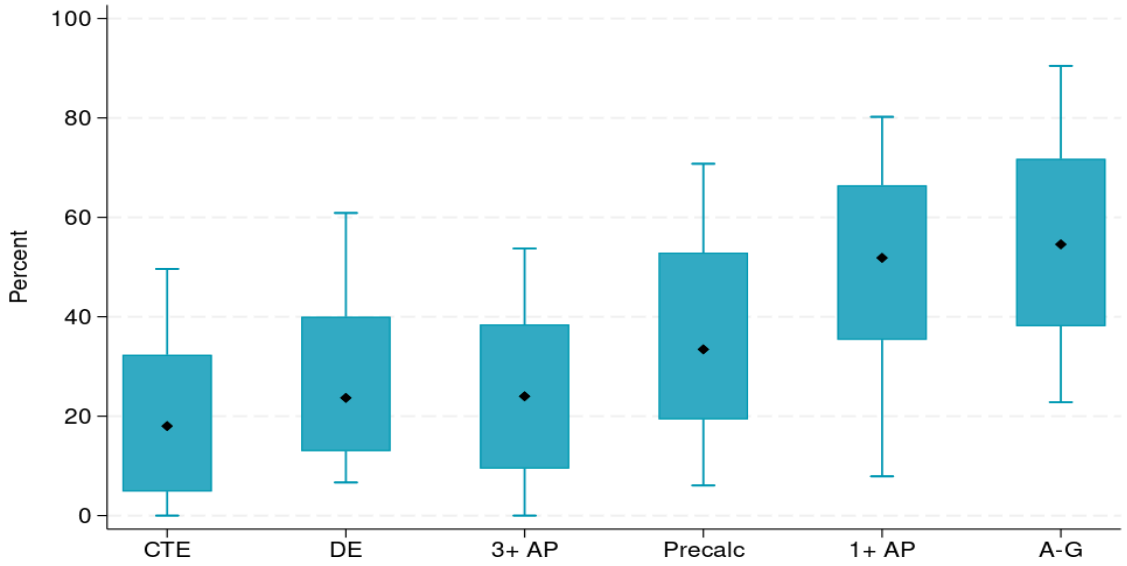
Coursetaking Across Schools

Students' access to and participation in college and career preparatory courses or pathways is a function of both structural and individual factors, as described previously. For some students, engagement in these opportunities is also a matter of choice, based on current preferences and future aspirations. For most students, this choice is limited by the policies and practices of the school they attend.

Prior work exploring the coursetaking patterns of California public high school students has documented in detail the differences in college and career coursetaking across schools. Reed et al. (2023b) found that for the 2019 graduating cohort, A-G course completion rates varied from zero to nearly 100% of graduates across traditional public high schools. Similar patterns have been documented for AP exam-taking (Reed et al., 2023b), dual enrollment (Friedmann et al., 2024), CTE pathway completion (Reed et al, 2018), as well as enrollment in math during senior year and advanced math coursetaking throughout high school (Larson et al., 2026). Mirroring prior research, Figure 8 depicts the variation in college and career preparatory coursetaking for the 2022 cohort across California public high schools. Here, the teal boxes represent the range (interquartile range) of overall course participation or pathway completion rates for schools between the 25th and 75th percentile, and the bar height represents the range of rates for schools between the 10th and 25th percentile and

75th and 90th percentile, respectively. For example, while half of high schools in our sample had A-G completion rates between 37% and 70%, one-tenth of schools had an A-G completion rate below 21% and another one-tenth of schools had an A-G completion rate over 90%. Other points of interest from Figure 8 include the fact that about one-tenth of schools had CTE pathway completion rates of over 48%, and one-tenth of schools had a dual enrollment participation rate of 59% or higher. Additionally, at half of all high schools, the rate of enrollment in 3+ AP courses was more than 23% of the graduating cohort (or higher).

Figure 8. Distribution of college and career preparatory participation across schools



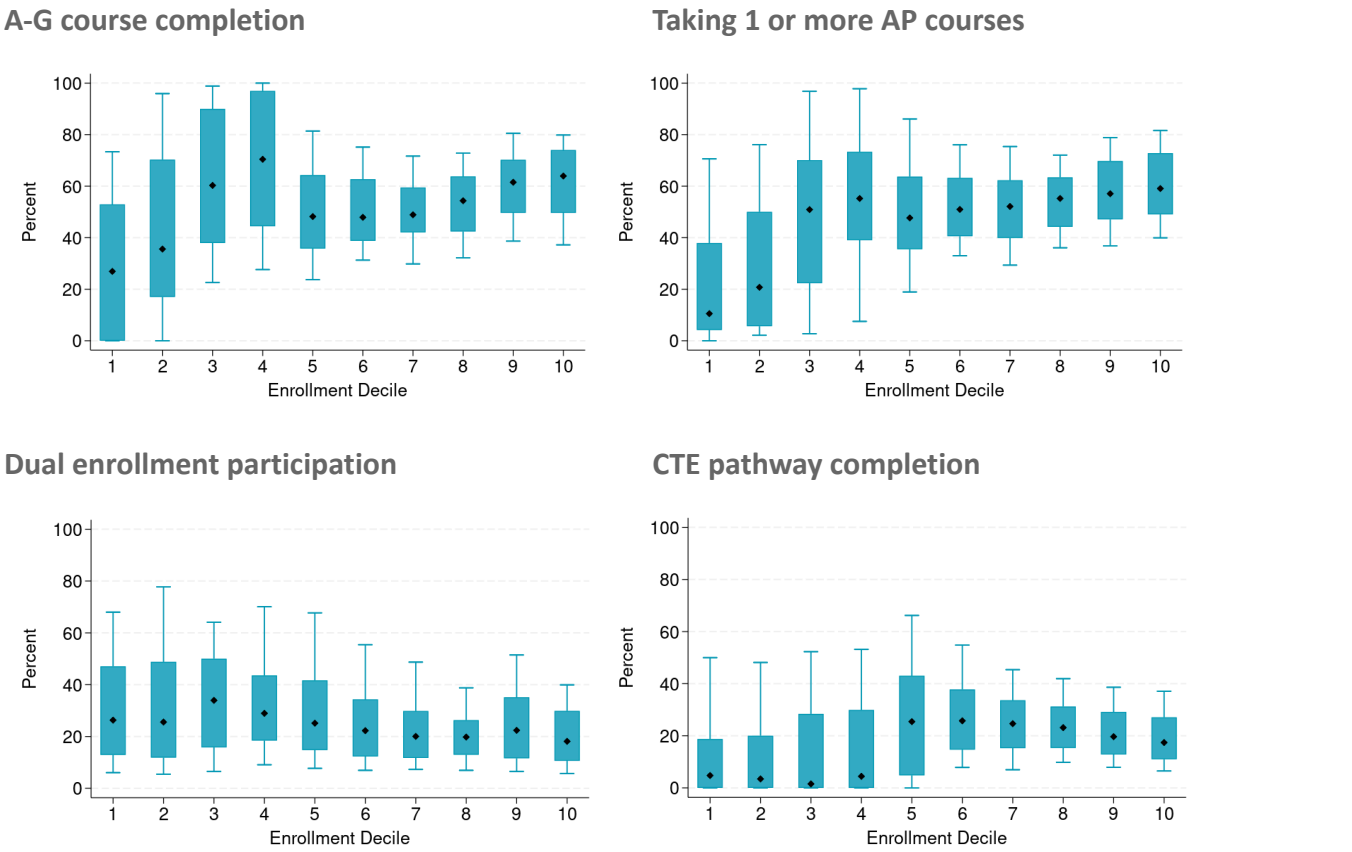
Note. Distribution of school-level participation and completion rates. Boxes represent the interquartile range. Bars represent the range of rates for schools between the 10th and 25th percentile and 75th and 90th percentile, respectively. Includes schools with SOC codes of 65, 66, 67 in the California Department of Education's *Public Schools and Districts* data files. Excludes schools with fewer than 15 seniors enrolled on April 15, 2022.

