Improving College Readiness: A Research Summary and Implications for Practice

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Executive Summary

Given the importance of a college degree for both individual and societal economic prosperity, policymakers and educators are focused on strengthening the path to college beyond college entry. In this report, we synthesize the existing literature on four factors key to educational attainment—aspirations and beliefs, academic preparation, knowledge and information, and fortitude and resilience—and the implications of each.

- *Aspirations and beliefs*—the belief that college is possible and integral to educational success. By establishing strong college-going cultures, positive role models, and practices that extol and encourage a growth mindset, schools can promote college aspirations and college identity from an early age, an important precursor to cultivating self-efficacy.

- *Academic preparation*—the skills one develops in order to engage with college-level work are dependent on a student's course of study. While students typically self-select into a course of study, many structural dimensions constrain this choice, resulting in persistence inequality in educational pathways. Current efforts have focused on addressing disparities in curricular offerings, particularly in college gateway courses, but more work is needed to address differences among schools in academic rigor and disparate access to advanced coursework within schools.

- *Knowledge and information*—information is key to decision-making in the college-going process; however, students from low-income backgrounds and those who are the first in their families to attend college tend to have less access to quality information. To remedy this, information interventions have been particularly effective, but studies have also shown notable differences among schools in their efforts to guide students through the steps for collegiate access and success.

- *Fortitude and resilience*—an intrinsic set of social-emotional competencies and self-management skills necessary for individuals to engage more fully with academic content, navigate college and workplace processes, and persist through challenges. Although difficult to measure and disentangle the direct impact of these skills, research coalesces on their importance for future success and small-scale interventions show promise in their development through authentic pre-collegiate experiences, such as college-level courses, capstone projects, and internships, among others.

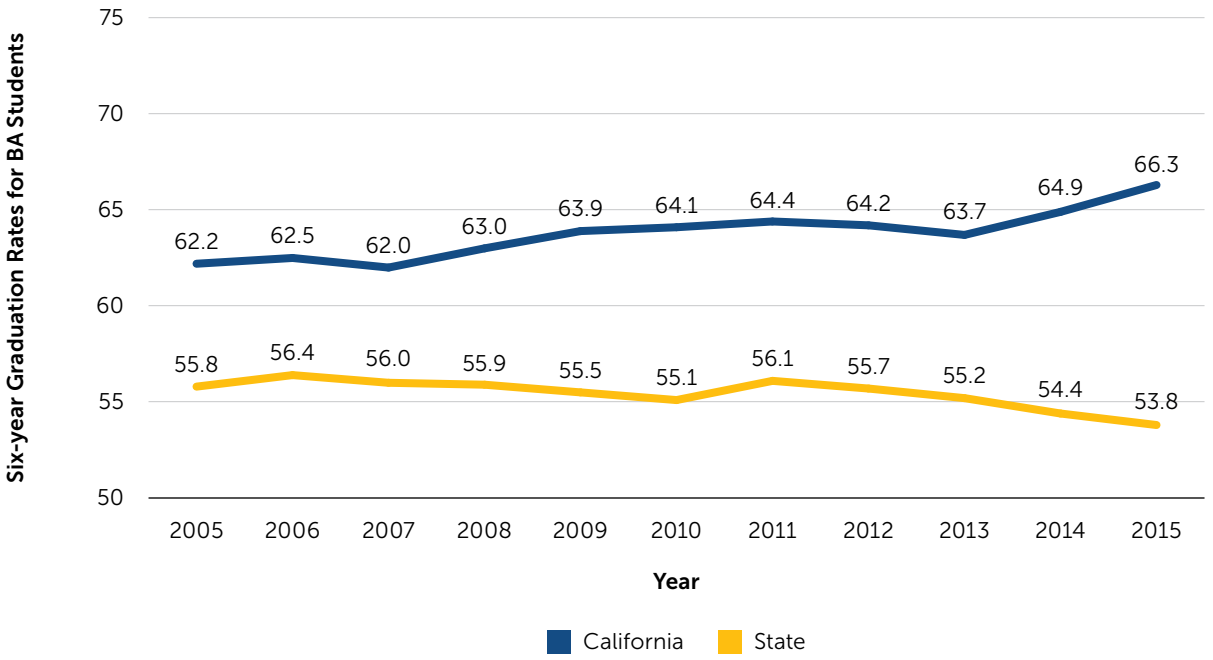
College readiness is therefore a dynamic process between choices, actions, and beliefs bounded by structural constraints in opportunities often at the school level. Given that schools play a large role in this process, there is much for schools to consider in developing students' skills and dispositions for successfully navigating the pathways to and through college. The conclusion of our report highlights several frameworks currently used to monitor key indicators along students' educational trajectories in order to foster an affirmative college-going culture, strengthen academic preparation, improve college knowledge and information, and cultivate stronger resilience for success in college.

Introduction

A majority of middle and high school students, regardless of academic performance, now report that they plan to attend college, aspirations that not only reflect the growth in educational expectations over the past several decades (Goyette, 2008; Jacob & Wilder, 2011; Reynolds & Pemberton, 2001), but have also been met with an overall increase in college participation. More people are going to college today than ever before, with nearly 40 percent of 18-24-year-olds enrolling in some postsecondary schooling (including associate- and bachelor's degree-granting colleges and universities, as well as trade schools and other sub-baccalaureate institutions). This is a substantial increase compared to the 28 percent enrolled in 1990. These rates are even higher among high school graduates who enroll directly from high school (about 67 percent nationwide) (McFarland et al., 2019).

However, college degree attainment has not kept up with the rise in educational expectations or college entry. Despite increases in college participation, only a little more than half the students that enter college nationally earn a bachelor's degree within six years. The figures are slightly higher in California, where about two-thirds of all students earn a bachelor's degree (Figure 1).

Figure 1. College Completion Rates for California and the U.S., 2005-2015



Source: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2015, Graduation Rate Survey.

A college degree is now more important than ever before for ensuring economic prosperity for both individuals and society at large. The education earnings premium, as it is often referred to, has grown tremendously over the past several decades; both men and women with bachelor's degrees earn about 70 percent more over their lifetime compared to those with a high school diploma, an increase from the approximately 20 percentage point difference in 1971 (Baum, Ma, & Payea, 2013). In addition to higher earnings, education "pays" in other ways as well, as individuals with higher levels of education are more likely to be employed and have access to health insurance and retirement benefits, among others (Baum, Ma, & Payea, 2013).

Given the importance of a college degree for future earnings and the middling rate at which students earn degrees, policymakers and educators are taking a close look at the factors that may be impacting college completion. This encompasses college readiness, which multiple scholars and organizations have attempted to define and has been attributed with strengthening the links between K-12 and higher education. Some of the individual attributes and skills identified have been well established by rigorous research studies, including randomized experiments (the gold standard in education research), while others are either correlational in nature or common-sense judgments about the knowledge, skills, and dispositions that success in college demands. The following review is an effort to summarize the existing literature on key predictors of college readiness.

We describe the theories behind the contributing factors to educational attainment, what the empirical evidence suggests, as well as implications for identifying, measuring, and tracking related indicators. Finally, we discuss suggestions proposed in the literature for developing a system that can better track students' college-readiness trajectories while in school.

While predictors of educational attainment—specifically college completion—can be grouped in several ways, prior studies largely coalesce around key areas, including cognitive skills, college knowledge, broader dispositions, and social-emotional (or "noncognitive") skills. We organize this review around four domains that precede college matriculation: (1) educational aspirations and beliefs, (2) academic preparation for college, (3) college information, and (4) college navigation and resilience skills. Additionally, it is important to note that all factors in this review include both individual disposition and skill development as well as structural or environmental factors and settings (i.e., schools). Therefore, as we discuss below, there is much that schools must consider in the development of individuals' dispositions and skills for successfully navigating the pathways to and through college.

Key Predictors of Educational Attainment: A Research Summary

College Aspirations and Beliefs

A pervasive college-for-all ethos spurs the college aspirations of students across the nation. Today, as more youth than ever before intend to pursue postsecondary education, these aspirations may be indicative of both students' expectations that they will attend college and their specific goals to fulfill this expectation, such as where they will enroll and what degrees and careers they intend to pursue. Enfolded within these aspirations is an underlying motivation to pursue a college education, driven in part by students' beliefs about their ability to realize their aspirations and attain their goals. Often referred to as mindset, this incorporates how students view themselves as learners and their belief in their own ability to perform academically.

Theory. The attainment of any goal begins with an aspiration to do so. Aspirations, likely influenced by shifting social norms and school environment, are expressly tied to belief in one's own abilities. This is central, because the degree to which people believe in themselves precedes what they aspire to do and how they perceive this can best be achieved.

This belief about oneself is further exhibited in the motivation one holds and effort one applies in pursuit of an aspiration, such as attending college. Extant literature on motivation reveals that there are a multitude of reasons students pursue college,

including financial gain, personal betterment, a desire to meet family expectations, and to give back to society. These reasons, or motivating factors, coupled with a belief in the intrinsic value of education, are associated with college enrollment, persistence, and degree attainment (Allen, Robbins, Casillas, & Oh, 2008; Anderson, 1999; Damon, 2008; Lazowski & Hulleman, 2016). Additionally, social psychologists have long demonstrated that students' beliefs about their abilities to succeed are related to their effort (Bandura, 1982, 1997; Dweck & Elliott, 1983). Individuals' sense of self-efficacy (the belief they have about their abilities to influence the outcomes of their lives) is key to how much effort one may decide to expend or how long they persist in light of challenging or unpredictable situations. A student's sense of efficacy, then, can impact their actions overall by not only influencing their goals and aspirations, but also their effort and commitments to different pursuits as well as their ability to cope in different environments (Bandura, 1981; Marsh, 1991; Murdock, Anderman, & Hodge, 2000; Reyes & Jason, 1993; Yeager & Walton, 2011). Mindset also plays a key role. Individuals who believe their efforts will have an impact on their pursuits have been found to draw from a growth mindset, or the idea that abilities are malleable and knowledge is not finite. In contrast, those who think intelligence is inherent, and thus unchangeable are said to have a fixed mindset and may exert less effort (Dweck, 1986; Dweck & Leggett, 1988).

Further, it is important to note that aspirations develop over time and are uniquely tied to students' sense of identity within their educational environment, which alone can either support or suppress the successful attainment of goals (Farrington et al., 2012).

Research evidence. Educational expectations and beliefs are key determinants of not only students' attitudes and behavior in school, but subsequent educational success as well, as college aspirations have been found to have a positive impact on the degree of importance students place on academics. For example, one study found college expectations influenced the significance students placed on high school mathematics, noting that changes in expectations have a positive, causal effect on students' perceptions of its future relevance (Domina, Conley, & Farkas, 2011). In terms of attitude and behavior, research indicates that motivation is predictive of academic performance, even after accounting for prior achievement. One study exploring high school academic performance (as measured by GPA) found motivation explained as much variance as prior academic achievement (Casillas et al., 2012), while a recent meta-analysis of 74 studies found motivation is predictive of higher quality work, higher scores on standardized assessments, and persistence in school across K-12 and higher education (Lazowski & Hulleman, 2016). The value of motivation is also demonstrated in a study of nearly 7,000 students enrolled at 23 four-year colleges that examined the relationship between college commitment, measured in the first year of college, and retention in college three years later. Researchers found that motivation, defined here as college commitment, had a direct effect on persistence through college (Allen, Robbins, Casillas, & Oh, 2008).

The social psychological forces behind students' behaviors in educational contexts is also critical to examine. Students' sense of belonging, or how connected they feel to the school or academic community, is strongly related to academic outcomes (Osterman, 2000; Walton & Cohen, 2007, 2011), and this can differ across contexts. For example, researchers have established that the under participation of women majoring in science, technology, engineering, and mathematics (STEM) is a function of disparities in interest in and affect towards math/science, not preparation or achievement (Mann & DiPrete 2013; Morgan et al., 2016; Riegle-Crumb, King, Grodsky, & Muller, 2012; Xie & Shauman, 2003). Further, while research regarding identity and belonging is most often examined in higher education settings, Yeager and colleagues recently demonstrated that high school students' perception of belonging in college predicted college persistence, controlling for academic ability and intelligence quotient (IQ) (Yeager et al., 2016).

