Transitions from High School to College

Andrea Venezia and Laura Jaeger

Summary

The vast majority of high school students aspire to some kind of postsecondary education, yet far too many of them enter college without the basic content knowledge, skills, or habits of mind they need to succeed. Andrea Venezia and Laura Jaeger look at the state of college readiness among high school students, the effectiveness of programs in place to help them transition to college, and efforts to improve those transitions.

Students are unprepared for postsecondary coursework for many reasons, the authors write, including differences between what high schools teach and what colleges expect, as well as large disparities between the instruction offered by high schools with high concentrations of students in poverty and that offered by high schools with more advantaged students. The authors also note the importance of noncurricular variables, such as peer influences, parental expectations, and conditions that encourage academic study.

Interventions to improve college readiness offer a variety of services, from academic preparation and information about college and financial aid, to psychosocial and behavioral supports, to the development of habits of mind including organizational skills, anticipation, persistence, and resiliency. The authors also discuss more systemic programs, such as Middle College High Schools, and review efforts to allow high school students to take college classes (known as dual enrollment). Evaluations of the effectiveness of these efforts are limited, but the authors report that studies of precollege support programs generally show small impacts, while the more systemic programs show mixed results. Dual-enrollment programs show promise, but the evaluation designs may overstate the results.

The Common Core State Standards, a voluntary set of goals and expectations in English and math adopted by most states, offer the potential to improve college and career readiness, the authors write. But that potential will be realized, they add, only if the standards are supplemented with the necessary professional development to enable educators to help all students meet academic college readiness standards, a focus on developing strong noncognitive knowledge and skills for all students, and the information and supports to help students prepare and select the most appropriate postsecondary institution.

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As Sandy Baum, Charles Kurose, and Michael McPherson discuss in their article in this issue, the postsecondary education landscape in the United States has changed dramatically over the past half-century.[1] The aspirations and actions of the vast majority of high school students have shifted, with greater percentages of students intending to complete some form of postsecondary education. For example, from 1980 to 2002, the share of tenth graders who aspired to earn at least a bachelor's degree rose from 41 percent to 80 percent, with the largest increase coming from low-income students.[2] Unfortunately, far too many students enter college without the basic content knowledge, skills, or habits of mind needed to perform college-level work successfully. As college-going rates increase, the limitations of the traditional and current structures, programs, and practices designed to promote student success within both secondary and postsecondary education systems and institutions become more visible.

This chapter discusses transitions from high school to college and some of the major efforts under way in states and schools to improve college preparation. It begins with an overview of the problem, including estimates of the number of high school graduates who are not ready for college and the major reasons why they are not. The chapter then explores whether current conceptions of college readiness are adequate and also what it means for students to find the right college "fit." Next, it reviews some of the major interventions designed to improve college readiness, particularly among low-income students: the federal TRIO programs, the Early College High School (ECHS) and Middle College High School (MCHS) initiatives, dual-enrollment programs, California's

Early Assessment Program, and statewide default curricula. Finally, it describes the Common Core State Standards movement and concludes with a discussion of both the need for more comprehensive and systemic reforms and the challenges related to implementing them.

Understanding the Problem

In recent years, roughly 3 million students have been graduating from U.S high schools annually. According to the National Center for Educational Statistics, more than 2.9 million students graduated from U.S. high schools in 2008, the last year for which data are available.[3] A key question is, how many of these students are prepared for college-level work?

College readiness is commonly understood as the level of preparation a student needs to enroll and succeed in a college program (certificate, associate's degree, or baccalaureate) without requiring remediation.[4] While there is no precise way of knowing how many high school graduates meet this standard, the largest nationally representative and continuing assessment of what America's students know and can do in various subject areas—the National Assessment of Educational Progress (NAEP)—suggests that many students are likely falling short. The NAEP determines students' achievement level—basic, proficient, or advanced—based on input from a broadly representative panel of teachers, education specialists, and members of the general public. Students determined to be proficient or advanced have demonstrated a competency over challenging subject matter that would be expected of entering college students, including subject-matter knowledge, application of such knowledge to real-world situations, and analytical skills appropriate to the subject matter. In 2009,

only 38 percent of twelfth-grade students performed at or above the proficient level on NAEP's reading assessment; even fewer, 26 percent, were at or above the proficient level in mathematics.[5]

Other common assessments used to determine college readiness are the ACT and SAT exams, which are typically administered to high school juniors and seniors. In 2012, only 25 percent of all ACT-tested high school graduates met the College Readiness Benchmarks in all four subjects, meaning that they earned the minimum score needed to have a 50 percent chance of obtaining a "B" or higher in corresponding first-year college courses. Fifty-two percent of graduates met the ACT's reading benchmark, 46 percent met the mathematics benchmark, and 67 percent met the English benchmark. Only 31 percent met the benchmark in science.[6] Looking at SAT data, among the high school graduating class of 2012, only 43 percent of all SAT takers met the SAT College & Career Readiness Benchmark, which indicates a 65 percent likelihood of obtaining a "B-" average or higher during the first year of college.[7]