A broad body of literature has documented the role of schools in students' coursetaking, including the role of resources (Clotfelter et al., 2010; Gagnon & Mattingly, 2016; Hanushek et al., 2004; Iatarola et al., 2011; Peske & Haycock, 2006), the characteristics of students served (Adelman, 1999; Carbonaro et al., 2024; Conger et al., 2009; Klopfenstein, 2004; Klugman, 2013; Moore & Slate, 2008; Ogut & Circi, 2023; Solórzano & Ornelas, 2004), and the size and geographic location (Cisneros et al., 2014; Gagnon & Mattingly, 2016; Grant, 2022; Iatarola et al., 2017). Prior work showed that nearly all

public high schools offer—inferred from student participation—the full set of A-G courses (Reed et al., 2023b), AP and advanced math courses (Larson et al., 2026; Reed et al., 2023b), and dual enrollment opportunities (Friedmann et al., 2024; Reed et al., 2023b). Even so, participation varied by school. In this case, small schools and schools serving a high proportion of SED students were often among the schools with the lowest rates of participation in college and career opportunities (Larson et al., 2026; Reed et al., 2018), and sometimes among the schools with the highest rates of participation (Friedmann et al., 2024; Larson et al., 2026; Reed et al., 2023b). A large proportion of the schools with no, or low, participation in each college or career pathway were charter schools (Reed et al., 2018; Reed et al., 2023b) or rural schools (Friedmann et al., 2024; Reed et al., 2023b). In some cases, schools with the highest rates of participation were schools with a special academic focus, such as Early College and Middle College High Schools, where nearly all students participate in dual enrollment (Friedmann et al., 2024).

Building on this prior work, Figures 9 and 10 illustrate the range of school-level participation rates in college and career preparatory coursetaking by key characteristics of the student body—size and share of the senior cohort who are SED. As seen in Figure 9, where Decile 1 represents the smallest schools (<35 students) and Decile 10 represents the largest schools (> 534 students), participation rates for the 2022 cohort varied across small schools much more than at larger schools (as illustrated by the larger interquartile range). The smallest schools generally had lower rates of AP coursetaking and CTE pathway completion, but slightly higher rates of dual enrollment participation compared to larger schools. Even with these differences, there was plenty of overlap in the distribution of coursetaking at schools of all sizes. See Appendix Table A5 for course participation and pathway completion rates for all enrollment deciles.

Figure 9. Distribution of college and career preparatory participation by school size



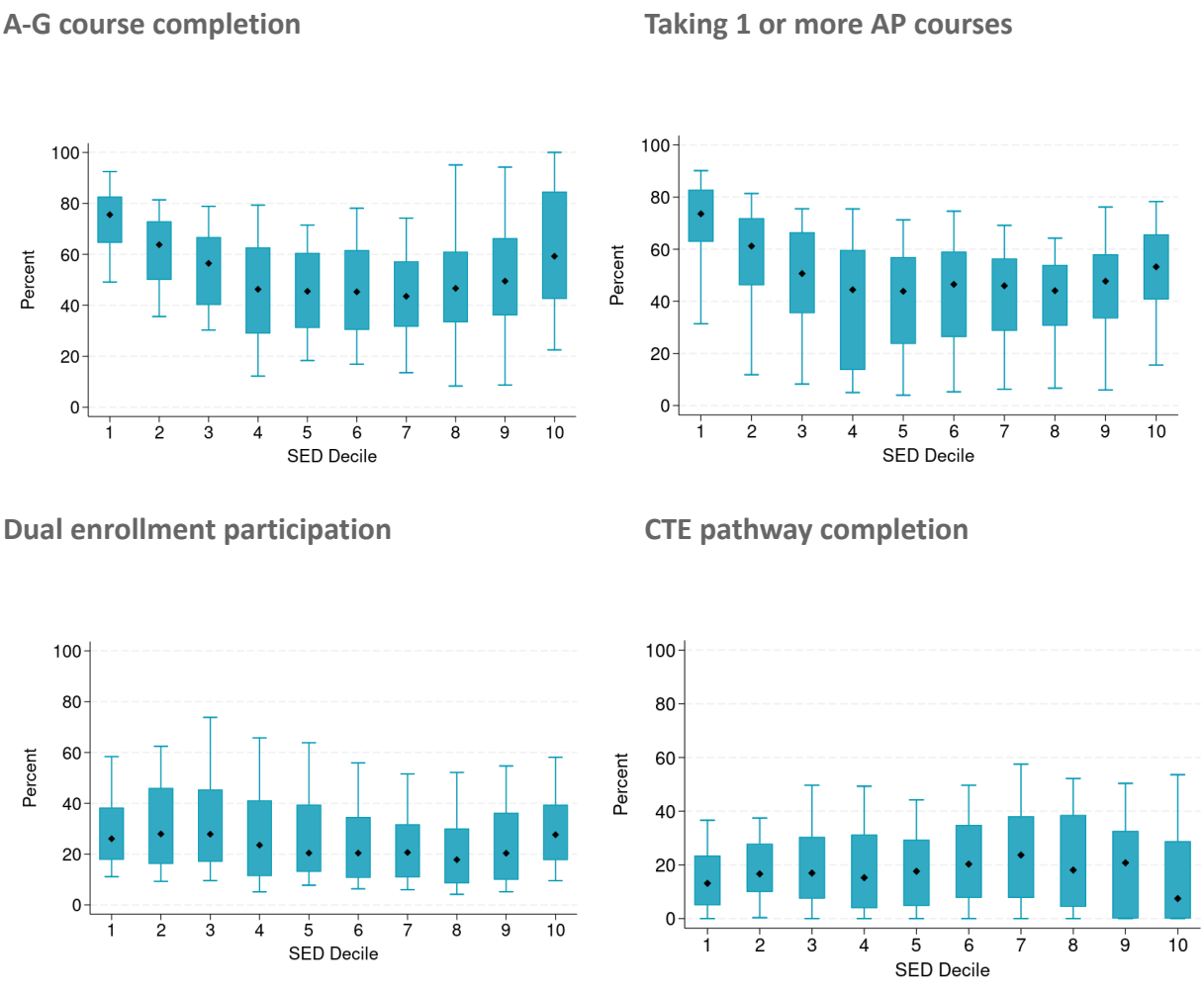
Note. Distribution of school-level participation and completion rates. Boxes represent the interquartile range. Bars represent the range of rates for schools between the 10th and 25th percentile and 75th and 90th percentile, respectively. Includes schools with SOC codes of 65, 66, 67 in the California Department of Education's *Public Schools and Districts* data files. Excludes schools with fewer than 15 seniors enrolled on April 15, 2022.