Given the importance of students' motivation and their perceived sense of self-efficacy in their choices and behaviors, researchers have explored how to influence and strengthen these predictors of educational attainment. Fortunately, both motivation and the belief in one's ability to succeed are malleable, as experiments from social psychology demonstrate that affirming one's values and emphasizing growth rather than gaps can enhance self-efficacy, aspirations, and performance. This attitude, or mindset (as noted above), is therefore critical as research suggests that the way in which students process early expectations and challenges can influence their educational trajectories (Cohen, McCabe, Michelli, & Pickeral, 2009).

A variety of interventions have effectively increased motivation and changed students' attitudes regarding academic setbacks (e.g., poor grades or test scores). Perhaps most popular among them—growth mindset interventions—have demonstrated that teaching students to view intelligence as malleable, and not fixed, can lead to a host of improved academic outcomes, particularly in subjects such as math, which are often dominated by fixed mindsets (Dweck, 1986; Dweck & Elliott, 1983; Dweck & Leggett, 1988; Yeager & Walton, 2011). Mindset interventions may also have an impact on achievement, as a recent study found that Latino students randomly assigned to an online growth mindset intervention improved their grade point averages (.40 points) (Broda, et al., 2018). In addition, self-affirmation interventions, which typically ask students to reflect on their core values through a short writing exercise, can boost students' educational performance and persistence in school as well as potentially reduce the negative influence of stereotype threat (the worry that one could be perceived through the lens of a negative stereotype in school). In fact, research illustrates that when such self-affirming occurs, minority students experiencing stereotype threat feel a greater sense of belonging in school and demonstrate improved academic performance over time, suggesting early alterations in a student's psychological trajectory, even if small, can have long-term effects (Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009; Cook, Purdie-Vaughns, Garcia,

& Cohen, 2012; Sherman et al., 2013). A related study conducted by Duckworth and colleagues (2011) demonstrated the positive effect of "mental contrasting" (identifying goals and obstacles) and "implementation intentions" (articulating action steps towards goals) on performance. Researchers found that students who wrote about steps for overcoming obstacles that might disrupt their goals completed 60 percent more study activities than those who wrote about goals alone (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011).

Summary and implications. Research demonstrates that identity and social contexts matter, and given that students' beliefs about their educational success are changeable, schools play an important role in facilitating an environment where college aspirations flourish, growth mindset is nourished, and self-efficacy is fostered. By establishing strong college-going cultures and positive role models, coupled with practices that extol and encourage a growth mindset, schools can promote college aspirations and college identity from an early age, an important precursor to cultivating self-efficacy.

College Academic Preparation

Preparation for the academic demands of college is critical for college success. In fact, research reveals that high achieving students, as well as those with access to a more rigorous course of study in high school, have better postsecondary and labor market outcomes compared to their counterparts (Adelman, 1999, 2006; Kurlaender & Howell, 2012; Long, Conger, & Iatarola, 2012).[1] Academic preparation for college thus requires enrollment in a rigorous set of courses, which lay the foundation for students to develop the skills necessary to succeed in college-level courses. Historically, a college preparatory sequence of courses was often synonymous with the courses required for admission (e.g., courses designated as A-G in California); however, a rigorous course of study today often involves four years of mathematics (i.e., reaching pre-calculus levels) as well as advanced courses, such as honors, Advanced Placement (AP), and International Baccalaureate (IB). Dual enrollment programs, through which students can take courses for college credit, are also becoming more commonplace in high schools eager to make the transition to college more seamless for students.

The most compelling evidence that educational pathways are not seamless for many students is found in the high rates of remediation and low rates of completion across broad access colleges and universities throughout the U.S. In addition to the large financial expense of remediation in college (to both an individual and the public), students

[1] Several studies find that enrolling in more advanced mathematics courses in high school leads to higher wages once in the workforce (Altonji, 1995; Levine & Zimmerman, 1995; Rose & Betts, 2004).

in need of remedial, or developmental, coursework are less likely to persist and complete a college degree than those who do not (Bettinger, Boatman, & Long, 2013). Given this, efforts at reducing college remediation often focus on improving students' academic rigor while in high school.

Theory. There are several plausible mechanisms by which enrollment in rigorous courses can lead to increased educational attainment. First, a rigorous course of study provides exposure to more advanced material, introducing students to topics they may encounter in subsequent years and thereby improving their schooling transitions and supporting greater academic success and confidence. Second, high quality content is often correlated with high quality instruction. For example, rigorous courses in high school, such as honors and AP, are frequently taught by more skilled teachers (with additional credentials, more experience, or specialized professional development) than less rigorous courses. Third, rigorous schooling environments, both across and within schools, attract particular students and families, often those most socially, financially, or academically able and/or those most motivated. As such, engagement with these higher-achieving peers (based on ability, social class, motivation, etc.) may positively influence student outcomes (Ingersoll, 1999; Kalogrides, Loeb, & Béteille, 2013).[2] Fourth, enrollment in more intensely rigorous learning environments can serve as an important, positive signal for future schooling destinations, as some college admissions officers rank high schools on the academic intensity of their offerings.

As students tend to self-select into their courses in high school, those that choose to take a more rigorous set of courses are likely to have a host of other, often unobservable, attributes that may lead to success in college and later in life. For example, such students may simply have better early academic skills (from prior quality educational environments, more motivation, or supplementary academic support and encouragement from families or teachers). However, this self-selection and choice occurs in the midst of great inequalities in our society and educational systems, and several studies have documented the various ways in which parents from different income backgrounds intervene in or advocate for their children's schooling experiences (Hamilton, 2016; Lareau, 2000, 2011; Stevens, 2007). Given the potential inequalities surrounding who has access to rigorous college preparatory experiences and how this can influence students' trajectories, it is important to focus on the ways in which schools can equalize access to these opportunities.

Research evidence. Extensive research on the academic pathways to college reveals that increases in curricular intensity and academic rigor in high school are

[2] See Sacerdote (2001) and Zimmerman (2003) for evidence of peer effects in education.

associated with better outcomes at the high school level and beyond, including test scores (Attewell & Domina, 2008), high school graduation (Schneider, Swanson, & Riegle-Crumb, 1997), college entry (Long, Conger, Iatarola, 2012), type of college entry (Attewell & Domina, 2008), likelihood of remediation (Kurlaender & Howell, 2012), college grades (Klopfenstein & Thomas, 2009), college graduation (Adelman, 2006; Attewell & Domina, 2008), and wages (Altonji, 1995; Rose & Betts, 2004). However, the benefits of taking more advanced coursework can vary depending on the attributes of the school one attends. For example, one study finds that, controlling for enrollment in rigorous courses, students attending high poverty schools or those with lower average levels of achievement experienced larger increases in high school graduation and college enrollment rates than students attending more affluent high schools (Long, Conger, & Iatarola, 2012), suggesting that access to rigorous coursework is critically important for students in low-achieving schools.

In addition to enrollment in rigorous courses, how one performs in a course and the ability to demonstrate mastery of content is also critical to college success. Notably, prior academic performance is the best predictor of later performance, as research notes that students' performance in advanced academic courses and on standardized end-of-course exams (e.g., AP and IB exams) is predictive of college success (Dougherty, Mellor, & Jian, 2006; Morgan & Klaric, 2007; Scott, Tolson, & Lee, 2010). In fact, a student's grade point average (GPA) in 9th grade, above and beyond test scores, has been found to be highly predictive of later GPA, high school graduation, college enrollment, first year college grades, and college persistence (Easton, Johnson, & Sartain, 2017). Several studies have also demonstrated that GPA is at least as powerful of a predictor of college success as college entrance exams (Belfield & Crosta, 2012; Geiser & Santelices, 2007; Noble & Sawyer, 2002) and sometimes more predictive (Bowen, Chingos, & McPherson, 2009; Kurlaender & Cohen, 2019), reflecting the fact that performance in high school courses captures both achievement (i.e., mastery of course content) as well as motivation and effort. Additionally, a recent study in California shows that high school GPA is a stronger predictor of first-year college GPA than standardized assessments (both the SAT and California's Smarter Balanced Assessments) for students attending California State University, and is equally predictive of first year grades (when compared to these assessments) for students enrolled at the University of California (Kurlaender & Cohen, 2019).

A core component to course-taking is the means by which a student enrolls in a course. Students do not enroll in a course of study based purely on their own preferences, nor strictly by chance. First, to enroll in a rigorous course, a student must have access to the course; however, this access is unequally distributed, with schools serving primarily low-income students often having fewer advanced curricular offerings

than schools serving a more affluent student population (Adelman, 1999; Conger, Belsky, & Capaldi, 2009). Second, students who enroll in rigorous coursework are often motivated and encouraged by social networks (e.g., peers, guidance counselors) to enroll in them. Conversely, while some students may have access to rigorous courses, the option to enroll in them is outside of their control. This is particularly true for students in schools that implement tracking, where course options are structurally limited, thereby institutionalizing inequalities in access to rigorous courses among students at the same school. In this case, disparities in course-taking are largely a within-school phenomenon (Attewell & Domina, 2008; Gamoran, 1987).

In terms of access and subsequent enrollment, evidence from a recent longitudinal study indicates persistent disparities in course enrollment by student background. Table 1 presents descriptive statistics on advanced course-taking for students from different racial backgrounds. For a nationally representative sample of high school students, large gaps in enrollment are evident, with African American students enrolling in calculus at extremely low rates compared to Asian American students. These gaps are similar for AP and IB courses.

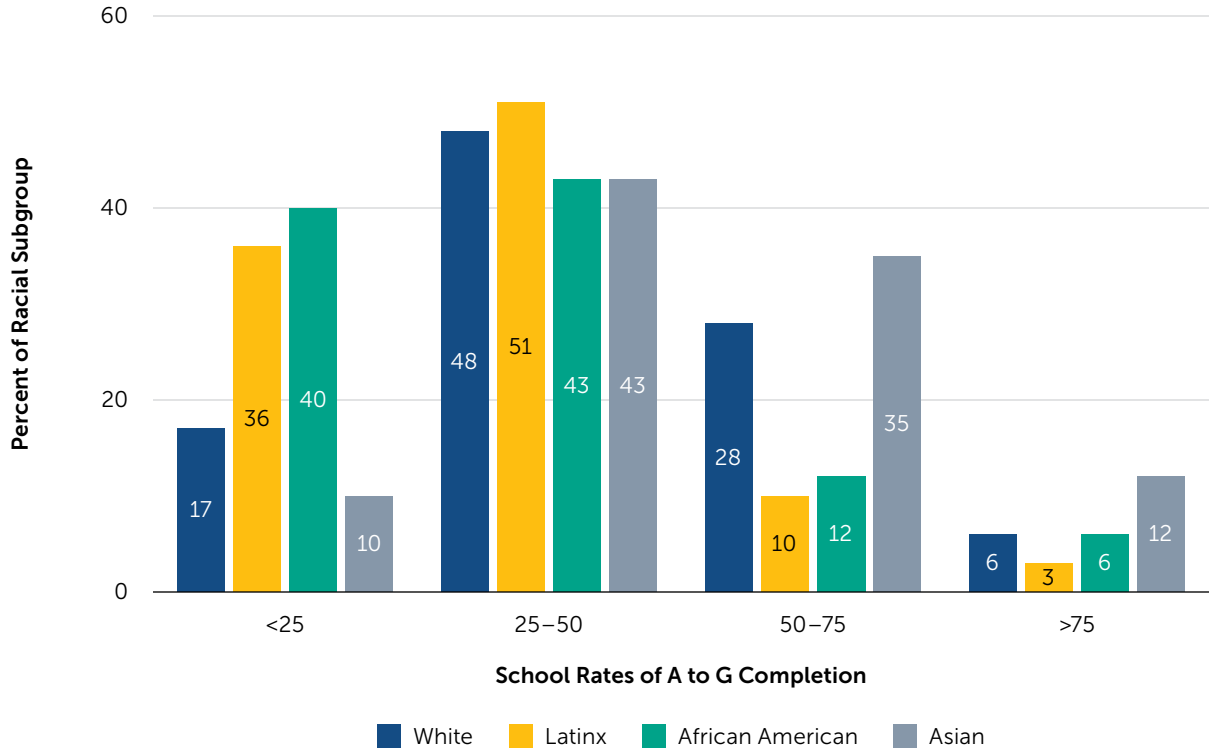
Table 1. National Statistics on Advanced Course-Taking by Racial/Ethnic Subgroup

	Percent of Student Subgroup Enrolled		
	Highest Math Course Taken		Advanced Placement (AP) or International Baccalaureate (IB)
Racial/Ethnic Subgroup	Precalculus	Calculus	
African American	16	6	23
Asian American	22	45	72
Latinx	17	10	34
White	22	18	40
Two or more races	16	11	34

Source: National Center for Education Statistics, ELS 2002

Disparities by key subgroups are also evident in California. In terms of academic preparation, an exploration of A-G course completion at the school level (Figure 2) reveals that Latinx and African American students appear to be largely concentrated in schools with lower A-G completion rates, relative to Asian American or White students.