The reasons why more high school graduates are not ready for college are complex and highly dependent upon individual circumstances. The factors are academic and non-academic; schools are able to control some of them but not others, such as family variables and peer influences outside of school. On the academic side, many studies over the past ten years have documented the disconnect between what high school teachers teach and what postsecondary instructors expect with regard to students' preparation for first-year credit-bearing courses in college.[8] High school courses, such as algebra, often teach content such as factoring equations by using

rote memorization of algorithms, rather than engaging students in problem-solving and critical-writing exercises that develop both deeper knowledge of the content and the more general logical and analytical thinking skills valued at the postsecondary level.[9] Most public high schools offer at least one Advance Placement (AP) or, less commonly, one International Baccalaureate (IB) course. These courses are designed to be more rigorous than a standard high school course and to foster the critical thinking skills expected of college students. That said, the College Board, which administers the AP program, reports that only 30 percent of 2011 public high school graduates participated in AP courses and only 18.1 percent succeeded in scoring 3 or higher ("qualified" to receive college credit or placement into advanced courses) on at least one AP exam.[10]

The decentralized nature of education in the United States—in which states delegate authority to more than 15,000 local school districts to design and direct programs of instruction—may partly explain the variation in what high schools offer and how well they prepare students for college.[11] In the 2010–11 academic year, more than 49 million students were enrolled in public elementary and secondary schools.[12] The key characteristics of those schools show disparities by race and ethnicity and by poverty level. For example, 60 percent of Asian/Pacific Islander and just over half of white high school freshmen attended schools in which the counselors reported that the primary goal of the school guidance program was to help students prepare for college. In contrast, only 44 percent of black freshmen, 41 percent of Hispanic freshmen, and 29 percent of American Indian/Alaskan Native freshmen attended such schools.[13] White and Asian students are more likely to attend low-poverty schools,

while American Indian/Alaskan Native, black, and Hispanic students are more likely to attend high-poverty schools. In 2007–08, approximately 91 percent of twelfth-graders in low-poverty schools graduated with a diploma, compared with 68 percent of twelfth-graders in high-poverty schools (based on eligibility for free or reduced-price lunch).[14] In that same year, 52 percent of high school graduates from low-poverty schools attended a four-year postsecondary institution, compared with about 28 percent of graduates from high-poverty schools.[15] Unfortunately, current disparities could grow, given recent budget cuts to all levels of education—primary, secondary, and postsecondary—that are likely to affect low-income students the most.[16]

As noted, nonacademic factors also affect college readiness. Students' families play an important role in setting expectations and creating conditions—from overseeing completion of homework assignments to encouraging a variety of learning opportunities outside of school—that make it more or less likely that students will be prepared for college. Not surprisingly, research shows that students whose parents have gone to college are more likely to attend college themselves.[17] Students are also influenced positively or negatively by the people they encounter at school and in their community. Patricia Gándara and Deborah Bial, for example, state that many students face impediments such as limited cultural supports, community resources, and peer supports, as well as racism, ineffective counseling, and limited networking opportunities with people who have succeeded in college.[18] Finally, college readiness can be influenced by noncognitive skills that differ at the individual level and may be related to both schooling and family background. Arthur Costa and Bena

Kallick coined the term "habits of mind" to describe a series of intelligent behaviors that would help people be better problem solvers and thus have more success in their lives.[19] David Conley refines the concept to describe the habits of mind necessary to succeed in college including critical thinking, an inquisitive nature, a willingness to accept critical feedback, an openness to possible failure, and the ability to cope with frustrating and ambiguous learning tasks.[20]

Are Current Measures of College Readiness Adequate?

With larger proportions of underserved student populations going to college, traditional indicators of academic preparation such as the SAT and ACT have come under fire. Critics are concerned that wealthier students have better opportunities to prepare for such tests, that the tests do not measure what is learned in the classroom, and that the tests are not strong predictors of how students perform in college.[21] In addition, the large numbers of students who plan to attend community college generally do not take the SAT or ACT because these tests are not required for admission. Community colleges do use standardized tests after matriculation, such as the ACCUPLACER and COMPASS, to determine if students need to take remedial education in English language arts and mathematics and then to place students in the appropriate courses. As noted in the article in this issue by Eric Bettinger, Angela Boatman, and Bridget Terry Long, these tests also have been found to be poor predictors of how students will perform academically.[22]