Coursetaking also differed by the share of SED students as depicted in Figure 10. Here, Decile 1 represents the most affluent schools, or those with the lowest concentrations of SED students (<23% SED students), and Decile 10 represents schools with the highest concentrations of SED students (>94% SED students). For A-G completion and AP course enrollment, we note a "U-shape" consistent with prior work in this area (Asim et al., 2019; Larson et al., 2026) where the schools with the lowest and highest concentrations of SED had among the highest participation in these postsecondary preparation courses. These patterns likely indicate the positive effect of policy interventions and financial investments—through LCFF supplemental and concentration funds and federal programs such as Title 1—that aim to improve the educational opportunities and outcomes of socioeconomically

disadvantaged students. See Appendix Table A6 for course participation and pathway completion rates for all SED deciles.

For dual enrollment and CTE pathway completion, however, participation rates were much more similar across schools serving different proportions of SED students. As with student enrollment, there was overlap between deciles, suggesting that many schools had similar coursetaking patterns despite differences in their student body characteristics.

Figure 10. Distribution of college and career preparatory participation, by SED concentration



Note. Distribution of school-level participation and completion rates. Boxes represent the interquartile range. Bars represent the range of rates for schools between the 10th and 25th percentile and 75th and 90th percentile, respectively. Includes schools with SOC codes of 65, 66, 67 in the California Department of Education's *Public Schools and Districts* data files. Excludes schools with fewer than 15 seniors enrolled on April 15, 2022. SED = Socioeconomically disadvantaged. SED status is determined at the student level. School-level SED rates calculated by authors from student-level data.

A high school's geographic location was also associated with differences in coursetaking. On average, schools in cities and suburbs—which make up a majority of schools and serve the majority of students in California—were ten percentage points more likely to complete the A-G course requirements or take AP courses than students from more rural schools. However, students from rural schools were typically more likely to complete a CTE pathway or participate in dual enrollment through a community college (see Appendix Table A7 for course participation and pathway completion rates by urbanicity).

Despite the evident differences in college and career preparatory coursetaking across schools, school size, student body composition, geographic locale and other school characteristics do not fully explain the differences in coursetaking across student subgroups. Prior research indicated notable differences in coursetaking within schools. Larson et al. (2026) found that about 11% of the variation in calculus course enrollment and 13% of AP statistics enrollment was due to differences between schools. The remainder of the variation resulted from within-school and/or individual factors. Reed et al. (2023b) found differences in A–G completion rates by race/ethnicity both across and within schools and Boochever et al. (2025) noted that both between-school and within-school factors contributed to disparities in Latinx students' participation in CTE pathways.

High School Coursetaking and College Enrollment

Prior literature has also established a strong connection between high school coursetaking and college enrollment, performance, and degree completion. Although some studies aim to identify causal relationships between high school courses and postsecondary outcomes—by utilizing the introduction of a new or changing course pathways at a school, or by controlling for a host of observables—most of the research base is correlational in nature. It is quite difficult to confirm causal links, because, as described above, educational pathways are paved by a host of observable and unobservable individual and school factors that make it difficult to isolate whether particular courses (or paths) impact postsecondary outcomes. But descriptive and correlational research still has immense value as we seek to understand the relationships between college and career preparatory coursework and postsecondary outcomes. In this section, we describe the college enrollment patterns of California

public high school graduates across the various college and career preparatory course types in high school.