Figure 2. Percent of Students in Each Racial Category Attending Schools with Varying A-G Completion Rates, Class of 2012



Source: Reed, Kurlaender, & Hurtt (2016)

Further, while a recent statewide eligibility study illustrates that there has been tremendous growth in University of California (UC) and California State University (CSU) eligibility rates, disparities persist by student demographics and across sectors of higher education. Specifically, sizable gaps in CSU, and especially UC, eligibility are evident between students of different racial, ethnic, and socioeconomic backgrounds (Table 2). Taken together, disproportionate A-G completion and eligibility rates suggest that the pathway to college remains unequal.

Table 2. UC and CSU Eligibility Rates for 2015

	Percent of Student Subgroup Eligible	
	UC	CSU
Total	**13.9**	**40.8**
Racial/Ethnic Subgroup		
African American	6.5	30.0
Asian American	6.8	34.7
Latinx	30.7	64.0
White	8.5	31.9
Two or more races	11.9	39.8
Socioeconomic Status		
Socioeconomic Disadvantaged	7.5	34.0
Not Socioeconomic Disadvantaged	17.6	52.2

Source: Silver, Hensley, Hong, Siegel, & Bradby (2017)

In principle, any academically stimulating environment may contribute to academic preparation; however, in practice, not all environments are the same. While it is common to think of course titles and/or grades as proxies for rigor, where an honors English course title denotes rigor and a 4.0 GPA indicates high achievement, the content of a course and the reflection of mastery a grade intends to symbolize can differ across schools and classrooms. Large differences in academic rigor between schools is also evident, such that even the highest performing students who attend schools with weak academic preparation (for example, because of instructional practice or curricula), may enter college less ready than their peers with weaker grades, but who experience more academically enriched settings (Kurlaender, 2018).

Given disparities in college preparation, it is important to closely consider what academic preparation actually looks like. Conley (2012) posits that a college readiness program of study will ensure that students can, among other things, read and synthesize a range of material, including informational texts; write expository texts; understand the big ideas from disciplines (e.g., the scientific process or historical trends); and interpret and organize data, tables, and graphs. These key components span a host of academic subjects and are the basis for academic success in college courses. Therefore, students enrolled in college-level courses (e.g., AP, IB, honors, and college credit courses available through dual enrollment) likely develop these critical skills while in high school. The key components Conley identified are also at the heart of the Common Core State Standards; therefore, Common Core aligned materials and professional development may ensure that all college preparatory courses in high school promote these skills. Additionally, in

California, the CSU system has widely invested in improving the preparation of college students through the through the introduction of curricular materials and professional development of high school teachers in expository reading and writing. Specifically, the Expository Reading and Writing Course (ERWC) for high school seniors offers an additional opportunity for students to demonstrate their college readiness while still in high school, with a rigorous external evaluation suggesting that students exposed to its curriculum see improved performance on college readiness tests (Fong, Finkelstein, Jaeger, Diaz, & Broek, 2015). Similar efforts are underway to better align high school math curricula with college expectations (Burdman, 2018; Friedmann, 2017).

Summary and implications. Curricular pathways are shaped by both individual choices and the constraints and opportunities available to students. While students typically engage in choice and self-select (often with the aid of parents, teachers, or counselors) into a course of study, many structural dimensions constrain this choice and can result in educational pathways that are self-perpetuating. That is, quality early schooling experiences beget better placement into secondary school courses and programs, and more intense academic rigor in high school results in more selective college admissions and greater likelihood of degree attainment and labor market success. Researchers and educators must therefore continue to seek ways to not only eliminate barriers to the course selection process, but extend the offerings available to students, especially when such constraints can result in within-school racial/ethnic or socioeconomic segregation (Grodsky & Riegle-Crumb, 2010; Kelly, 2009). Current efforts to ensure that opportunities are more equally distributed among schools have focused on addressing disparities in curricular offerings, particularly in college gateway courses such as AP, but more work is needed to address school differences in academic rigor of the A-G course pathway and within-school disparities in access to advanced college readiness coursework (e.g., ERWC, advanced mathematics, honors, among others).

College Knowledge and Information

Above and beyond academic preparation, part of the explanation for high rates of remediation and low rates of degree completion may be the limited information students possess regarding the skills and behaviors necessary to be successful in college. High school students use information from many sources to make numerous decisions, such as what classes to enroll in during high school, what college preparation activities may be beneficial, whether and where to attend college, how to apply for and pay for college, and how to seek help once in college. Early information may help students—nearly all of whom aspire to attend college—realize that they can get there.

Information, therefore, is an important determinant of students' educational pathways, and one that is not evenly distributed (by school, by race/ethnicity, or by social

class). Today, clear structural barriers to information about successful college pathways endure; however, these information barriers are also the target of some of the most developed and popular areas of interventions among social scientists and policymakers eager to reduce educational attainment gaps between groups from different racial/ethnic or social strata.

Theory. Despite a near universal college-going culture and high personal aspirations, students often have very limited and only vague information about what college will be like, which is particularly true for students who will be first in their family to attend college (Rosenbaum, 2011). This is because the pathway to college is heavily influenced by one's access to information and the quality of that information. Researchers have long demonstrated that social capital (a set of resources embedded in social relationships and networks) plays a major role in shaping students' educational pathways because it is through social connections that students acquire valuable information from others about the college application and participation processes and learn a normative orientation toward higher education (i.e., the educational expectations to which they will be held to by others in their social networks, including their parents, teachers, and peers).

Research on the role of social capital in college application and enrollment has also established the importance of students' social ties for the development of college-going attitudes and behaviors. These ties include relationships with peers, teachers and counselors, immediate and extended family members, college outreach programs, and broader school and community forces (Gonzalez, Stoner, & Jovel, 2003; McDonough, 1997; Perez & McDonough, 2008; Perna, 2000; Perna & Titus, 2005; Sandefur, Meier, & Campbell, 2006; Stanton-Salazar, 1997, 2001; Tierney & Venegas, 2006). Students that internalize socially constructed norms of college attendance through their social interactions and whose networks provide access to information about the complex details associated with the college choice process are more likely to attend and persist in college relative to students with fewer social capital resources.

Research evidence. Many students find navigating the college application and financial aid processes difficult due to complex enrollment processes and lack of accurate information. Over the last decade, a host of rigorously tested information interventions have focused on nearly all aspects of the college attainment process, offering high school students (and their families) additional academic preparation and fundamental information about the steps necessary to navigate the college enrollment process. Due to the breadth of this scholarship, we summarize the research evidence on the importance of information in improving students' educational attainment trajectories below, including college academic readiness, college choice, college entry, and college success.

Information on college readiness. Achievement on state assessments and course grades offer an important source of information to students about their academic readiness for postsecondary schooling, as evidence suggests that high school students update their college-going expectations based on information they receive about their academic ability during secondary school (Jacob & Wilder-Linkow, 2011). In fact, the labels assigned to students through state standardized testing can impact college-going decisions. Researchers find that students reassess their educational trajectories based on standardized test result labels as early as eighth grade. One study in Massachusetts found that a "Needs Improvement" label on the state assessment increased the likelihood that urban, low-income youth will enroll in college compared to a "Warning" label, an indication that they're in danger of failing (Papay, Murnane, &Willet, 2011). Additionally, California's Early Assessment Program, now over ten years old, is also an important effort to formally provide students with information about their college readiness through the 11th grade state assessment. Although the program has modestly reduced remediation rates at the state's less selective four-year state university campuses (Kurlaender, Jackson, Howell, & Grodsky, 2014), there is limited evidence about whether and how students, their parents, or schools use the information provided on state assessments to help students make plans for senior year and beyond.

It is also important to consider that information from college assessments (or other sources) intended to motivate students toward their postsecondary goals could also discourage lower-performing students. For example, students taking state assessments who are told they may require remediation upon entering college may feel that they do not belong in college and decide not to enroll. However, research on California's effort to provide students with college readiness information in 11th grade through state assessments found that the early signal of "Not Ready" did not dissuade students from applying to or enrolling in college, nor did it push them into attending a less academically demanding college, such as a community college (Howell, Kurlaender, & Grodsky, 2010; Jackson, 2015; Kurlaender, Carrell, & Jackson, 2016).

A key source of information about academic readiness for college can be obtained from exposure to college experiences while in high school. In addition to the benefits of the academic content of those experiences (described in the previous section), courses such as AP, IB, and honors, as well as college credit courses offered through dual enrollment, offer students a direct source of information about what it takes to succeed in college. A variety of "bridge" programs have also been created to provide high school students—often from underrepresented groups and/or who are low income or first generation—exposure to a more focused college transition experience. These include

programs such as Upward Bound,[3] GEAR UP, and Talent Search, among others (Barnett et al., 2012; Domina, 2009).[4] Rigorous evaluations of these programs reveal some mixed or modest results of their effectiveness when compared to other experiences eligible students have access to (e.g., AVID or other college coaching programs and resources). Nevertheless, access to such opportunities for high school students is important to consider given that these programs present a more formal relationship between high schools and postsecondary institutions.

Other approaches to increase college knowledge have also demonstrated promise. The College Advising Corps provides full-time college counselors (trained recent college graduates from the community) and has shown positive results in Texas, including increased school-wide college enrollment rates (with even higher rates for Latinx students) and improved college aspirations, planning, and application steps (Horng et al., 2013). Relatedly, Chicago Public Schools found positive results with both a coaching program and a College Match program that placed advisors in high schools to promote college awareness and increase enrollment in four-year colleges and selective colleges (Stephan & Rosenbaum, 2013).

Information on college choice. The college application and selection process presents students with a variety of information-based decisions and steps necessary to be eligible for a four-year college, from taking college entrance exams to choosing the right college. The information available and what students absorb is paramount to this process as evident in the results of a recent sociological study of 150 low-income youth. Interviews revealed that students were also contending with "information poverty" with respect to the postsecondary school transition and the pathway from college to work. In this case, students' sense of urgency toward obtaining a solid job led them toward the ill-advised decision to enroll in for-profit trade programs rather than two- or four-year nonprofit institutions (Holland & DeLuca, 2016). Similar studies find that although all young people overwhelmingly aspire to earn a college degree, higher-income youth are presented with a unified cultural front regarding the desirability of a four-year degree (and the corresponding undesirability of other pathways), a norm which is not consistently present among their lower-income peers (Grodsky & Riegle-Crumb, 2010; Harding, 2011).

[3] A rigorous evaluation of Upward Bound found no detectable effect on postsecondary outcomes among eligible students (Seftor, Mamum, & Schirm, 2009), but an evaluation of Talent Search finds more promise, as participants were 14-28 percentage points more likely to complete financial aid applications and 6-18 percentage points more likely to enroll in college immediately after high school (Constantine, Seftor, Martin, Silva, & Meyers, 2006).

[4] Federal TRIO programs originate from the Higher Education Act of 1965 and are designated to improve the college pipeline for underrepresented minority students.

Moreover, even when choosing to enroll in college, a large majority of students do not apply to selective schools despite the fact that their performance on the SAT or ACT would make them eligible for admission (Hoxby & Avery, 2013). In fact, 40 percent of low-income, high-achieving students send their scores to non-selective schools, while only eight percent send them to selective schools for which they are qualified (Hoxby & Avery, 2013). This is problematic given that persistence and graduation rates at non-selective schools are often lower than more-selective institutions; additionally, there are greater potential labor market returns associated with enrollment in a more selective institution (Hoekstra, 2009).

Information interventions have been used to address such "undermatching" (when a student's academic credentials substantially exceed the academic credentials of the typical student at the college or university in which he or she has enrolled) in college enrollment.[5] One study, implementing a low-cost intervention providing low-income students with more information about college choice and application fee waivers, found that students receiving this information were more likely to apply to multiple institutions, and, as a result, the schools to which students applied had higher median SAT scores, graduation rates, and spending on students (Hoxby & Turner, 2015). More recently, a field experiment conducted at the University of Michigan found that students encouraged to apply, paired with a promise of financial aid (not contingent on completing an aid application), were more than twice as likely to apply (67 percent) and enroll (27 percent) than those in the control group (Dynarski, Libassi, Michelmore, & Owen, 2018), suggesting that targeted information interventions can substantially close income gaps in college choices.