Frustrations with the limitations of standardized tests, together with new thinking and research on what it means to be prepared for college or a job right out of high school (commonly referred to as "college and career

readiness"), have led to efforts to develop new and more comprehensive measures. The Educational Policy Improvement Center (EPIC), Georgetown's Center on Education and the Workforce, the Association for Career and Technical Education, ConnectEd: the California Center for College and Career, the Conference Board, the National Association of State Directors of Career Technical Education Consortium, the Secretary's Commission on Achieving Necessary Skills, and Assessing and Teaching 21st Century Skills are among the groups and organizations that have developed new college and career readiness standards.[23] These standards include not only the English language arts and mathematics necessary for entering first-year college students to take college-level credit-bearing courses but other competencies as well. For instance, some focus on twenty-first-century expectations. While these standards vary depending on the organization that developed them, they generally focus on quantitative STEM (science, technology, engineering, and mathematics) knowledge and skills; technical content (this area applies to preparation for career and technical education courses and includes a range of career-specific knowledge and skills); broad transferable skills (such as productive dispositions and behaviors); habits of mind; and preparation for civic life (such as knowledge of the democratic process and civic engagement).[24] These categories are not mutually exclusive, and views differ about what each category comprises and how much weight each component in a category should carry. In addition, there is no consensus about whether college and career readiness are different and, if so, how they differ. If they are different, the concern is how schools can avoid curricular tracking by ethnicity and income levels. Moreover, if college and career readiness are different, it is not

clear whether a single framework can support opportunities for students to be ready to succeed at all postsecondary institutions and within all workforce opportunities. Finally, although these broadened definitions of college readiness are intriguing, it is unclear whether and how these notions may be incorporated into state educational policies or the assessment practices of typical high schools or school districts.

Finding the Right College Fit

A corollary to determining college readiness is the importance of helping students to find the right institutional fit, particularly for students from low-income families or families that do not have experience with college. "Fit" includes aspects of a postsecondary institution such as its cost, location, size, student-faculty ratio, counseling and advising services, student body composition (for example, institutions that primarily serve students from a particular racial, ethnic, or religious background, or single-gender institutions), and areas of study offered or special areas of focus.[25] Many traditionally underserved students often do not have the option to matriculate farther away than the closest community college or broad-access university because they need to stay close to home to contain costs or help their family. In addition, all students, but particularly students who are traditionally underrepresented in college, often do not know enough both about themselves and their future goals and about postsecondary institutions to analyze institutional fit.[26]

An issue closely related to choice and fit is the tendency for some students to attend colleges that are less selective than those they are qualified to attend. This phenomenon, known as "undermatching," refers to students who meet the admissions criteria for high-ranking

colleges and universities based on test scores, rigorous course taking, and grades but who instead go to less selective four-year colleges, two-year colleges, or no college at all.[27] Available research findings suggest that undermatching is particularly a problem for students of color and from low-income families. A descriptive study that used case studies to examine how social class and high school guidance operations interact to influence high school students' educational aspirations found that female students, African American students, and students from low-socioeconomic backgrounds are most likely to undermatch.[28] Analyses of longitudinal data suggest that students who undermatch are significantly less likely to graduate. In their study of sixty-eight public colleges and universities, including twenty-one flagship institutions in four states, William Bowen and colleagues found that students who attended the most selective colleges for which they were academically qualified were more likely to graduate than were similar students who undermatched by enrolling in colleges for which they were overqualified.[29]

These findings, together with the well-documented pattern of students from middle- and upper-income families attending four-year institutions, while low-income students are concentrated in two-year community colleges, reflect major weaknesses in the college-choice process for many students, especially minority and low-income students.[30] The inequalities in college-going and success rates by ethnicity and income groups are stark. As of 2010, 60.5 percent of the college population was white non-Hispanic students, compared with 14.5 percent black students and 13.0 percent Hispanic students.[31] Moreover, in 2009, only 55 percent of high school graduates from the lowest family income quintile enrolled

in college immediately after high school, compared with 84 percent of those from the most affluent families and 67 percent from middle-income families. These inequalities have helped to drive the growth of precollege outreach programs and large-scale interventions and reforms.

Interventions Designed to Boost College Readiness

A variety of programs are now available to help boost the college readiness of today's high school students. Current interventions and reform efforts use a range of strategies to attempt to address a wide variety of student needs regarding college readiness. Strategies range from academic preparation to psychosocial and behavioral supports and the development of appropriate habits of mind (such as organization, anticipation, persistence, and resiliency). While each intervention tends to focus on a distinct group of students and to emphasize different aspects of college readiness, there is considerable overlap in the strategies these efforts use in helping students have access to, be prepared for, and succeed in postsecondary schooling. In this section, we discuss some of the better-known programs; their strategies are summarized in table 1.