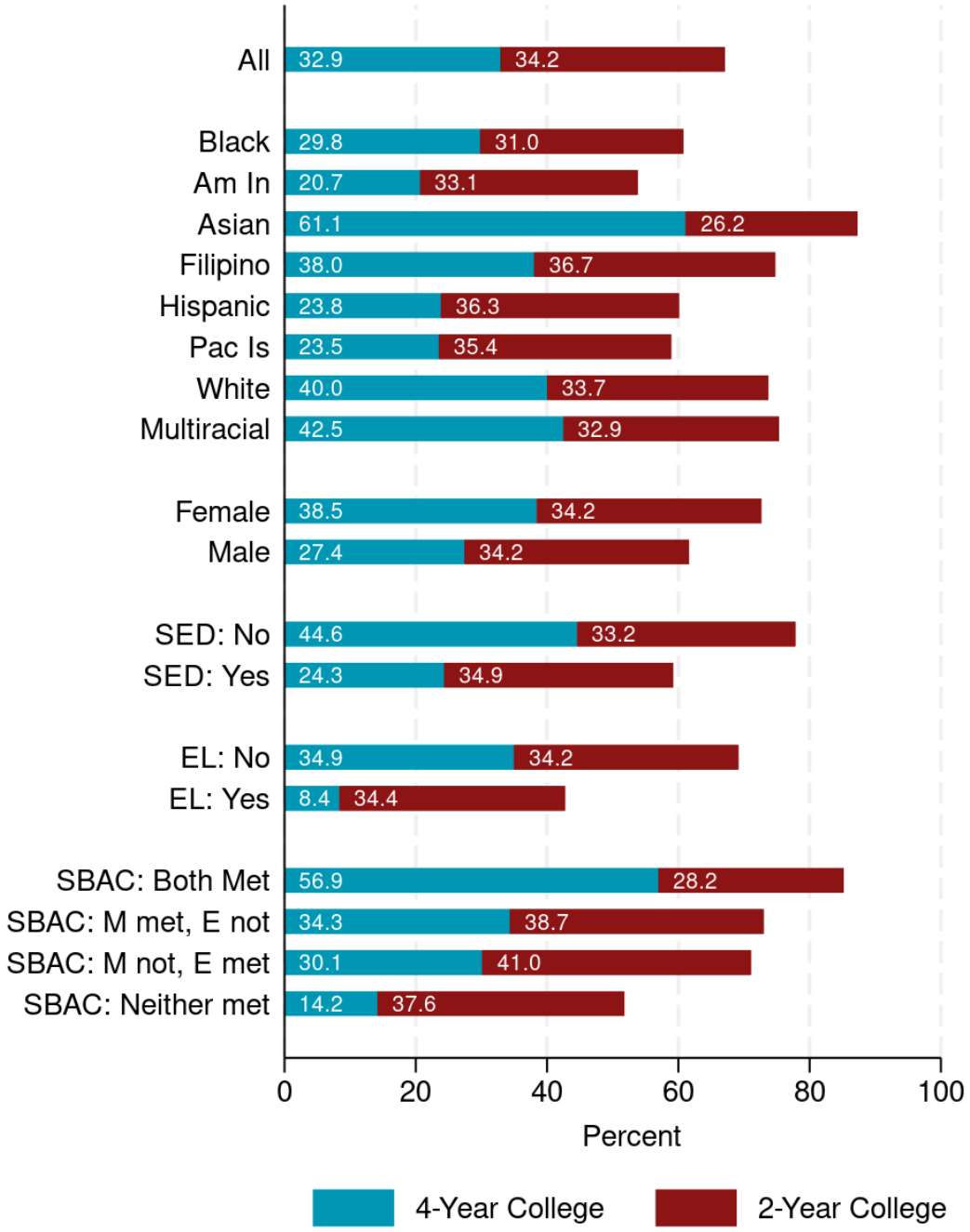
Among the Class of 2022, 67% of high school completers enrolled in college within 16 months of graduation. About one-third of graduates (32.9%) enrolled in a 4-year college and just over one-third (34.2%) enrolled in a 2-year college; the remaining third did not attend college immediately after high school. Similar to coursetaking patterns, college enrollment rates varied by race/ethnicity, as depicted in Figure 11. Asian students had the highest overall college enrollment rate (87%) and the highest 4-year college enrollment rate (61%). Filipino, multiracial, and white students had similar rates of overall college enrollment—about 75%—though there were slight differences in 4-year and 2-year enrollment rates with multiracial students enrolling in college at a rate 4 percentage points higher than Filipino students. About 60% of Black and Latinx students matriculated to college the year after high school graduation, though Black students enrolled in a 4-year institution at a rate 6 percentage points higher than Latinx students. The lowest college-going rates were found among American Indian students (54%), with far more students attending a 2-year college than 4-year college. See Appendix Table A8 for college enrollment rates by student subgroups.

Male high school graduates attended college at a rate 11 percentage points lower than female students and were far more likely to attend a 2-year college; among female graduates that enrolled in college (73%), about half go to 4-year college and half go to 2-year college. Among high school completers, students identified as SED were less likely to enroll in college—a difference of nearly 20 percentage points—and more likely to enroll in 2-year college than their non-SED peers. Likewise, English learners (43%) attended college at a lower rate than non-English learners (69%), though in this case the magnitude of the difference was substantially larger; just 9% of English learners enrolled in a 4-year college the year after high school graduation.

College enrollment patterns also differed by students' performance on the 8th grade SBAC. Students who met or exceeded expectations in both ELA and math had the highest overall college-going rates and the highest 4-year college enrollment rates by a substantial margin. These high-achieving students were also the only subgroup among which a larger proportion attended a 4-year college than a 2-year college. Slightly over 70% of students who met the 8th grade standards in only one subject area enrolled in college immediately following high school; those who met or

exceeded standards in math were more likely to attend a 4-year college than students who demonstrated proficiency in ELA only. Students who failed to meet proficiency standards in either subject area in 8th grade were the least likely to matriculate to college; moreover, students in this group were more likely to enroll in 2-year colleges than 4-year institutions.

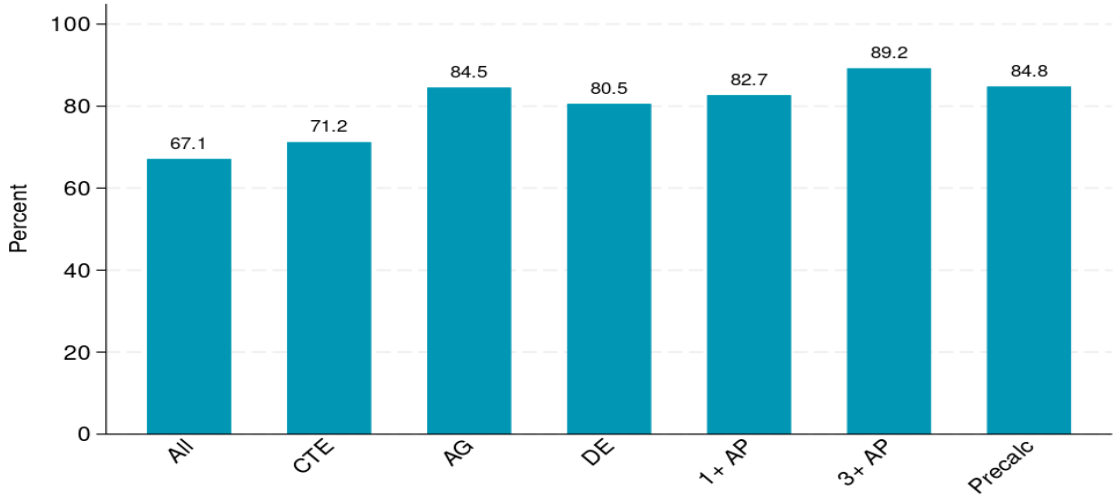
Figure 11. College enrollment rates, by student subgroups



Note. Rates represent the percent of high school seniors enrolled in a California public high school on April 15, 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available. SED = Socioeconomically disadvantaged. EL = English learner. SED and EL statuses determined by the California Department of Education and represent student designations on April 15, 2022. SBAC = Smarter Balanced Assessments. M = math SBAC. E = ELA SBAC. SBAC proficiency levels determined from performance on 8th grade assessments.