High schools also have the potential to influence students' postsecondary choices through the amount of information they share with students and families. A study conducted by the College Board found sizable differences across high schools in undermatching, even after controlling for a variety of different school characteristics. Overall, large schools and those with higher SAT participation rates had lower undermatching rates, while those with higher average SAT scores and higher pupil-teacher ratios had higher undermatching rates. However, more than half (54%) of the variation in public high school undermatch rates is unexplained by observed school attributes (Hurwitz, Smith, Howell, & Pender, 2012). This suggests that differences in leadership and personnel (e.g., counselors and teachers), curricular focus on college applications, and perhaps other external programmatic participation (college coaching programs, etc.) are likely explanations for school differences in college destinations.

[5] Undermatching also has important consequences, as these high-achieving, low-income students would actually pay a lower net price at more selective institutions.

School personnel, specifically counselors, can play a critical role in helping students traverse information barriers, especially those faced by low-income and first-generation college students. While college counselors are often the primary source of information for low-income students (Bridgeland & Bruce, 2011), access to college counseling in high school is a major obstacle. Nationally, the average number of students per counselor is 471 (Avery, Howell, & Page, 2014), while in California there are about 760 students per counselor (ASCA, 2015), reprehensibly more than the 250 to 1 ratio recommended by the American School Counselor Association (Avery, Howell, & Page, 2014). Further, counselors report being pulled to other issues (attendance, discipline, etc.), which, albeit important, leave them with little time to focus on college planning and admissions with their students (Bridgeland & Bruce, 2011). Research on the effect of counselor access offers strong evidence that smaller student-to-counselor ratios improve postsecondary access outcomes (e.g., completing college applications, taking college entrance exams, enrolling in college, and knowing how and where to apply for financial aid) (Avery, Howell, & Page, 2014). In fact, one national study finds that just one additional high school counselor is associated with as much as a 10 percentage point increase in four-year college attendance (Hurwitz & Howell, 2013).

Information on financing college. Cost is also a substantial barrier to college enrollment and completion for many students. Among a representative sample of youth that did not go to college, the primary reason given for not attending was affordability (Bozick & DeLuca, 2011). Additionally, despite being eligible, many students do not apply for college financial aid (King, 2004; Yonezawa, 2013). Information plays an important role in seeking financial aid, as incomplete or insufficient information can lead students to underestimate benefits or overestimate the costs of college, precluding many from applying for aid (Perna, 2007; Scott-Clayton, 2012). Moreover, first generation and low-income parents are less likely to accurately estimate college costs compared to more affluent parents, who tend to have better knowledge of college prices (Grodsky & Jones, 2007; Horn, Chen, & Chapman, 2003).

Barriers to financial aid include poor marketing and lack of awareness about aid, as well as complex aid formulas and application procedures (Long, 2010; Scott-Clayton, 2012). These barriers are more pronounced for underrepresented minority and low-income students,[6] who may not even know that the programs exist, which undermines the primary purpose of federal and state need-based financial aid (Scott-Clayton, 2012). Because need-based financial aid targets students at the margin of choosing whether or not to attend college, the complexity of the Free Application for Federal Student Aid (FAFSA), for example, may lead to negative decisions about college enrollment and/or

[6] For students that do attempt the FAFSA application, many have difficulty answering questions, requesting a high school diploma, or having a Social Security number (McKinney & Roberts, 2012; Yonezawa, 2013).

persistence (Scott-Clayton, 2012). In effect, the students least likely to be able to afford college are the ones with the least amount of information about college costs (Horn, Chen, & Chapman, 2003; Scott-Clayton, 2012). Interventions aimed at reducing these information barriers, however, show real promise. Most notably, researchers implemented a randomized field experiment with the tax preparation firm H&R Block to assist low-income families with FAFSA preparation and found great improvement in FAFSA submission, college enrollment, and Pell Grant receipt rates.[7] Longer-term effects were also evident, as three years after the intervention students were more likely to be enrolled for at least two consecutive years.

Information on navigating college. Even after being admitted to college, between 10 and 22 percent of students fail to enroll in their first semester (Castleman & Page, 2014). This phenomenon, often referred to as "summer melt," is particularly high among low-income students. Researchers have attributed this, at least in part, to the informational barriers imposed during the summer months when students receive a large volume of material from their intended college of enrollment, which can be especially overwhelming for first-generation students and families with lower financial literacy (Arnold, Fleming, DeAnda, Castleman, & Wartman, 2009).

In an effort to address such information barriers, researchers have tested low-cost interventions that periodically reminded students of counseling services and financial aid deadlines over the summer through calls, texts, email, and social media. These resulted in increases in college enrollment, persistence through freshman year, and persistence into sophomore year, with even larger effects for the lowest-income students, for whom college enrollment increased by 12 percentage points (Castleman & Page, 2015).

Summary and implications. Students from low-income backgrounds and those who are the first in their families to attend college tend to have less access to information, which is also often lower quality, on all aspects of the college-going process. Therefore, increasing access to and improving the quality of information about college pathways is an important way educators and policymakers can break the self-perpetuating nature of educational inequality. Information interventions have been particularly effective at improving the complex college choice and application processes. In addition, studies have also demonstrated significant differences among schools in their efforts to guide students through the steps necessary for postsecondary access and success (e.g., application

[7] Specifically, for dependent students, personal counseling increased FAFSA submission by 16 percentage points (40 percent increase), Pell Grant receipt by 10 percentage points (36 percent increase), and college enrollment by 8 percentage points (24 percent increase). For independent students with no prior college experience, the intervention increased FAFSA submission by 27 percentage points (168 percent increase), Pell Grant receipt by 3 percentage points (27 percent increase), and college enrollment by 1.5 percentage points (16 percent) (Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2008).

materials, college choice, and enrollment), likely due to differences in leadership and personnel (e.g., counselors and teachers), curricular focus on college applications, and other external programmatic participation (e.g., college coaching programs).

Developing College Fortitude and Resilience

In addition to aspirations, academic preparation, and information, social-emotional competencies and life-management skills are key factors for success in college. Often referred to as noncognitive skills, soft skills, or 21st century skills, this broad set of skills includes those necessary to engage with the academic demands of college, cope with life's competing pressures, and navigate the college environment. Frameworks for these skills abound in both research and practice despite a lack of consensus on naming or defining the specific skills included in the notion of college resilience. There is, however, agreement on the importance for a broad set of life skills, not fully captured by the aforementioned categories, which are critical for ensuring resilience and fortitude in college.

The numerous frameworks that have been developed illustrate the complexity of this area. Conley clusters these skills in two subgroups: student ownership of learning and learning techniques. While student ownership of learning includes goal setting, persistence, self-awareness, motivation, monitoring progress, seeking help, and self-efficacy, there are also specific skills necessary to manage and engage with academic content and college coursework, such as time management, study skills, strategic reading, memorization techniques, collaborative learning, technology skills, and self-monitoring (Conley, 2012). Researchers with the National Academy of Sciences recently proposed a taxonomy of 21st century skills that includes cognitive competencies, intrapersonal competencies, and interpersonal competencies (Pellegrino & Hilton, 2012). However, others stress the role of creativity, critical thinking, communication, and collaboration in college success (Partnership for 21st Century Skills, 2010), and recent reports published by the Consortium on Chicago School Research (CCSR) have focused heavily on these skills. In a 2012 review of the literature, CCSR organized college readiness skills into five broad categories: academic behaviors, academic perseverance, academic mindsets, learning strategies, and social skills (Farrington et al., 2012). Additionally, in a 2015 concept paper, CCSR presented a *Developmental Framework for Young Adult Success* highlighting three categories of noncognitive factors (agency, integrated identity, competencies) and four underlying foundational components (self-regulation, knowledge and skills, mindsets, and values) (Nagaoka, Farrington, Ehrlich, & Heath, 2015). More recently, the Consortium published a guide for educators, emphasizing the importance of developing social-emotional competencies coupled with academic preparation as key for college success (Allensworth et al., 2018).

The complexity of this area is due in part to its overlap and interaction with other predictors of college success. For example, Conley emphasizes the role of motivation and self-efficacy as a learning skill, whereas we include motivation and self-efficacy in our previous discussion on aspirations and beliefs. Additionally, while Conley describes goal setting, persistence, and progress monitoring as skills evident in student-owned learning, CCSR uses the term agency (the ability to make independent choices about one's life) to describe student ownership and persistence, and the College Readiness Indicator System (CRIS) includes academic tenacity (defined as self-discipline, beliefs and attitudes) as an indicator of student-directed learning and persistence. In combination, a student with a strong sense of agency may set goals and monitor progress towards achieving those goals, demonstrating tenacity for academic pursuit. Therefore, these skills often overlap, or interact, with each other as well as with aspirations and beliefs and/or academic preparation. Despite the differences in the organization of these constructs, there is widespread agreement in the importance for developing these skills in tandem to improve college success.

Theory. Theories from psychology, economics, sociology, and education all contribute to the broader notion that a complex set of noncognitive skills (many of which are difficult to measure) likely explain differences in college persistence. These noncognitive skills stem from some social-psychological processes and include, among others, social learning (where students learn through their interactions with others) (Bandura, 1977; Rotter, 1954; Vygotsky, 1978); goal theory (the development, acquisition, and demonstration of competencies) (Dweck, 1986; Dweck & Leggett, 1988); attribution theory (how individuals explain the cause of event or action) (Weiner, 1979); expectancy-value theory (individuals' expectations and perceived value of a goal shape outcomes) (Eccles et al., 1983); and grit (perseverance and passion to pursue a goal) (Duckworth, Peterson, Matthews, & Kelly, 2007). All of these are shaped through childhood, and as such, there is great focus on investing in the development of these skills early on and evaluating longer-term outcomes as part of those investments (Heckman, 2011; Heckman, Pinto, & Savelyev, 2013).

Although this broad set of skills is often referred to as noncognitive, the term has been pushed back against primarily due to the fact that human behavior is rarely "devoid of cognition" (Borghans, Duckworth, Heckman, & ter Weel, 2008, p. 974). Further, as Nagaoka and Holsapple (2017) point out, what we define separately as cognitive and noncognitive factors are, in fact, "inextricably connected, with new knowledge always interacting with a combination of existing knowledge, beliefs, behaviors, emotions, motivation, and the ability to manage and reflect on new information and experiences" (p. 7). For example, as aforementioned, researchers have established the predictive power of high school grades in college performance. While grades most certainly represent the cognitive factors of academic ability, knowledge, and skills, grades may also reflect student

aspirations and motivation, as well as study habits, perseverance, and social-emotional competency (Nagaoka & Holsapple, 2017). Moreover, complex admissions and enrollment processes demand not just a demonstration of cognitive skills (e.g., test scores) for purposes of admissions, but also a strong set of organizational and problem-solving skills that will no doubt be useful for navigating complex college organizational processes.

Developmental psychologists posit that these dispositions and skills develop over time from childhood through adulthood. Children begin developing social-emotional skills as early as infancy through their environments and interpersonal interactions, while toddlers demonstrate self-regulation and perseverance as they learn new tasks and solve simple problems. These self-regulation skills are associated with academic skills, including literacy, vocabulary, and math development in children as young as preschool (Tangney, Baumeister, & Boone, 2004). As children grow and learn, their dispositions are shaped through their experiences and interactions with others, with social-emotional and self-management skills developing in new situations every day. By adolescence, youth apply a broad range of skills to achieve their goals, academic or otherwise. The variety and complexity of such skills are well represented in the tasks necessary for the transition to college, when students must analyze options, set goals, activate motivation and self-efficacy, manage their time, and collaborate and communicate with adults and multiple organizational entities in order to successfully submit applications, much less enroll and persist to a degree.

Research evidence. It is difficult to isolate the effects of the skills specific to resilience and fortitude from the aspirations, beliefs, and academic preparation already discussed due to its complex and interrelated nature with many other skills and attributes. Moreover, the research base is decidedly thin on both how to measure these constructs and effectively strengthen them in young people. While much of the available research evidence is correlational in nature and somewhat dated, several researchers have explored the relationship between academic outcomes and the cluster of dispositions and skills referred to by some as perseverance, tenacity, or resilience.