Federal TRIO Programs

Since 1965, an estimated 2 million students have graduated from college with the special assistance and support of federal TRIO programs, such as Upward Bound and Talent Search, which provide outreach and student services to individuals from low-income backgrounds, those with disabilities, and those who are first-generation college-going to help them successfully navigate their educational pathways from middle school through post-baccalaureate programs.[32] Upward Bound academic preparation provides

Table 1. Strategies Used by Selected College Readiness Interventions and Reforms

Intervention reform strategy	Areas of student need					
	Better academic preparation	Increased psychosocial and behavioral support	Greater exposure to college	Better information about college and financial aid	Better alignment between high school and college assessment and curricula	Development of appropriate habits of mind
TRIO						
Upward Bound	✔	✔		✔		✔
Talent Search		✔	✔	✔		
GEAR UP	✔	✔	✔	✔		✔
Early College High School and Middle College High School	✔	✔	✔	✔	✔	✔
Dual Enrollment	✔		✔		✔	
Early Assessment Program	✔					✔
Default curricula	✔					✔

Source: Authors.

participants with instruction in mathematics, laboratory sciences, composition, literature, and foreign languages. It also offers academic and social support through tutoring, counseling, mentoring, cultural enrichment, and work-study programs, and provides education to improve the financial and economic literacy of students. Talent Search provides students and their parents with information about college admissions requirements, scholarships, and financial aid. It also provides social support through counseling and helping students understand their educational options. Upward Bound and Talent Search both include services designed for disconnected student groups, such as students who drop out of high school, students who have limited English proficiencies, students from groups that are traditionally underrepresented in postsecondary education, students with disabilities, homeless students, and students who are in foster care or are aging out of the foster care system.

Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP), a federal program established by Congress as part of the 1998 reauthorization of the Higher Education Act, provides six-year grants to states and to partnerships (among local elementary and secondary schools, institutions of higher education, and community organizations) to serve cohorts of students attending high poverty schools beginning no later than the seventh grade and following them through high school. In contrast to programs such as Upward Bound that focus on academic preparation, GEAR UP programs take a more systemic approach by providing college scholarships, academic support services and counseling, and college-related information. They also attempt to work with the parents and families of the students.

Funding for these programs, however, is inadequate to reach all the students in need of them. In 2011, 951 Upward Bound programs served more than 64,000 students

nationwide, and more than 300,000 students in grades six through twelve across the nation were involved with Talent Search.[33] In 2010, Congress appropriated more than $300 million for GEAR UP, which served 748,000 students through 42 state grants and 169 partnership grants.[34] Despite the large number of students being served by these programs, not all eligible students are being reached. According to the Council for Opportunity in Education, 11 million students are eligible for and need access to services through TRIO programs, but federal funding is sufficient to serve less than 7 percent of those eligible students.[35]

Middle College and Early College High Schools; Dual Enrollment

The most comprehensive of all the efforts discussed here are Middle College High Schools (MCHSs) and Early College High Schools (ECHSs). These are small schools (the average size is around 250 students) that serve students historically underrepresented in college populations and that aim to coordinate student services, decrease repetition in curriculum, make college attainable, and eliminate the need for remediation. The first MCHS opened in 1974 at LaGuardia Community College in New York; there are now 40 MCHSs across the United States.[36] The ECHS Initiative, which builds off the MCHS model and is supported by the Bill and Melinda Gates Foundation, includes approximately 270 schools serving more than 75,000 students in 28 states.[37] Both models attempt to create strong college-going cultures throughout each school and to partner with colleges to provide dual-enrollment opportunities, college visits, and other connections with postsecondary education. Dual-enrollment courses are college-level courses, taught either in high schools or colleges, for which high school students receive both high

school and college credit. Typically, high school and college faculty work together to ensure that curricula and instruction within the high school align well with credit-bearing college-level coursework. Some ECHSs and MCHSs work with feeder middle schools to begin this "scaffolding," or alignment, of curricula and instruction in earlier grades. Another difference from most large comprehensive high schools is that ECHSs and MCHSs try to provide students with a full range of support services, including advisory classes, college counseling, peer support, psychosocial and behavioral supports, and career experience opportunities for all students.[38]

Dual-enrollment programs also provide opportunities for high school students to take college-level classes and earn both high school and college credit but without the additional supports of the MCHC and ECHS models.[39] Historically, dual-enrollment programs have been offered in highly resourced high schools with large percentages of students who matriculate into college. Increasingly, however, dual enrollment is being offered in high schools serving high-need populations. Students do not pay for the dual-enrollment courses, so they can accumulate free college credit in high school and potentially shorten the time it takes to complete a degree once they matriculate, therefore accelerating their progression from high school to and through college. A critical issue is that the standards for dual-enrollment courses must remain college level.