The likelihood of enrolling in college after high school graduation increased with participation in one or more of the college and career preparatory coursework. As shown above, the probability that average California public school students enroll in college anytime in the 16 months following high school completion was 67%. Among students who completed the A-G course requirements and/or took any college-level coursework (dual enrollment, AP, advanced math) the probability of college enrollment was over 80% (Figure 12). See Appendix Table A9 for a tabular representation of overall college enrollment by student subgroups and pathway completion. Moreover, these same coursetaking experiences were associated with an increased likelihood of enrollment in a 4-year rather than 2-year college (see Appendix Tables A10 and A11). These descriptive results are not causal; illustrated associations may reflect selection into the preparatory pathways, where students who intend to go to college seek out and participate in coursework that will academically prepare them for the demands of college. Participation and success in preparatory coursework may also open postsecondary pathways for students through various mechanisms, including but not limited to a shift in students' aspirations and goals, increased awareness of postsecondary opportunities and pathways, and greater likelihood of eligibility and admissions.

Figure 12. Conditional probability of college enrollment given participation in college and career preparatory coursework



Note. Rates represent the probability of participation among high school seniors enrolled in a California public high school on April 15, 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available.

CTE pathway completion was also associated with a greater likelihood of college enrollment, though the magnitude of the difference was much smaller and concentrated in 2-year college enrollment. In this case, the increased likelihood of college enrollment among CTE pathway completion was four percentage points more than the probability of college enrollment for all students. Moreover, the difference was primarily driven by 2-year college enrollment, where the CTE pathway completion was associated with about a positive three percentage point difference in the probability of 2-year college enrollment and a one percentage point difference in the probability of 4-year college enrollment.

The relationship between college and career preparatory coursetaking and enrollment in college differed across student subgroups as depicted in Figure 13. Among Asian students, there was little difference in the likelihood of attending when conditioning on college and career preparatory course participation because both participation in all of the various course types and college enrollment were quite high on their own. In contrast, there was a noticeably higher probability of college enrollment when conditioning on participation or completion of college and career preparatory coursework for Black and Hispanic students. Among Black students and Hispanic students, the likelihood of enrolling in college the year following high school graduation was about 60%. For Black students and Hispanic students who completed the A-G course requirements or took a precalculus or higher math course, the likelihood of going to college was closer to 80%. And for students in these same racial/ethnic subgroups who took three or more AP courses, the probability of college enrollment was over 85%.

Similar patterns emerged when examining gender, SED, and English learner subgroups (Figure 14). More specifically, among student subgroups with lower likelihood of attending college in general—male students, SED students, English learners—participation in and completion of college and career preparatory was associated with a larger difference in the probability of attending college than it was for student subgroups with a higher unconditional probability of college attendance—female students, non-SED students, and English proficient students, respectively.

Figure 13. Conditional probability of college enrollment given participation in college and career preparatory coursetaking, by racial/ethnic subgroups