Most famously, Duckworth and colleagues demonstrate the relationship between grit and several outcomes, including the academic performance of college students, where, even after controlling for prior academic performance, grit was found to be associated with current term GPA (Duckworth, Peterson, Matthews, & Kelly, 2007). This association—albeit weak—suggests that achieving difficult goals, such as getting into and performing well in college, requires not only effort and academic aptitude, but an ability to sustain and focus that effort and aptitude over time. Similarly, in a meta-analysis of studies linking personality traits and education outcomes, researchers find that conscientiousness may explain as much about academic performance as intelligence (Porporat, 2009). This may be due to the link between conscientiousness and learning skills, such as goal setting

(Barrick, Mount, & Strauss, 1993), compliance and commitment to homework (Trautwein, Ludtke, Schnyder, & Niggli, 2006), time management (Bidjerano & Dai, 2007), and effort (Barrick, Mount, & Strauss, 1993; Bidjerano & Dai, 2007). Others have demonstrated that self-control and self-regulation are also highly correlated with academic performance in young children and adolescents (Duckworth & Seligman, 2005; McClelland et al., 2007; Shoda, Mischel, & Peake, 1990).

Study skills, or learning techniques, are also principal factors with regard to students' success in college. Research indicates a relationship between metacognitive and self-regulation strategies and academic performance (Lennon, 2010; McKeachie, Pintrich, Lin, & Smith, 1986; Pintrich & Degroot, 1990; Zimmerman & Martinez-Pons, 1986), although research in this area is limited in several ways. First, research on metacognition often relies on students' self-reported use of strategies or techniques. Second, studies tend to be cross-sectional in nature, meaning that they examine the relationship between learning strategies and current academic performance rather than the link between learning strategies developed and used in elementary, middle, or high school with long-term educational outcomes, such as performance in college. Finally, research is unable to single out specific malleable strategies that are predictive of academic outcomes due to the overlapping nature of mindsets, academic content knowledge and skills, and metacognitive strategies. Nevertheless, researchers have indicated that learning strategies mediate the relationship between beliefs and academic performance in that students who express high levels of self-efficacy and apply metacognitive strategies, including self-regulation, to academic tasks (Pintrich & Degroot, 1990), which likely result in better academic performance both contemporaneously and in the future.

Although the use of learning strategies can be difficult to observe and disentangle from underlying beliefs and mindsets, as well as connect to long-term outcomes, researchers often rely on observable behaviors, such as school attendance, grades, and homework, as proxies. School attendance is often used as a measure of motivation and fortitude, though it overlaps substantially with numerous academic and social-emotional factors. Students must exercise motivation, determination, self-regulation, and sometimes grit and tenacity to attend school daily. In turn, this attendance allows students the opportunity to engage in learning activities and gain academic knowledge and skills. In one study, monitoring patterns of attendance and discussing attendance with students led to improved attendance records; and differences in attendance of just one week were associated with large differences in student grades in high school courses (Allensworth & Easton, 2007). Similarly, homework time is often used as a proxy for metacognitive strategies and organization of time and resources, as students must dedicate time, structure the use of that time, set priorities, and determine the relative importance of various tasks as they practice academic skills and solidify content knowledge while engaging in homework and studying for exams. Studies show that teaching students

to manage time (Weinstein & Mayer, 1986), or to set specific goals, results in improved performance (Barnett & Stanicek, 1979; Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011; Schunk, 2003). Several studies have also documented the relationship between the amount of time spent on homework and students' grades (Cooper, Robinson, & Patall, 2006; Keith, 1982; Peng & Wright, 1994). In their 2007 study of 9th graders in Chicago Public Schools, Allensworth and Easton find that attendance and study habits together explain 61 percent of the variation in students failing 9th grade, while prior test scores and background characteristics explain only 12 percent of the variation (Allensworth & Easton, 2007). Though these studies are largely correlational in nature—and cannot make causal claims—these associations suggest that in addition to academic knowledge and skills, the metacognitive skills and dispositions gained through, for example, dedicated homework time earlier in one's educational trajectory, will positively impact later educational behaviors and outcomes.

Prior research has also established the positive relationship between social-emotional skills and success in school (Durlak et al., 2011; Teo, Carlson, Mathiedu, Egeland, & Sroufe, 1996). In a recent meta-analysis, researchers found 35 studies with evidence to support a positive relationship between social-emotional interventions delivered by teachers and students' academic performance (grades and test scores) (Durlak et al., 2011). Nevertheless, the precise effect of social-emotional competencies on academic outcomes is difficult to identify as researchers are unable to isolate specific skills from complex learning processes and environments. Studies suggest the positive impacts of social-emotional skills on academic achievement are likely indirect and mediated by student behaviors in the classroom, where students' cooperation and collaboration with peers, communication with teachers, and willingness to follow rules enhances learning and in turn results in better outcomes (CASEL, 2003; Wentzel, 1993). Additionally, social-emotional factors may influence course grades, but only in cases where the teacher includes student behavior and participation directly as a component of grades (Austin & McCann, 1992). Again, although much of the evidence is correlational, the relationship between social-emotional competencies and academic performance is widely accepted by educators and is an oft-cited key competency for success in college and employment.

Summary and implications. Today, educators are turning attention to the broad set of skills necessary for individuals to engage more fully with academic content, navigate college and workplace processes, and persist through challenges. Although it is difficult to measure and disentangle the direct impact of these noncognitive skills from other academic skills or students' aspirations and beliefs, there is little doubt of their importance for longer-term postsecondary and occupational success. Identifying, measuring, and developing these skills is not easy, but proxies for behaviors that demonstrate resiliency and fortitude include attendance, engagement, and effort.

Similar to the development of aspirations and beliefs, small-scale interventions show promise in the development of noncognitive skills, including learning strategies, attendance, goal setting, and time management. Given how these skills interact with aspirations, academic preparation, and college knowledge, the most promising ways to develop them are through authentic pre-collegiate experiences that offer opportunities for students to cultivate learning strategies, goal setting, and time management in a higher-level context. For example, these may include college credit courses through dual enrollment, early college high schools, capstone projects, internships, and apprenticeships, all of which allow students additional opportunities to develop the social-emotional competencies and self-management skills necessary for success in college or other postsecondary pursuits (Nagaoka & Holsapple, 2017).

Strengthening the Transition to College: Identifying Key Markers Along Students' K-12 Educational Trajectories

The above state of the research broadly categorizes four areas critical to students' college readiness and success: (1) aspirations and beliefs, (2) academic preparation, (3) knowledge and information, and (4) fortitude and resilience. It is clear from the literature that college attainment requires a complex set of dispositions and skills. Moreover, college readiness is not an event, but a dynamic process involving individual choices, actions and beliefs, and structural constraints in opportunities, often at the school level. Research indicates that the dispositions and skills necessary for educational success are malleable and that schools matter when it comes to developing students' college readiness. In this section, we review existing frameworks for how schools can monitor key indicators along students' educational trajectories in order to foster an affirmative college-going culture, strengthen academic preparation, improve college knowledge and information, and cultivate the stronger resilience students need when they enter college.

Researchers and practice-based organizations alike have developed comprehensive frameworks and models for organizing the essential dispositions and skills for college readiness. While there is no clear consensus, established frameworks tend to converge on the academic and practical knowledge students need and how to best cultivate it, with several painting a broad picture of what schools should be cognizant of. For example, the College and Career Competency Framework, developed by researchers at the University of Kansas, notes 26 competencies in three domains: interpersonal, intrapersonal, and cognitive (Gaumer-Erickson & Noonan, n.d.), while canonical work by David Conley and the Educational Policy Improvement Center (EPIC) in Oregon articulates four dimensions of college and career readiness: cognitive strategies, content knowledge, learning skills and techniques, and transition knowledge and skills (Conley, 2012). Similarly, ConnectEd, which began as a California-based organization and is presently a network of 30 districts

in several states, promotes the integration of Linked Learning Pathways comprised of four components, including rigorous academics, real-world technical skills, work-based learning, and personalized student supports (such as counseling and supplemental instruction) (Atterbury, 2014). The Developmental Framework for Young Adult Success outlined by Jenny Nagaoka at the Chicago Consortium for School Research also highlights three key factors of success: agency; integrated identity (a strong sense of who one is); and the competencies to be productive, effective, and adaptable (Nagaoka, Farrington, Ehrlich, & Heath, 2015). While these rest on four foundational components (self-regulation, knowledge and skills, mindsets, and values), what is of note is the social-emotional factors at the root of each of these elements, a contrast to the aforementioned frameworks.

Importantly, some frameworks extend beyond simply defining the set of knowledge and skills necessary for success in college and instead aim to provide a comprehensive set of indicators from which to gather data, set improvement targets, support students, and monitor progress. Additionally, well-developed indicator systems communicate district priorities and values, foster collaboration, guide student supports and interventions, provide students and parents with important information on goal attainment, and hold schools accountable for student outcomes (Allensworth, Nagaoka, & Johnson, 2018). The College Readiness Indicator Systems (CRIS) initiative provided the opportunity for researchers, public school district leaders, and a school support organization to collaborate in the development and testing of diagnostic indicators of college readiness (Annenberg Institute for School Reform, 2014). The CRIS initiative developed a conceptual framework which includes three dimensions of college readiness—academic preparedness, academic tenacity, and college knowledge—along with three levels of indicators—the individual (student) level, setting (school) level, and the system (district/partnership/network) level. Figure 4 provides an overview of the CRIS framework and a sample of indicators in each level that may be adapted by schools and Local Education Agencies (LEAs).

Figure 4. CRIS College Readiness Indicator Framework

	Individual-Level Indicators	Setting-Level Indicators	System-Level Indicators
Academic Preparedness	• GPA and credits/courses • Benchmark exams	• Advance Placement course availability • Academic supports • Consistent grading standards	• Student/teacher assignment policies • Number of schools with Advance Placement courses • Availability/evaluation of academic supports
Academic Tenacity	• No/low disciplinary infractions • Attendance • Self-discipline • Mastery goal orientation	• Students' perceptions (instructional scaffolding, academic press, support for autonomy) • Professional development on practices that promote academic tenacity	• Communicated expectations about academic tenacity • Professional development on practices that promote academic tenacity
College Knowledge	• Completion of college and financial aid applications • Campus visits • Meetings with college advisor	• College-going culture in school • Access to counseling resources • Resources for teachers' college knowledge	• Resources to support college-going culture/ knowledge • Communicated expectations about college knowledge supports

Source: gardnercenter.stanford.edu

While robust in its accounting for individual and contextual factors, CRIS stops short of recommendations on how to leverage specific indicators for improvement in student outcomes. This echoes the inevitable tradeoff that can arise between comprehensiveness and simplicity or clarity, because a focus on multiple areas may try to capture complex systems at work and may not be ideal in terms of implementation.

Other work in the field extends the frameworks and indicators by providing robust systems for monitoring progress through multiple data points. For example, in Dallas Independent School District (Dallas ISD), improving college readiness through progress monitoring included not only academic preparation, but also college knowledge. Dallas ISD built a system of indicators for college applications, SAT/ACT participation, and FAFSA completion, and holds high school counselors accountable for improvement in the indicators (Hall, 2013). Similarly, San Jose Unified School District—one of the urban school districts partnering around CRIS—recently undertook work to implement a holistic system of *Key Performance Measures* that included early literacy, advanced reading and mathematics achievement, English learner (EL) reclassification, social-emotional learning, writing performance, Algebra I performance, AP/IB exams, SAT/ACT scores, A-G course completion, and 21st century skills. The key measures, which span many of the critical components for college preparation reviewed above, are included in internal districtwide accountability reports with regular alerts. (Kless, 2013).

Progress monitoring is an important aspect of college readiness, as both academic research and practitioner experience indicate its association with improved outcomes. Further, schools that monitor student-level indicators and intervene early have been found to improve academic behavior (Allensworth & Easton, 2007; Gwynne, Pareja, Ehrlich, & Allensworth, 2012). The existence of data or a progress monitoring system alone, however, is not enough to improve student outcomes. Follow-up work on Dallas ISD, led by the Everyone Graduates Center at Johns Hopkins University, noted that despite the user-friendly data system incorporating several college readiness indicators, a lack of integration of the system into organizational routines limited its intended effects (Mac Iver, Mac Iver, & Clark, 2015). In contrast, such a system was integral to the work in San Jose, where teams—with members from elementary, middle, and high schools that create college readiness pipelines—engaged in data intervention cycles to identify struggling students, plan interventions, and monitor student progress. Research suggests that this systematic monitoring of data and professional collaboration around data-driven decision making is necessary to improve outcomes (Pitcher et al., 2016). Similarly, the Network for College Success at the Chicago School Consortium built professional leadership and teacher capacity to lead the transformation and improve student outcomes in both Chicago and New York through early warning indicator systems (Allensworth, Nagaoka, & Johnson, 2018). In fact, Chicago's *Freshman On-Track* indicator system, designed with both a year-end metric and system of early warning indicators to track college readiness of high school freshmen, became a tool for professional collaboration around improving student outcomes. The combination of the regular data reports and the structures for review and use of the data to identify students for early intervention resulted in a dramatic improvement in graduation rates (24 percentage points) over a ten-year period (Pitcher et al., 2016).