The U.S. Department of Education reports that as of 2005, 98 percent of community colleges and 77 percent of public four-year colleges were participating in dual-enrollment programs.[40] Most of these programs serve a relatively small number of students at specific

school sites, however. Thirty-eight states have policies that allow for dual enrollment, but some states will not allow both high schools and colleges to receive funding for the same course. Postsecondary faculty members teach some dual-enrollment courses, while others are taught by high school teachers who have completed training at the postsecondary institution that is providing the college credit. The kinds of courses offered through dual enrollment also vary a great deal. Some institutions provide access to any course requested by the participating high schools students, while others limit course options based on available sections and other factors. A growing number of dual-enrollment courses are in career and technical education.[41]

State-Level Reforms

More recently, various state-level reforms have emerged that address specific areas of college readiness through key leverage points within a state system. A growing number of these programs focus on students' academic preparation and better alignment between high schools and colleges in the curricula and assessment tools they use. One example is the implementation (typically statewide) of default curricula, which attempt to eliminate tracking in which some high school students complete a college preparatory curriculum while others complete a set of courses that does not prepare them well to succeed in education or training past high school. Instead, these states are requiring all high school students to enroll in coursework that aligns with postsecondary entrance requirements. By 2015, at least twenty-one states and the District of Columbia will have default curriculum requirements in place; these typically call for four years of English and mathematics and at least three years of science or social science, or both.[42]

Another state-level reform effort receiving attention is California's Early Assessment Program (EAP), a collaborative effort that started in 2004 among the state board of education, the California Department of Education, and the California State University system. The EAP provides an assessment of college readiness in English and mathematics for one system of higher education in California (the state universities) to help students prepare for placement exams before they enroll in college and thus avoid the need for remediation once they reach college. The EAP uses students' scores on California's eleventh-grade assessment as indicators of students' readiness for college-level work in the state university and community college systems. Incoming high school seniors receive notification in August before their senior year about their level of readiness and the courses they can take to improve their academic preparation. Students who score high enough on the EAP (or on the SAT or ACT) are exempt from taking postsecondary placement tests and can go right into college-level courses.[43]

Evidence on Effectiveness

Although they employ a range of strategies, these programs all share the same aim: to increase the rates at which participants complete high school and enroll in and graduate from college. Rigorous evidence regarding the effectiveness of these postsecondary readiness reforms is relatively small, however. As a result, we focus on results from those studies that used the most rigorous methods available. To begin, we discuss two TRIO programs focused on connecting high school students from low-income and first generation college-going families to college—Upward Bound and Talent Search; we then present findings on GEAR UP. We also summarize research on MCHCs and ECHSs to provide

information and evidence about systemic approaches, but evaluations of systemic reform efforts tend to be less rigorous, both because a control or comparison group is not easy to construct and because methodologically sound evaluations are often unaffordable for small-scale precollege outreach programs.[44]

From a methodological perspective, experimental design is particularly useful when addressing evaluation questions about the effectiveness of programs or other interventions, because it provides the strongest data possible about whether observed outcomes are the result of a given program or innovation. Experimental designs include the random assignment of students either to a treatment group, which receives the intervention, or a control group, which does not. Any variation in outcomes may be attributed to the intervention.[45] When it is not feasible to assign participants randomly to treatment and control groups, researchers may use quasi-experimental designs, including regression discontinuity, difference-in-difference, interrupted time series, and propensity score matching. Regression discontinuity is differentiated from the other quasi-experimental designs because researchers maintain control over the treatment; participants are assigned to a program or comparison group on the basis of a cutoff score on a preprogram measure.[46]

Evaluations of Upward Bound, Talent Search, and GEAR UP have yielded mixed findings on the programs' impact on the high school courses participants take—the number one predictor of college readiness.[47] Results on longer-term outcomes for Talent Search have been more positive, however. For example, two quasi-experimental studies of Talent Search in Texas and Florida that

included about 5,000 Talent Search participants along with a comparison sample of more than 70,000 students created through propensity score matching report positive effects on high school completion and college enrollment. In both cases, Talent Search participants completed high school at a significantly higher rate (86 percent in Texas; 85 percent in Florida) than did comparison group students (77 percent in Texas; 70 percent in Florida).[48]

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In contrast, findings for postsecondary enrollment and completion were more mixed for Upward Bound participants. Mathematica Policy Research conducted a randomized assignment study with a nationally representative sample of sixty-seven Upward Bound projects hosted by two- and four-year colleges and universities. Researchers found that the program had no detectable effect on the rate of overall postsecondary enrollment, the type or selectivity of the postsecondary institution attended, or the likelihood

of earning a bachelor's or associate's degree. However, the program was found to have positive effects on postsecondary enrollment and completion among the subgroup of students with lower educational expectations upon entering the program, that is, the students who did not expect to complete a bachelor's degree. The study also found that longer participation in Upward Bound was associated with higher rates of postsecondary enrollment and completion.[49] It appears that a key strength of the program is positively influencing students' educational expectations. Findings from the first phase of the Mathematica study found that, in general, program participants had higher expectations related to educational attainment.[50]