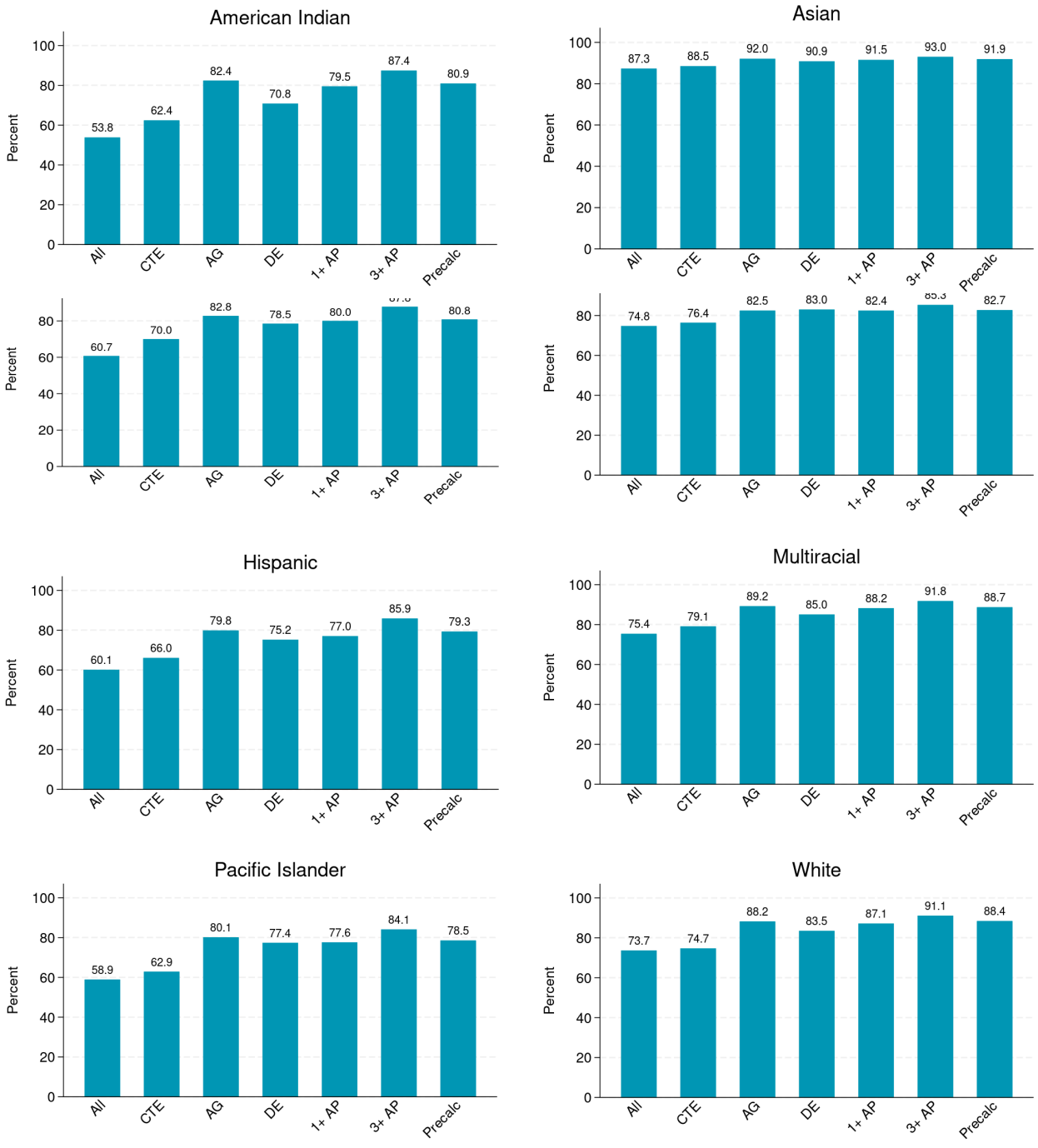
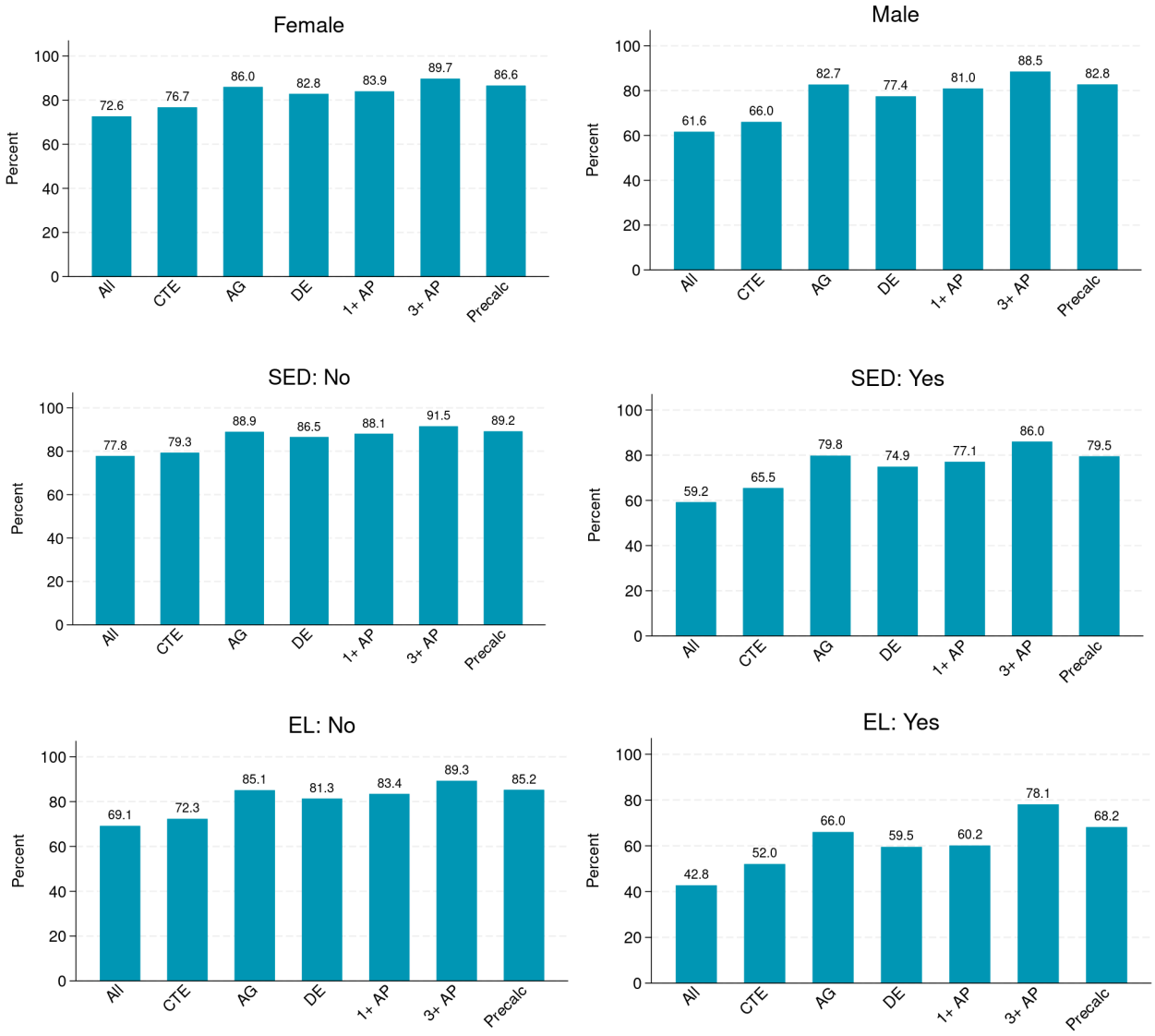


Figure 14. Conditional probability of college enrollment given participation in college and career preparatory coursetaking, by student subgroups