The development of college readiness indicator systems, though, is not limited to researchers and practitioners. New federal accountability guidelines and state accountability systems are calling for multiple measures of college and career readiness, with agencies redesigning accountability frameworks to include these indicators. Recently, the Boston Opportunity Agenda, along with Boston Public Schools, identified four measures of postsecondary achievement specific to the local context of Boston schools and its students. These measures, which include maintaining an attendance rate of 94 percent or higher; achieving a cumulative GPA of 2.7 or higher; completing an internship, job shadowing, or community service; and completing the Massachusetts Recommended Core Curriculum (while also enrolling in at least one AP, IB, dual enrollment or CTE course), were found to be effective in empirical research conducted by Balfanz and Byrnes (2019), as nearly nine out of ten students earning a postsecondary degree had completed at least one, while two-thirds had completed two or more. Relatedly, the new California School Dashboard also includes multiple academic preparation indicators—suspension rates, high school graduation rates, college/career preparedness, progress of English learners towards English proficiency, and chronic absence rates—for which school-level

performance is measured through a combination of current performance and change over time. Included in the California School Dashboard is the College/Career Indicator (CCI), the primary indicator of school quality as it pertains to college preparation. The CCI is determined at the school level based on the proportion of students deemed to be prepared for college and career based on their 11th grade ELA and math Smarter Balanced Assessment scores, career technical education pathway completion, leadership/military science course completion, AP and IB exams, dual enrollment, A-G course completion, or attainment of the State Seal of Biliteracy. While the California School Dashboard, including the CCI, are not designed as student-level indicators for communication about college readiness with students and parents, district leaders across the state affirm that the school-level indicators inform school-based practices, such as academic course offerings and college guidance.

As school districts engage in the development of an indicator system they should be cognizant of several key principles:

1. Predictors of college readiness are all interrelated and therefore difficult to isolate, but research reveals these factors are malleable.

2. Dispositions and skills are developed over the course of a student's life and therefore require attention early on and at key educational transition points, coupled with a developmental lens for monitoring.

3. Individuals' pathways to college are inherently shaped by their schooling contexts; therefore, schools must examine and attend to the obstacles that may constrain individual choices.

With this in mind, school districts might develop, adopt, or adapt frameworks that first include a variety of measures that capture the complexity of the key determinants of college attainment reviewed above (aspirations and beliefs, academic preparation, college knowledge, and college fortitude and resilience). Additionally, an indicator system should track students from the early grades through, at minimum, college enrollment, given the well-established literature on the impact of early childhood experiences, potential for summer melt, and other obstacles to college matriculation. Third, such a system should assess the structural obstacles that may impede some students' choices as they prepare for college (e.g., course availability and access to counseling). Finally, an indicator system should also expand our understanding of what might improve college readiness through better measurement of these key predictors; specifically, more integrated data systems to track students longitudinally from preschool to postsecondary outcomes, and through testing a host of practice-based interventions to disrupt the inequities that persist in students' academic trajectories.

References

Adelman, C. (1999). *Answers in the toolbox: Academic intensity, attendance patterns, and bachelor's degree attainment.* Washington, DC: U.S. Department of Education Office of Educational Research and Improvement.

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Washington, DC: U.S. Department of Education Office of Educational Research and Improvement.

Allen, J., Robbins, S. B., Casillas, A., & Oh, I. S. (2008). Third-year college retention and transfer: Effects of academic performance, motivation, and social connectedness. *Research in Higher Education, 49*(7), 647-664.

Allensworth, E. M., & Easton, J. Q. (2007). *What matters for staying on-track and graduating in Chicago public highs schools: A close look at course grades, failures, and attendance in the freshman year.* Chicago, IL: Consortium on Chicago School Research.

Allensworth, E. M., Farrington, C. A., Gordon, M. F., Johnson, D. W., Klein, K., McDaniel, B., & Nagaoka, J. (2018). *Supporting social, emotional, & academic development: Research implications for educators.* Chicago, IL: Consortium on Chicago School Research.

Allensworth, E. M., Nagaoka, J., & Johnson, D. W., Farrington, C., Klein, K., Gordon, M. F., & McDaniel, B. (2018, April). *High school graduation and college readiness indicator systems: What we know, what we need to know*. Chicago, IL: Consortium on Chicago School Research.

Altonji, J. G. (1995). The effects of high school curriculum on education and labor market outcomes. *Journal of Human Resources, 30*(3), 409-438.

Anderson, E. (1999). *Code of the street: Decency, violence, and the moral life of the inner city*. New York, NY: W.W. Norton & Company.

Annenberg Institute for School Reform, Brown University; John W. Gardner Center for Youth and their Communities, Stanford University; & University of Chicago Consortium on Chicago School Research. (2014). *Beyond college eligibility: A new framework for promoting college readiness. College Readiness Indicator Systems Resource Series.* Seattle, WA: Bill & Melinda Gates Foundation.

Arnold, K., Fleming, S., DeAnda, M., Castleman, B., & Wartman, K. L. (2009). The summer flood: The invisible gap among low-income students. *Thought & Action, 25*, 23-24.

ASCA (2015). *State-by-state student-to-counselor ratio report: 10-year trends.* American School Counselor Association (ASCA) and National Association for College Admission Counseling (NACAC). Retrieved from https://www.schoolcounselor.org/asca/media/asca/Publications/ratioreport.pdf

Atterbury, R. (2014). Building a linked learning pathway: A guide for transforming high schools for college and career success. *ConnectEd: The California Center for College and Career.*

Attewell, P., & Domina, T. (2008). Raising the bar: Curricular intensity and academic performance. *Educational Evaluation and Policy Analysis, 30*(1), 51-71.

Austin, S., & McCann, R. (1992, February 29). ED343944 - "Here's Another Arbitrary Grade for Your Collection": A Statewide Study of Grading Policies., 1992-Mar. Retrieved from https://eric.ed.gov/?id=ED343944

Avery, C., Howell, J. S., & Page, L. (2014). *A review of the role of college applications on students' postsecondary outcomes.* College Board Research Brief.

Balfanz, R., & Byrnes, V. (n.d.). College, Career and Life Readiness - tbf.org. Retrieved from https://www.tbf.org/-/media/tbf/reports-and-covers/2019/boa_readiness-report-201903-v2.pdf?la=en

Bandura, A. (1981). Self-referent thought: A developmental analysis of self-efficacy. In J. H. Flavell & L. Ross (Eds.), *Social cognitive development: Frontiers and possible futures* (200-239). Cambridge, MA: Cambridge University Press.

Bandura, A. (1982). The psychology of chance encounters and life paths. *American Psychologist,37*(7), 747-755. Doi:10.1037//0003-066x.37.7.747

Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology, 4*(3), 359-373. Doi:10.1521/jscp.1986.4.3.359

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York, NY: W.H. Freeman and Company.

Barnett, E. A., Bork, R. H., Mayer, A. K., Pretlow, J., Wathington, H., Trimble, M. J., & Weiss, M. J. (2012, June 01). Bridging the Gap: An Impact Study of Eight Developmental Summer Bridge Programs in Texas (NCPR Report). Retrieved from https://ccrc.tc.columbia.edu/publications/bridging-gap-impact-developmental-summer-bridge.html

Barnett, M. L., & Stanicek, J. A. (1979). Effects of goal setting on achievement in archery. *Research Quarterly. American Alliance for Health, Physical Education, Recreation and Dance, 50*(3), 328-332. doi:10.1080/00345377.1979.10615618

Barrick, M. R., Mount, M. K., & Strauss, J. P. (1993). Conscientiousness and performance of sales representatives: Test of the mediating effects of goal setting. *Journal of Applied Psychology, 78*, 715-722. doi:10.1037//0021-9010.78.5.715

Baum, S., Ma, J., & Payea, K. (n.d.). Education Pays: The benefits of higher education for individuals and society. Retrieved from https://trends.collegeboard.org/education-pays

Belfield, C. R., & Crosta, P. M. (2012). Predicting success in college: The importance of placement tests and high school transcripts. CCRC Working Paper No. 42. New York, NY: Columbia University, Teachers College, Community College Research Center. Retrieved from https://files.eric.ed.gov/fulltext/ED529827.pdf

Bettinger, E. P., Boatman, A., & Long, B. T. (2013). Student supports: Developmental education and other academic programs. *The Future of Children, 23*(1), 93-115. doi:10.1353/foc.2013.0003

Bettinger, E. P., Long, B. T., Oreopoulos, P., & Sanbonmatsu, L. (2012). The role of application assistance and information in college decisions: Results from the H&R Block FAFSA experiment. *The Quarterly Journal of Economics, 127*(3), 1205-1242. doi.org/10.1093/qje/qjs017

Bidjerano, T., & Dai, D. Y. (2007). The relationship between the big-five model of personality and self-regulated learning strategies. *Learning and Individual Differences, 17*(1), 69-81. doi: 10.1016/j.lindif.2007.02.001

Borghans, L., Duckworth, A. L., Heckman, J. J., & ter Weel, B. (2008). The economics and psychology of personality traits. *Journal of Human Resources, 43*(4), 972-1059. doi:10.3386/w13810

Bowen, W. G., Chingos, M. M., & McPherson, M. S. (2009). *Crossing the finish line: Completing college at America's public universities* (Vol. 52). NJ: Princeton University Press.

Bozick, R., & DeLuca, S. (2011). Not making the transition to college: School, work, and opportunities in the lives of American youth. *Social Science Research, 40*(4), 1249-1262. doi.org/10.1016/j.ssresearch.2011.02.003

Bridgeland, J., & Bruce, M. (2011). 2011 National survey of school counselors: Counseling at a crossroads. College Board Advocacy & Policy Center.

Broda, M., Yun, J., Schneider, B., Yeager, D. S., Walton, G. M., & Diemer, M. (2018). Reducing Inequality in Academic Success for Incoming College Students: A Randomized Trial of Growth Mindset and Belonging Interventions. *Journal of Research on Educational Effectiveness,11*(3), 317-338. doi:10.1080/19345747.2018.1429037

Burdman, P. (2018, November 01). The Mathematics of Opportunity: Rethinking the Role of Math in Educational Equity. Retrieved from https://justequations.org/resource/the-mathematics-of-opportunity-report/

CASEL (2003). *Safe and sound: An educational leader's guide to evidence-based social and emotional learning (SEL) programs*. The Collaborative for Academic, Social, and Emotional Learning (CASEL) in Cooperation with the Mid-Atlantic Regional. Retrieved from http://www.casel.org/safe-and-sound-an-educational-leaders-guide-to-evidence-based-social-and-emotional-learning-sel-programs

Casillas, A., Robbins, S., Allen, J., Kuo, Y. L., Hanson, M. A., & Schmeiser, C. (2012). Predicting early academic failure in high school from prior academic achievement, psychosocial characteristics, and behavior. *Journal of Educational Psychology, 104*, 407-420. doi:10.1037/a0027180

Castleman, B. L., & Page, L. C. (2015). Summer nudging: Can personalized text messages and peer mentor outreach increase college going among low-income high school graduates? *Journal of Economic Behavior & Organization, 115*, 144-160. doi*: 10.1016/j.jebo.2014.12.008*

Castleman, B.L., & Page, L.C. (2014). *Summer melt: Supporting low-income students in the transition from high school to college*. Cambridge, MA: Harvard Education Press.

Cohen, G. L., Garcia, J., Purdie-Vaughns, V., Apfel, N., & Brzustoski, P. (2009). Recursive processes in self-affirmation: Intervening to close the minority achievement gap. *Science, 324,* 400-403.

Cohen, J., McCabe, L., Michelli, N. M., & Pickeral, T. (2009). School climate: Research, policy, practice, and teacher education. *Teachers College Record, 111*(1), 180-213.