To date, no large-scale study has tracked GEAR UP participants to the point of high school graduation; however, across three quasi-experimental studies of GEAR UP (using a sample of eighteen middle schools and eighteen matched comparisons), GEAR UP participants generally showed modest but positive outcomes related to academic performance by the end of eighth grade.[51] The studies also found positive outcomes for tenth-grade participants related to academic performance, course-taking patterns, and college plans.[52] Despite these intermediate student outcomes, most differences between GEAR UP participants and comparison groups were not statistically significant on outcomes related to overall academic performance, odds of being college-ready in English or reading, and taking the core high school curriculum or having plans for college.

Very few rigorous studies have evaluated the impact of the ECHS and MCHS models on college readiness outcomes, and findings from studies that have been conducted are mixed. A randomized trial on the impact of North Carolina's ECHS model on ninth-grade student outcomes found that, compared with control-group students, a higher proportion of ECHS students were taking core college preparatory courses and succeeding in them; the difference was substantial and statistically significant.[53] In terms of high school graduation and college enrollment and success, a randomized controlled trial of 394 students in the Seattle Public Schools (in which a lottery was used to place students into MCHSs or regular high schools), found minimal, nonstatistically significant effects of the MCHS on students' staying in and completing school. Specifically, 36 percent of the MCHS students dropped out of school, compared with 33 percent of control group students; and 40 percent of the MCHS students earned a high school diploma or GED (General Educational Development) certificate two years after random assignment, compared with 38 percent of control group students.[54]

To date, the studies evaluating the impact of ECHSs and MCHSs on college outcomes have been primarily descriptive. While the findings look positive, they may also be overly optimistic given the likelihood that those participating in the programs may have done better than the comparison group even without participating in the program. Both models appear to increase the rate at which participants take college-level courses and earn credits while in high school, but participants' longer-term success once in college may be less promising. A documented issue is a decline in ECHS and MCHS students' academic performance over time, particularly when they transition from high school to college. A longitudinal, descriptive study of a 2006–07 cohort of ECHS students found a decline in grade point average (GPA) over time; in particular, as the students moved

from twelfth grade to the first year in college, the average student GPA dropped from 2.63 to 2.48.[55] In addition, the credits that the students in these models earned in high school may not transfer once they enroll in college; thus, these students are not earning college credit free of cost to them.[56] The decline in student outcomes once they are out of the "high expectation and high support" environment has implications for future high school reform efforts and for the role of the postsecondary system in supporting students once they matriculate.

To date, no randomized trials have been conducted on the effects of dual enrollment. A series of five state case studies has provided descriptive evidence that dual enrollment is an effective strategy for helping students make a better transition to college and to persist in college once they are there, particularly for lower-income students and for males.[57] Recently, the Community College Research Center (CCRC) published findings from a three-year evaluation that tracked outcomes for thousands of students in career-focused dual-enrollment programs in California. The study found that students who completed dual courses were more likely to graduate from high school, enroll in a four-year postsecondary institution, and persist in college. They were less likely to be placed into developmental education, and they earned more college credits than did comparison students.[58] Similarly, research by the CCRC at the City University of New York (CUNY) found that students who completed one or more CUNY dual-enrollment courses earned more credits and had higher grade point averages than did students who did not complete such courses. The study controlled for demographic and academic achievement factors and had a large sample size (almost 23,000 students), thus increasing

the researchers' ability to estimate program effects.[59] Because the CCRC studies did not use a random assignment design, they cannot control for motivation or other unmeasured differences between dual-enrollment students and those in the comparison groups.

As for statewide programs, a quasi-experimental study of the California EAP with a treatment-comparison design found that the program reduced students' need for remediation by 6.1 percentage points in English and 4.1 percentage points in mathematics.[60] However, several variables are at play once students get an EAP score at the end of the junior year, including the availability of high-level English and mathematics courses during the senior year. In theory, if students have access to these courses, their need for remediation will likely decrease. But lack of resources and training for teachers who teach the on-site courses makes this access less of a reality for many students across California.[61]