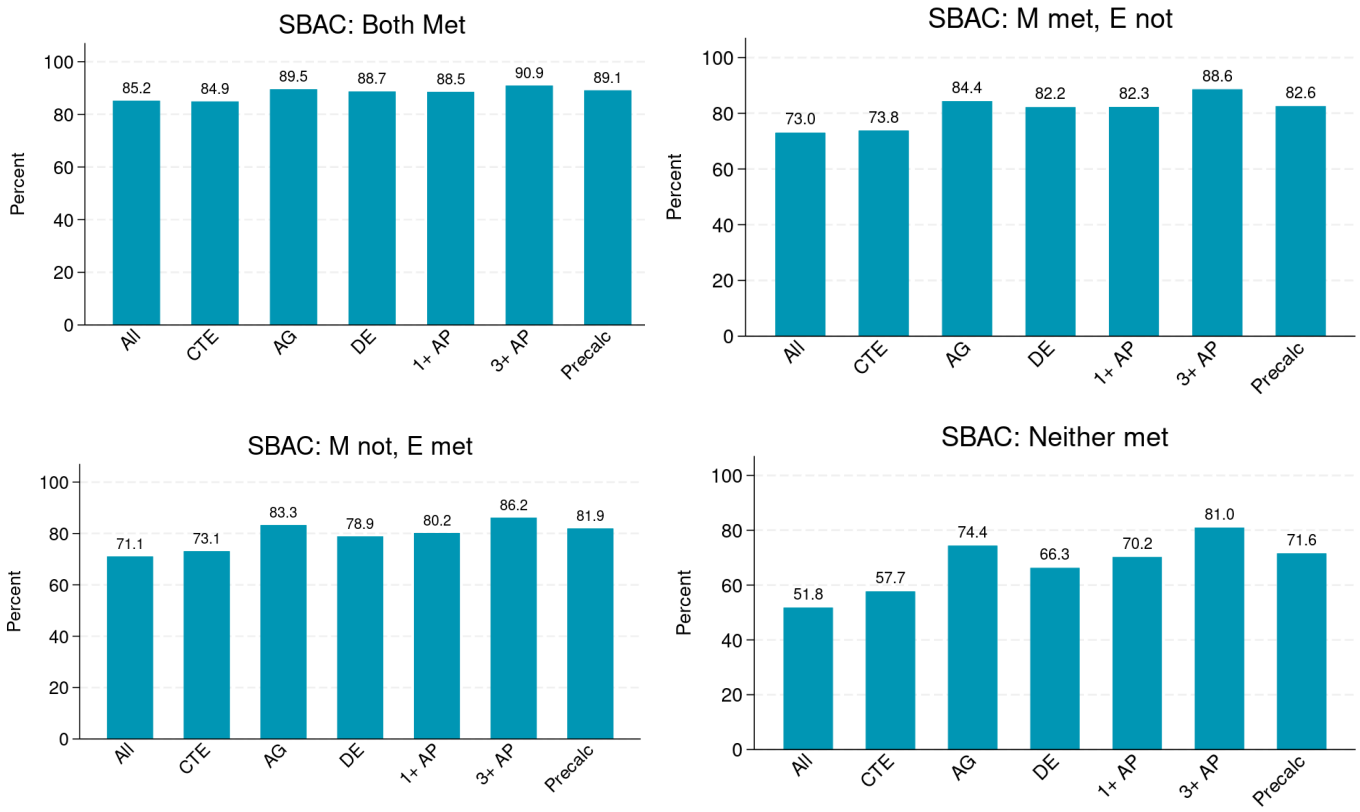


Note. Rates represent the probability of college enrollment among high school seniors enrolled in a California public high school on April 15. 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available. SED = Socioeconomically disadvantaged. EL = English learner. SED and EL statuses determined by the California Department of Education and represent student designations on April 15, 2022.

When considering the likelihood of attending college by academic proficiency in 8th grade, students who met or exceeded the standards in both math and ELA had the highest probability and those who didn't meet standards in either subject area had the lowest probability (Figure 15). Students

who demonstrated proficiency in both subject areas had the highest likelihood of attending college. Conditional on high achievement in earlier grades, as measured by 8th grade test scores, the likelihood of college enrollment did not change substantially when adding college and career preparatory coursework in high school. However, among students unable to demonstrate proficiency in 8th grade who then participated in any number of college and career preparatory coursetaking opportunities, the likelihood of college enrollment increased remarkably. For example, just over half of students deemed not proficient in math and ELA on the 8th grade assessments enrolled in college the year following high school; among these students who then successfully completed the A-G requirements or took multiple AP courses, the likelihood of college attendance increased by over 20 percentage points or nearly 30 percentage points respectively.

Figure 15. Conditional probability of college enrollment given participation in college and career preparatory coursetaking, by academic proficiency in 8th grade



Note. Rates represent the probability of college enrollment among high school seniors enrolled in a California public high school on April 15. 2022 and who completed high school that same year; are included in the CCI accountability cohort in 2021, 2022, or 2023; and for whom 4 years of high school coursetaking data is available. SBAC = Smarter Balanced Assessments. M = math SBAC. E = ELA SBAC. SBAC proficiency levels determined from performance on 8th grade assessments.

While we cannot determine causality from this descriptive analysis, these conditional probabilities illustrate a positive correlation between college and career preparatory coursework in high school coursework and subsequent college enrollment. On the one hand, these figures may simply be telling a story of highly motivated, high-achieving students, where college-intending students engage in numerous preparatory opportunities. In this case, students who plan to go to college work to complete the A-G coursework, and in some cases, engage in college-level courses, to both signal readiness in college admissions processes and to prepare for the academic rigor of college. On the other hand, it may be that one (or more) of these academic opportunities truly opens access to college entry. In this

case, students may be uncertain of their postsecondary plans, and/or do not perform well on state assessments, but engage in and experience success in college and/or career preparatory coursework—either as a result of individual choice or school policies and practices around course placement. These experiences likely illuminate college and career opportunities, pave the way for eligibility, encourage application, and facilitate admissions. Whatever the case, participation in these college and career preparatory opportunities is associated with an increased probability of matriculating to college, and that increased probability is greater among student subgroups with lower rates of college enrollment to begin with (American Indian, Black, Hispanic, Pacific Islander, males, SED, English learners or those unable to demonstrate academic proficiency in 8th grade). This may indicate the powerful potential of high school coursework for broadening access to postsecondary education.

Discussion and Conclusion

This report provides a comprehensive description of coursetaking and college enrollment patterns among California's public high school graduates, synthesizing information that has not previously been presented in an integrated, statewide framework for educators and policymakers. The patterns are clear and consistent. Across A-G course completion, advanced math enrollment, AP coursetaking, and dual enrollment participation, there are striking disparities between racial/ethnic subgroups, SED and non-SED students, and English learners and their non-EL peers. At the same time, academic performance on 8th grade standardized assessments is relatively predictive of college preparatory coursetaking. Participation in these courses, as well as strong performance on the 8th grade standardized assessments, is associated with a greater likelihood of enrolling in college the year following high school.

Coursetaking patterns suggest that many students are interested in attending college. Over half of all high school graduates complete the minimum course requirements necessary to attend a 4-year college in California. Additionally, half of graduates take at least one AP course, 40% take a precalculus or more advanced math course, and a quarter take a community college course while in high school. Aligned with extant literature (Adelman, 1999, 2006; Allen & Dadgar, 2012; An, 2013; An & Taylor, 2019; Lee et al., 2022; Morgan & Klaric, 2007; Speroni, 2011; Woods et al., 2018), the likelihood of enrolling in college after high school graduation increases with participation in college and career

preparatory coursework for California public high school graduates. Over two-thirds of students matriculate to college in the year following high school graduation, though just one-third enter a 4-year institution—far short of the number meeting the eligibility requirements for California public universities. With the exception of CTE, college and career preparatory coursework is associated with an increased likelihood of enrollment in a 4-year, rather than 2-year college. These patterns may be illustrative of college-intending students seeking opportunities to signal readiness ahead of college admissions decisions (Serna, 2020; Spence, 1973) and prepare for the academic demands of college or the mechanisms by which high school coursework opens doors to further educational opportunity (Adelman, 1999, 2006; Allen & Dadgar, 2012; An 2013; Lee et al., 2022).