Conger, R. D., Belsky, J., & Capaldi, D. M. (2009). The intergenerational transmission of parenting: Closing comments for the special section. *Developmental Psychology, 45*(5), 1276-1283. doi: 10.1037/a0016911

Conley, D. T. (2012). *A complete definition of college and career readiness.* Eugene, OR: Educational Policy Improvement Center. Retrieved from https://eric.ed.gov/?id=ED537876

Constantine, J. M., Seftor, N. S., Martin, E. S., Silva, T., & Myers, D. (2006). Study of the effect of the talent search program on secondary and postsecondary outcomes in Florida, Indiana and Texas: Final report from phase II of the national evaluation. Washington, DC: U.S. Department of Education. Retrieved from https://www2.ed.gov/rschstat/eval/highered/talentsearch-outcomes/ts-report.pdf

Cook, J. E., Purdie-Vaughns, V., Garcia, J., & Cohen, G. L. (2012). Chronic threat and contingent belonging: Protective benefits of values affirmation on identity development. *Journal of Personality and Social Psychology, 102*(3), 479-496. doi: 10.1037/a0026312

Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987-2003. *Review of Educational Research, 76*(1), 1-62. doi: 10.3102/00346543076001001

Damon, W. (2008) *The path to purpose: Helping our children find their calling in life.* New York: Free Press.

Domina, T. (2009). What works in college outreach: Assessing targeted and schoolwide interventions for disadvantaged students. *Educational Evaluation and Policy Analysis, 31*(2), 127-152. doi: 10.3102/0162373709333887

Domina, T., Conley, A., & Farkas, G. (2011). The link between educational expectations and effort in the college-for-all era. *Sociology of Education, 84*(2), 93-112. doi:10.1177/1941406411401808

Dougherty, C., Mellor, L., & Jian, S. (2006). The relationship between advanced placement and college graduation. 2005 AP Study Series, Report 1. National Center for Educational Accountability. Retrieved from https://eric.ed.gov/?id=ED519365

Duckworth, A. L., Grant, H., Loew, B., Oettingen, G., & Gollwitzer, P. M. (2011). Self-regulation strategies improve self-discipline in adolescents: Benefits of mental contrasting and implementation intentions. *Educational Psychology, 31*(1), 17-26. doi: 10.1080/01443410.2010.506003

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087-1101. doi:10.1037/0022-3514.92.6.1087

Duckworth, A. L., & Seligman, M. E. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science, 16*(12), 939-944. doi:10.1111/j.1467-9280.2005.01641.x

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*(1), 405-432. doi: 10.1111/j.1467-8624.2010.01564.x

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*(10), 1040-1048. doi:10.1037/0003-066x.41.10.1040

Dweck, C. S., & Elliott, E. S. (1983). Achievement motivation. In P. H. Mussen, E. M. Hetherington & L. Carmichael (Eds.), *Handbook of Child Psychology* (643-691). New York: Wiley.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256-273.

Dynarski, S., Libassi, C. J., Michelmore, K., & Owen, S. (2018). Closing the gap: The effect of a targeted, tuition-free promise on college choices of high-achieving, low-income students (No. w25349). *National Bureau of Economic Research.* doi:10.3386/w25349

Easton, J. Q., Johnson, E., & Sartain, L. (2017). *The predictive power of ninth-grade GPA*. Retrieved from the University of Chicago Consortium on School Research: https://consortium.uchicago.edu/publications/predictive-power-ninth-grade-gpa

Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, Values and Academic Behaviors. In J. P. Spence (Ed.), *Achievement and achievement motivation: Psychological and sociological approaches* (pp. 75-146). San Francisco, CA: Free man.

Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Keyes, T. S., Johnson, D. W., & Beechum, N. W. (2012). *Teaching adolescents to become learners: The role of noncognitive factors in shaping school performance—A critical literature review.* Retrieved from the University of Chicago Consortium on School Research: https://consortium.uchicago.edu/sites/default/files/2018-10/Noncognitive%20Report_0.pdf

Friedmann, E. (2016, June). Building Intersegmental Partnerships - edpolicyinca.org. Retrieved from https://edpolicyinca.org/sites/default/files/Building Intersegmental Partnerships.pdf

Fong, A. B., Finkelstein, N. D., Jaeger, L. M., Diaz, R., & Broek, M. E. (2015). *Evaluation of the expository reading and writing course: Findings from the Investing in Innovation Development grant.* Retrieved from WestEd: https://www.wested.org/wp-content/uploads/2016/11/1438034849ERWC_Report-3.pdf

Friedmann, E. (2017, June). *Building intersegmental partnerships*. Retrieved from Policy Analysis for California Education: https://edpolicyinca.org/sites/default/files/Building Intersegmental Partnerships.pdf

Gamoran, A. (1987). The stratification of high school learning opportunities. *Sociology of Education, 60*(3), 135-155. doi:10.2307/2112271

Gaumer Erickson, A. & Noonan, P. (n.d.). College & career competency framework. Retrieved from cccframework.org

Geiser, S., & Santelices, M. V. (2007). *Validity of high-school grades in predicting student success beyond the freshman year: High-school record vs. standardized tests as indicators of four-year college outcomes.* Retrieved from the University of California, Berkeley, Center for Studies in Higher Education: https://cshe.berkeley.edu/sites/default/files/publications/rops.geiser._sat_6.13.07.pdf

González, K. P., Stoner, C., & Jovel, J. E. (2003). Examining the role of social capital in access to college for Latinas: Toward a college opportunity framework. *Journal of Hispanic Higher Education, 2*(2), 146-170. doi:10.1177/1538192702250620

Goyette, K. A. (2008). College for some to college for all: Social background, occupational expectations, and educational expectations over time. *Social Science Research, 37*(2), 461-484. doi:10.1016/j.ssresearch.2008.02.002

Grodsky, E., & Jones, M. T. (2007). Real and imagined barriers to college entry: Perceptions of cost. *Social Science Research, 36*(2), 745-766. doi: 10.1016/j.ssresearch.2006.05.001

Grodsky, E., & Riegle-Crumb, C. (2010). Those who choose and those who don't: Social background and college orientation. *The ANNALS of the American Academy of Political and Social Science, 627*(1), 14-35. doi:10.1177/0002716209348732

Gwynne, J. A., Pareja, A. S., Ehrlich, S. B., & Allensworth, E. (2012). *What matters for staying on-track and graduating in Chicago public schools: A focus on English language learners.* Retrieved from the University of Chicago Consortium on School Research: https://consortium.uchicago.edu/publications/what-matters-staying-track-and-graduating-chicago-public-schools-focus-english-language

Hall, S. (2013). Putting college and career readiness at the forefront of district priorities in Dallas. *Voices in Urban Education, 38*, 6-9.

Hamilton, L. T. (2016). *Parenting to a degree: How family matters for college women's success.* Chicago: The University of Chicago Press.

Harding, D. J. (2011). Rethinking the cultural context of schooling decisions in disadvantaged neighborhoods: From deviant subculture to cultural heterogeneity. *Sociology of Education, 84*(4), 322-339. doi:10.1177/0038040711417008

Heckman, J. J. (2011). The economics of inequality: The value of early childhood education. *American Educator, 35*(1), 31-35.

Heckman, J., Pinto, R., & Savelyev, P. (2013). Understanding the mechanisms through which an influential early childhood program boosted adult outcomes. *The American Economic Review, 103*(6), 2052-2086. doi:10.3386/w18581

Hoekstra, M. (2009). The effect of attending the flagship state university on earnings: A discontinuity-based approach. *Review of Economics and Statistics, 91*(4), 717-724. doi:10.1162/rest.91.4.717

Holland, M. & DeLuca, S. (2016). "Why wait years to become something?" Low-income African American youth and the costly career search in for-profit trade schools. *Sociology of Education, 89*(4), 261-278. doi:10.1177/0038040716666607

Horn, L. J., Chen, X., & Chapman, C. (2003). *Getting ready to pay for college: What students and their parents know about the cost of college tuition and what they are doing to find out.* Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics.

Horng, E. L., Evans, B. J., Foster, J. D., Kalamkarian, H. S., Hurd, N. F., & Bettinger, E. P. (2013). Lessons learned from a data-driven college access program: The National College Advising Corps. *New Directions for Youth Development, 2013*(140), 55-75. doi:10.1002/yd.20078

Howell, J. S., Kurlaender, M., & Grodsky, E. (2010). Postsecondary preparation and remediation: Examining the effect of the early assessment program at California State University. *Journal of Policy Analysis and Management, 29*(4), 726-748. doi:10.1002/pam.20526

Hoxby, C., & Avery, C. (2013). The missing "one-offs": The hidden supply of high-achieving, low-income students. *Brookings Papers on Economic Activity, 2013*(1), 1-65. doi:10.3386/w18586

Hoxby, C. M., & Turner, S. (2015). What high-achieving low-income students know about college. *The American Economic Review, 105*(5), 514-517. doi:10.3386/w20861

Hurwitz, M., & Howell, J. (2013). *Measuring the impact of high school counselors on college enrollment.* Retrieved from the College Board: https://files.eric.ed.gov/fulltext/ED562748.pdf

Hurwitz, M., Smith, J., Howell, J., & Pender, M. (2012). The role of high schools in students' postsecondary choices. College Board Advocacy & Policy Center Research. Retrieved from: https://files.eric.ed.gov/fulltext/ED541972.pdf

Ingersoll, R. M. (1999). The problem of underqualified teachers in American secondary schools. *Educational Researcher, 28*(2), 26-37. doi:10.2307/1177187

Jacob, B. A. & Wilder Linkow, T. (2011). Educational expectations and attainment. In G. J. Duncan & R. J. Murnane (Eds.), *Whither Opportunity? Rising Inequality and the Uncertain Life Chances of Low-Income Children* (133-163). New York: Russell Sage Press.

Jackson, J. S. (2015). Does an early college readiness signal discourage college application and enrollment? *Journal of Research on Educational Effectiveness, 8*(3), 380-399. doi: 10.1080/19345747.2014.984885

Kalogrides, D., Loeb, S., & Béteille, T. (2012). Systematic sorting: Teacher characteristics and class assignments. *Sociology of Education, 86*(2), 103-123. doi:10.1177/0038040712456555

Keith, T. Z. (1982). Time spent on homework and high school grades: A large-sample path analysis. *Journal of Educational Psychology, 74*(2), 248-253. doi:10.1037//0022-0663.74.2.248

Kelly, A. V. (2009). *The curriculum: Theory and practice* (6th ed.). Los Angeles: SAGE.

King, J. E. (2004). *Missed opportunities: Students who do not apply for financial aid.* Retrieved from the American Council on Education: https://www.acenet.edu/news-room/Documents/IssueBrief-2004-Missed-Opportunities-Students-Who-Do-Not-Apply-for-Financial-Aid.pdf

Kless, L. (2013). San Jose Unified School District, 2010-2013: Building a culture of evidence-based practice around college readiness. *Voices in Urban Education, 38*, 23-27.

Klopfenstein, K., & Thomas, M. K. (2009). The link between advanced placement experience and early college success. *Southern Economic Journal, 75*(3), 873-891.

Kurlaender, M. (2018, November 16). High expectations demand high support: Strengthening college readiness at the California State Universities. *Education Next*. Retrieved from https://www.educationnext.org/high-expectations-demand-high-support-strengthening-college-readiness-california-state-universities

Kurlaender, M., Carrell, S., & Jackson, J. (2016). The promises and pitfalls of measuring community college quality. *The Russell Sage Foundation Journal of the Social Sciences, 2*(1), 174-190. doi: 10.1353/rus.2016.0009

Kurlaender, M., Jackson, J., Howell, J. S., & Grodsky, E. (2014). College course scarcity and time to degree. *Economics of Education Review, 41*, 24-39. doi:10.1016/j.econedurev.2014.03.008

Kurlaender, M., & Howell, J. S. (2012, August 31). Collegiate Remediation: A Review of the Causes and Consequences. Literature Brief. College Board. Retrieved from https://eric.ed.gov/?id=ED562687

Lareau, A. (2000). *Home advantage: Social class and parental intervention in elementary education.* Lanham, MD: Rowman & Littlefield.

Lareau, A. (2014). *Unequal childhoods: Class, race, and family life*. Berkeley, Calif: University of California Press.

Lazowski, R. A., & Hulleman, C. S. (2016). Motivation interventions in education: A meta-analytic review. *Review of Educational Research, 86*(2), 602-640.