Christopher Mazzeo and his colleagues at the Consortium on Chicago School Research studied a Chicago public schools reform that required a default curriculum for all students entering ninth grade in 1997 or later. The researchers compared students' outcomes in English, mathematics, and science before the policy was implemented with outcomes afterward. They found that students were more likely to earn college preparatory English and mathematics credit by the end of ninth grade after the policy than before it, but test scores did not increase. Grades declined for "lower-skilled" students, and those students were significantly more likely to fail their ninth-grade mathematics or English courses. Absenteeism increased among students with stronger skills in both subjects, and students were no more likely to take the most rigorous mathematics

classes. Finally, the policy shift was found to have negative effects on high school graduation and postsecondary enrollment rates. Students who earned a B or better were less likely to go to college after the reform than before the reform.[62] The researchers posited that the schools that have traditionally offered the most rigorous courses might be the ones that have the best capacity to teach them; spreading those requirements to other schools without the right capacity-building opportunities might result in ineffective curricula and pedagogy. Default curricula reforms typically are not accompanied by changes in school- and classroom-level capacity or by instructional reforms.[63]

Summary of Lessons from the Intervention Studies

Given the range of major reform efforts in place in primary and secondary schools to help more students become college-ready and the equally varied level of evidence available on each, it is difficult to isolate individual strategies that are more or less effective. Looking across the spectrum of efforts and research, however, the strengths of specific interventions appear to lie in their ability to target subgroups of students (for example, Upward Bound students with low educational expectations), to offer thorough support in specific areas (Talent Search participants were more likely than nonparticipants from similar backgrounds to be first-time applicants for financial aid),[64] and to provide prolonged support (longer program participation in Upward Bound is linked to positive outcomes). The length of time spent in certain programs seems to be a crucial factor in increasing students' postsecondary enrollment and completion. Research on California's EAP highlights the need for building capacity in classrooms and schools and surrounding supports such as instructional reforms

in order to make meaningful improvements in college readiness.[65] And while ECHS and MCHS models appear to increase the rate at which participants take college-level courses and earn credits while in high school, the longer-term success of these students once in college appears less promising.

"It should not be surprising," concludes an influential federally funded descriptive study of precollege outreach programs, "that these early intervention programs appear to have little influence on academic achievement. They tend to be peripheral to the K[kindergarten]-12 schools. They augment and supplement what schools do, but do not fundamentally change the way schools interact with students."[66] Current changes in federal and state policies attempt to reform how high schools provide opportunities for students to learn high-level content, aligned with college and career expectations, in a way that is integrated within the school day for all students (as opposed to programs for a small proportion of students). There is also increasing awareness in the field that students need more psychosocial and behavioral supports.

While resource limitations can affect the extent to which different interventions can be integrated to create a more comprehensive approach, over the past ten years, interest has been growing in finding more widespread systemic and holistic approaches to college readiness. The Common Core State Standards, discussed next, are being implemented in most states but focus primarily on academic knowledge and skills; examples of more systemic approaches include college-preparatory charter schools such as Alliance College-Ready Public Schools, Aspire Public Schools, Green Dot Public Schools, High Tech High, and KIPP Public Charter Schools.

Systems Reform and the Common Core State Standards

In an effort to create more consistency nationally, and to align expectations across high schools, colleges, and entry-level workforce opportunities, the National Governors Association and the Council of Chief State School Officers are leading the Common Core State Standards (CCSS) Initiative. The initiative embodies a set of goals and expectations in English language arts and mathematics designed to align with college and career readiness by the end of twelfth grade.[67] To date, they have been adopted by forty-five states and three territories.[68] Many current school accountability systems focus on the educational floor for high school graduation (minimum academic standards), not the ceiling (postsecondary readiness), but those systems will need to change to align with the CCSS. Because states are currently in the process of implementing the CCSS, there is no evidence yet regarding the effectiveness of the strategy, although states have been experimenting with standards-based reforms since the 1990s.

The CCSS initiative is intended to provide a framework for the development and implementation of more detailed curricula.[69] The goal is to move schooling more in the direction of greater cognitive challenges for students and clearer focus on key content. The standards aim to help students increase communication and critical thinking skills and learn deep content knowledge. Because standards alone will not shift student learning, the success of the CCSS depends on how they are implemented and whether the assessments are summative, formative, or both. Supporters intend the CCSS to have the potential, for example, to enable teachers to focus less on lectures and more on

coaching and facilitation, to help students take greater responsibility for their learning, to increase rigor in core subject areas, to help students learn how to construct arguments and critique others' reasoning, and to move away from rote memorization (what and when) toward a deeper understanding of why and how.[70]

The CCSS initiative acknowledges that college readiness requires students to go beyond rote memorization and to learn not only key content knowledge but also to develop skills around such abilities as effective analysis, communication, interpretation, and synthesis of information. The standards, however, are structured entirely around core subject areas at a time when increasing attention in policy and research circles is being focused on habits of mind related to college readiness, and those are not explicitly included in the CCSS.[71]

It is too soon to know if efforts to use college and career readiness standards to drive improved opportunities for high school students will make a difference in the percentage of students who succeed in postsecondary education. It is not known if these new tools can be implemented successfully at the desired scale, or if they will do a better job of teaching students about—or helping them attain—college readiness. Many questions remain: If postsecondary readiness and career readiness are the same, do broad similarities in the knowledge and skills necessary hold true across all fields and job types? If they are different, how can schools provide opportunities for students to become college- and career-ready, while affording all students the opportunity to explore their options and not end up tracked in a particular area?