Even with such mechanisms, inequitable enrollment in A–G, advanced math, AP, and dual enrollment courses signal that there are likely potential structural barriers to college preparatory courses and access to college as a result. In this case, course enrollment is not solely the product of students' preferences, but rather the result of the policies and practices in which students and schools are situated (Attewell & Domina, 2008; Gamoran, 1987; Iatarola et al., 2011; Oakes & Guiton, 1995). Although this report does not test mechanisms to improve equity in educational opportunity or attainment, prior research suggests that differences in course availability, counselor guidance, scheduling, and graduation requirements, among other factors, all shape who ultimately participates in a given course (Clotfelter et al., 2010; Gagnon & Mattingly, 2016; Iatarola et al., 2011; Lantz & Smith, 1981; Lee et al., 1997; Schmidt, 1983). Moreover, evidence in this report suggests that participation in and completion of college and career preparatory coursework is associated with college enrollment, especially for students that historically enroll in college at lower rates, including American Indian, Black, Latinx, and Pacific Islander students; male students; SED students; and English learners.

These findings also illuminate the importance of prior academic performance on high school coursetaking and college enrollment. This underscores the idea that academic preparation prior to high school can shape students' educational trajectories. However clear the pattern, performance on standardized assessments should not be considered deterministic. If prior academic performance is used as a sorting mechanism—through placement policies, prerequisite structures, or counselor recommendations—then 8th grade assessments may function as gatekeepers, reinforcing disparities. An alternative perspective is that performance on 8th grade assessments could serve as an early warning

indicator that prompts academic interventions and support. To this point, evidence here also indicates that participation in college and career preparatory coursetaking opportunities increases the likelihood of college enrollment even among students who fail to meet grade-level proficiency standards on the 8th grade SBAC.

CTE pathway completion patterns are somewhat distinct within college and career preparatory coursetaking; while these rates are lower overall, they are more equitable across student subgroups and the overlap with other advanced coursework is somewhat limited. These patterns suggest that some educators and students may view academic and career-oriented preparation as separate pathways—following historical notions (Ogden, 1990). However, evidence also suggests that CTE is not only an avenue for postsecondary preparation serving less academically-inclined students (Boocheever, 2025). CTE pathway completion is modestly associated with higher rates of college enrollment—approximately four percentage points above the overall average—and is driven primarily by enrollment in 2-year colleges. Together, these findings indicate that CTE participation is compatible with postsecondary enrollment, particularly in community colleges, while remaining less tightly connected to traditional 4-year preparatory coursework patterns.

Moreover, these findings also underscore the role academic labels or ability signals may have on students' coursetaking trajectories, as research suggests that early signals of performance can affect students' future choices (Avery et al., 2018; Papay et al., 2016). In this case, prior academic performance on statewide assessments and early success in college preparatory coursework may influence decisions by students (or their schools and teachers, or both) to enroll in additional, or perhaps more advanced, courses. For example, the labels students receive with their SBAC scores (e.g., meeting or exceeding the standards) may steer students to enroll (or choose not to) in higher level coursework. Similarly, results from conditional probabilities suggest that as students experience success in A-G courses, they may seek opportunities for more advanced courses through AP or dual enrollment. This echoes findings from Avery and Goodman (2022), who found that early academic recognition can influence students' future enrollment decisions, particularly for historically underrepresented students, who were more inclined to enroll in more challenging courses, such as AP Calculus, after being recognized as 'advanced'. In this case, early academic labels and expectations could play a role in bridging enrollment disparities in advanced coursework.

Recommendations

As the present findings further illustrate how critical coursework is for students' educational futures, policymakers, local education leaders, and practitioners may consider the following recommendations for policy and practice in order to ensure students have equal opportunities to access and engage in coursework that sets them up for success on the postsecondary and career pathway of their choosing.

Integrate advanced course options from multiple programs. Findings reveal that students often enrolled in several advanced courses from different programs; for example, many students that participated in dual enrollment also took AP courses (with nearly half taking three or more) and about a third of CTE pathway completers also participated in dual enrollment, among other iterations of course blending. In this case, policymakers and practitioners should explore ways to offer multiple options to students to increase the number of students able to access college and career preparatory coursework. Students may then take the courses that best fit their needs based on availability and content, among other factors. Moreover, course offerings can act as complements (Clayton, 2021), particularly in more rural areas where resource capacity may be a challenge. For example, a rural school may have the space, staff, and student interest to offer AP English, but may refer students to a dual enrollment course taught at the local community college for lab science or another subject (Gagnon & Mattingly, 2016). Strategic course offerings—particularly those that count toward multiple programs (e.g., an A-G approved dual enrollment or CTE course)—can also support students' pathways, potentially offering a leg up into college programs and careers of interest.

Alleviate structural barriers to advanced course enrollment. Given the role advanced coursework plays in students' educational trajectories, it is critical to consider ways in which potential hurdles that may impact students' enrollment can be removed. This includes who is identified or recommended for higher level courses as well as master schedules that can limit students from enrolling in advanced coursework. Enrollment in advanced courses can be constrained by tracking or personnel biases; schools can consider automatic enrollment policies, in which students must opt-out (instead of opt-in) to advanced or higher level coursework. Under these policies, students meeting benchmark proficiency levels on statewide assessments or prerequisite courses are automatically

enrolled in the more advanced class. For example, in Washington, students that meet the state standard in a given subject are eligible for an advanced course in that subject through the state's Academic Acceleration policy. Students are then automatically enrolled into the more advanced course (e.g., AP precalculus instead of regular precalculus), receive information about the benefits of advanced courses, and offered the opportunity to opt-out if desired. In this case, evidence indicates that enrollment increased in advanced courses across subject areas, especially among students who were proficient but previously overlooked for advanced coursework (Austin et al., 2025). Additionally, as scheduling policies can also inhibit or restrict course enrollment, schools may consider optimizing their master schedules to reduce conflicts between courses to widen options for students, particularly those that balance other programs and student activities that take place during the instructional day (e.g., band or orchestra) that may preclude them from advanced course options (Callahan & Shifrer, 2016).

Leverage student-level data for local course decisions. Although this analysis offers a broad view of advanced course participation in California, local educational agencies may consider leveraging district- and school-level data to determine patterns in advanced course enrollment and completion in order to understand which courses to potentially add, expand, or eliminate. This might include identifying the courses that may hinder students from completing the A-G course sequence and adding academic support, or determining whether additional sections may need to be added to the master schedule in order to foster the most opportunity for students to engage with college and career preparatory coursework. In this case, identifying instances of underalignment, in which required courses may not be offered, is critical for students, particularly students of color and lower income students (Rodriguez, 2018). Audits of this type, including those that focus on equity across student subgroups, can be done independently or in partnership with a county collaborative every few years, and could identify the courses that may act as gatekeepers or bottlenecks for students and improve equity in course enrollment and completion more generally (Lee, 2023). As Cradle-to-Career, California's statewide longitudinal data system, is finalized, tracking students' progress and diagnosing ways to improve access and completion at the local level may be an even easier feat in the coming years.

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