More generally, many state-level officials are concerned that current budget constraints will impede states' abilities to support the kinds of professional development opportunities and other supports necessary for schools and educators to successfully implement the CCSS. A 2012 survey of deputy state superintendents of education by the Center on Education Policy found that twenty-one states are experiencing challenges in having the resources necessary to implement the CCSS and that twenty states are worried they will not have enough computers for the CCSS-aligned assessments scheduled to be ready in 2014.[72]

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Conclusion

Given the implementation of the CCSS, the next few years are a critically important period in which to advance public discourse on college readiness. Capacity building for states, districts, schools, and educators is paramount to ensure that the new standards drive significant changes in what and how students learn and that the changes are aligned with postsecondary expectations.

The changes must go beyond teaching and learning in core subject areas. In addition to directly supporting academic preparation for students, capacity-building efforts need to focus on ensuring that large comprehensive high schools have strong college-going cultures, on providing the necessary professional development for educators to help all students meet college readiness standards, on supporting the development of strong habits of mind for all students, and on providing students with the information and supports to help them select the most appropriate postsecondary institution. Across the country, precollege outreach programs of all sizes are working on one or more of these issues, but the scale of those combined is small relative to the need.

Primary and secondary schools usually function in a different system from postsecondary institutions, with different leaders, priorities, incentives, accountability mechanisms, financial systems, data systems, norms, academic expectations, ways to measure progress and success, and pedagogies or instructional strategies. The separation between the two levels might have made sense decades ago, when the majority of students who went to college had the most "college knowledge"—the best abilities to navigate college academically, financially, socially, and psychologically. But today that separation contributes to the exacerbation of inequalities for a large and growing proportion of college students.[73] The CCSS should help bridge that divide. But to effectively connect the primary and secondary systems to the postsecondary education system and ensure that students are receiving the opportunity to prepare well for some form of postsecondary education, greater consensus is needed about what it means to be college- and career-ready, and higher education needs to play a more active role in reform

efforts. Currently, that role with regard to the implementation of the CCSS is unclear.

It is also not clear how a set of high-level standards will drive the kinds of capacity building, instructional change, and development of student supports writ large that will be required to move the needle on postsecondary readiness and success. Nor is it clear what the educational context that surrounds the CCSS will look like—will the focus in high schools be primarily on core academics? Will it include applied pathways that connect with postsecondary programs of study? Will primary schools be able to provide supports around the development of habits of mind, given that those behaviors and understandings need to start to develop before high school?

If the CCSS initiative is to help schools prepare larger numbers of students for postsecondary education, the new standards will need to be implemented with strong scaffolding—connecting curricula and instruction up and down the system—so that educators are able to provide the appropriate college readiness opportunities for students. The instruction will need to be supplemented by, or integrated with, the kinds of supports and other interventions currently offered by strong precollege outreach programs and school reform models. Currently, there are no national or state standards for capacity building, student supports, or the development of habits of mind. Given the complex issues involved in helping a larger percentage of students become ready for, and succeed in, some form of postsecondary education, perhaps it is time to consider how those activities can be supported in schools and integrated into the implementation of the CCSS.

Beyond standards, other widespread efforts to help students better navigate the divide between secondary and postsecondary education, such as dual enrollment, point to the challenges inherent in cross-system initiatives, as well as to opportunities to better connect the resources and knowledge within both secondary and postsecondary systems. Central to these streamlining efforts are considerations of how best to address the full range of student needs, including integrating academics with comprehensive support, so that students are prepared to be successful in college. The research, although limited, on federal intervention programs highlights the importance of length of time in a program for student outcomes related to credit accrual, high school graduation, and college enrollment. Looking for ways to leverage funds to extend the length of these programs and to target and involve students earlier would be worthwhile.

Consistent with the nation's history of decentralized control of education, no one reform model or intervention will work in every school or meet the needs of all students. While great variation in approaches and implementation strategies will no doubt continue, the field would benefit from a more comprehensive and consistent method for learning what works across different types of reforms—for example, using similar definitions and metrics—to help clarify what is transportable, effectively, across different contexts and scaling needs. Finally, it seems likely that to support postsecondary readiness for more students, reforms should take a systemic, comprehensive approach to provide students with both academic and nonacademic resources and opportunities.

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