Lennon, M. C. (2010). *Signalling abilities and achievement: Measuring and reporting on skill and competency development.* Higher Education Quality Council of Ontario. Retrieved from https://www.academia.edu/17278556/Signalling_Abilities_and_Achievement_Measuring_and_Reporting_on_Skill_and_Competency_Development

Levine, P. B., & Zimmerman, D. J. (1995). The benefit of additional high-school math and science classes for young men and women. *Journal of Business & Economic Statistics, 13*(2), 137-149. doi:10.2307/1392368

Long, B. T. (2010). *Financial aid: A key to community college student success*. Paper presented at the White House Summit on Community Colleges. Retrieved from https://www2.ed.gov/PDFDocs/college-completion/08-financial-aid.pdf

Long, M. C., Conger, D., & Iatarola, P. (2012). Effects of high school course-taking on secondary and postsecondary success. *American Educational Research Journal, 49*(2), 285-322. doi: 10.3102/0002831211431952
Mac Iver, M. A., Mac Iver, D. J., & Clark, E. (2015). Building a college readiness system: Progress in the Dallas Independent School District. Everyone Graduates Center, John Hopkins University. Retrieved from http://new.every1graduates.org/wp-content/uploads/2016/04/2016_DallasCASESTUDY_FINAL.pdf
Mann, A., & Diprete, T. A. (2013). Trends in gender segregation in the choice of science and engineering majors. *Social Science Research, 42*(6), 1519-1541. doi:10.2139/ssrn.1938328
Marsh, H. W. (1991). A multidimensional perspective on students' evaluations of teaching effectiveness: Reply to Abrami and D'Apollonia (1991). *Journal of Educational Psychology, 83*(3), 416-421. doi:10.1037/0022-0663.83.3.416
McClelland, M. M., Cameron, C. E., Connor, C. M., Farris, C. L., Jewkes, A. M., & Morrison, F. J. (2007). Links between behavioral regulation and preschoolers' literacy, vocabulary, and math skills. *Developmental Psychology, 43*(4), 947-959. doi:10.1037/0012-1649.43.4.947
McDonough, P. M. (1997). *Choosing colleges: How social class and schools structure opportunity.* Albany: State University of New York Press.
McFarland, J., Hussar, B., Zhang, J., Wang, X., Wang, K., Hein, S., Diliberti, M., Forrest Cataldi, E., Bullock Mann, F., & Barmer, A. *The Condition of Education 2019.* Prepared by the National Center for Education Statistics.
McKeachie, W. J., Pintrich, P. R., Lin, Y., & Smith, D. A. F. (1986). Teaching and learning in the college classroom: A review of literature. Retrieved from https://files.eric.ed.gov/fulltext/ED314999.pdf
McKinney, L., & Roberts, T. (2012). The role of community college financial aid counselors in helping students understand and utilize financial aid. *Community College Journal of Research and Practice, 36*(10), 761-774. doi:10.1080/10668926.2011.585112
Morgan, P. L., Farkas, G., Hillemeier, M. M., & Maczuga, S. (2016). Science achievement gaps begin very early, persist, and are largely explained by modifiable factors. *Educational Researcher, 45*(1), 18-35. doi:10.3102/0013189x16633182
Morgan, R., & Klaric, J. (2006, November 30). AP® Students in College: An Analysis of Five-Year Academic Careers. The College Board Research Report No. 2007-4. Retrieved from https://eric.ed.gov/?id=ED561034
Murdock, T. B., Anderman, L. H., & Hodge, S. A. (2000). Middle-grade predictors of students' motivation and behavior in high school. *Journal of Adolescent Research, 15*(3), 327-351. doi: 10.1177/0743558400153002
Nagaoka, J., & Holsapple, M. A. (2017). Beyond academic readiness: Building a broader range of skills for success in college. Retrieved from the University of Chicago Consortium on School Research: https://consortium.uchicago.edu/publications/beyond-academic-readiness-building-broader-range-skills-success-college
Noble, J., & Sawyer, R. (2002). *Predicting different levels of academic success in college using high school GPA and ACT Composite score: ACT Research Report No. 2002–4.* Iowa City, IA: ACT. (ERIC Document Reproduction Service No. ED469746)
Osterman, K. F. (2000). Students' need for belonging in the school community. *Review of Educational Research, 70*(3), 323-367. doi:10.2307/1170786
Papay, J. P., Murnane, R. J., & Willett, J. B. (2011). *How performance information affects human-capital investment decisions: The impact of test-score labels on educational outcomes.* NBER Working Paper Series: No. 17120.
Partnership for 21st Century Skills. (2010). *21st century readiness for every student: A policymaker's guide*. Retrieved from https://files.eric.ed.gov/fulltext/ED519425.pdf
Pellegrino, J. W., & Hilton, M. L. (2012). *Education for life and work: Developing transferable knowledge and skills in the 21st century.* Washington, D.C.: The National Academies Press.
Peng, S. S., & Wright, D. (1994). Explanation of academic achievement of Asian American students. *The Journal of Educational Research, 87*(6), 346-352. doi:10.1080/00220671.1994.9941265
Perez, P. A., & McDonough, P. M. (2008). Understanding Latina and Latino college choice: A social capital and chain migration analysis. *Journal of Hispanic Higher Education, 7*(3), 249-265. doi: 10.1177/1538192708317620
Perna, L. W. (2007). Understanding high school students' willingness to borrow to pay college prices. *Research in Higher Education, 49*(7), 589-606. doi:10.1007/s11162-008-9095-6
Perna, L. W. (2000). Differences in the decision to attend college among African Americans, Hispanics, and Whites. *The Journal of Higher Education, 71*(2), 117-141. doi: 10.1080/00221546.2000.11778831
Perna, L. W., & Titus, M. A. (2005). The Relationship between Parental Involvement as Social Capital and College Enrollment: An Examination of Racial/Ethnic Group Differences. *The Journal of Higher Education,76*(5), 485-518. doi:10.1080/00221546.2005.11772296
Pintrich, P. R., & DeGroot, E. (1990, April). *Quantitative and qualitative perspectives on student motivational beliefs and self-regulated learning.* Presented at the Annual Meeting of the American Educational Research Association, Boston, MA.
Pitcher, M. A., Duncan, S. J., Nagaoka, J., Moeller, E., Dickerson, L., & Beechum, N. O. (2016). *A capacity-building model for school improvement.* Retrieved from the University of Chicago Network for College Success: https://ncs.uchicago.edu/page/capacity-building-model-school-improvement
Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin, 135*(2), 322-338. doi:10.1037/a0014996
Reed, S., Kurlaender, M., & Hurtt, A. (2016, September 7). *Are A-G requirements an indicator of college readiness?* Memo submitted to the California Department of Education.

Reyes, O., & Jason, L. A. (1993). Pilot study examining factors associated with academic success for Hispanic high school students. *Journal of Youth and Adolescence, 22*(1), 57-71. doi: 10.1007/bf01537904
Reynolds, J. R., & Pemberton, J. (2001). Rising College Expectations among Youth in the United States: A Comparison of the 1979 and 1997 NLSY. *The Journal of Human Resources,36*(4), 703-726. doi:10.2307/3069639
Riegle-Crumb, C., King, B., Grodsky, E., & Muller, C. (2012). The More Things Change, the More They Stay the Same? Prior Achievement Fails to Explain Gender Inequality in Entry Into STEM College Majors Over Time. *American Educational Research Journal,49*(6), 1048-1073. doi:10.3102/0002831211435229
Rose, H., & Betts, J. R. (2004). The Effect of High School Courses on Earnings. *Review of Economics and Statistics,86*(2), 497-513. doi:10.1162/003465304323031076
Rosenbaum, J. E. (2011). The complexities of college for all: Beyond fairy-tale dreams. *Sociology of Education, 84*(2), 113-117. doi:10.1177/0038040711401809
Rotter, J. B. (1954). *Social learning and clinical psychology*. New York, NY: Prentice-Hall.
Sacerdote, B. (2001). Peer effects with random assignment: Results for Dartmouth roommates. *The Quarterly Journal of Economics, 116*(2), 681-704. doi:10.3386/w7469
Sandefur, G. D., Meier A. M., & Campbell, M. E. (2006). Family resources, social capital, and college attendance. *Social Science Research, 35*(2), 525-553. doi:10.1016/j.ssresearch.2004.11.003
Schneider, B., Swanson, C. B., & Riegle-Crumb, C. (1997). Opportunities for learning: Course sequences and positional advantages. *Social Psychology of Education, 2*(1), 25-53. https://doi.org/10.1023/A:1009601517753
Schunk, D. H. (2003). Self-efficacy for reading and writing: Influence of modeling, goal setting, and self-evaluation. *Reading &Writing Quarterly, 19*(2), 159-172. doi:10.1080/10573560308219
Scott, T. P., Tolson, H.L., & Lee, Y. H. (2010). Assessment of advanced placement participation and university academic success in the first semester: Controlling for selected high school academic abilities. *Journal of College Admission, 208*, 26-30. Retrieved from https://files.eric.ed.gov/fulltext/EJ893892.pdf
Scott-Clayton, J. (2012). *Information constraints and financial aid policy*. NBER Working Paper Series: No. 17811. doi: 10.3386/w17811
Seftor, N. S., Mamun, A., & Schirm, A. (2009). *The impacts of regular Upward Bound on postsecondary outcomes 7-9 years after scheduled high school graduation.* Washington, DC: U. S. Department of Education, Policy and Program Studies Service.
Sherman, D. K., Hartson, K. A., Binning, K. R., Purdie-Vaughns, V., Garcia, J., Taborsky-Barba, S., Tomassetti, S., Nussbaum, A. D., & Cohen, G. L. (2013). Deflecting the trajectory and changing the narrative: How self- affirmation affects academic performance and motivation under identity threat. *Journal of Personality and Social Psychology, 104,* 591-618. doi:10.1037/a0031495
Shoda, Y., Mischel, W., & Peake, P. K. (1990). Predicting adolescent cognitive and self-regulatory competencies from preschool delay of gratification: Identifying diagnostic conditions. *Developmental Psychology, 26*(6), 978-986. doi:10.1037//0012-1649.26.6.978
Silver, D., Hensley, E., Hong, Y., Siegel, P., & Bradby, D. (2017). *University eligibility study for the public high school class of 2015.* RTI International. Retrieved from http://www.data-science-at-csun.com/wp-content/uploads/2018/02/SB103-Final-OPR-Letter.Report.UC-and-CSU-Letters-7.24.17-4-1.pdf
Stanton-Salazar, R. (1997). A social capital framework for understanding the socialization of racial minority children and youths. *Harvard Educational Review, 67*(1), 1-41. doi: 10.17763/haer.67.1.140676g74018u73k
Stanton-Salazar, R. D. (2001). *Manufacturing hope and despair: The school and kin support networks of U.S.-Mexican youth.* New York: Teachers College Press.
Stevens, M. L. (2007). *Creating class: College admissions and the education elites.* Cambridge, MA: Harvard University Press.
Stephan, J. L., & Rosenbaum, J. E. (2013). Can high schools reduce college enrollment gaps with a new counseling model? *Educational Evaluation and Policy Analysis, 35*(2), 200-219. doi: 10.3102/0162373712462624
Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 271-324. doi:10.4324/9781315175775-5
Teo, A., Carlson, E., Mathieu, P. J., Egeland, B., & Sroufe, L.A. (1996). A prospective longitudinal study of psychosocial predictors of achievement. *Journal of School Psychology, 34*(3), 285-306. doi:10.1016/0022-4405(96)00016-7
Tierney, W. G., & Venegas, K. M. (2006). Fictive kin and social capital: The role of peer groups in applying and paying for college. *American Behavioral Scientist, 49*(12), 1687-1702. doi: 10.1177/0002764206289145
Trautwein, U., Lüdtke, O., Schnyder, I., & Niggli, A. (2006). Predicting homework effort: Support for a domain-specific, multilevel homework model. *Journal of Educational Psychology,98*(2), 438-456. doi:10.1037/0022-0663.98.2.438
Turner, A. C., Mayo, A., Hayes, K., Heath, R. D., & Dickson, S. (2015). *Foundations for young adult success: A developmental framework.* Concept Paper for Research and Practice. Retrieved from the University of Chicago Consortium on Chicago School Research: https://consortium.uchicago.edu/publications/foundations-young-adult-success-developmental-framework
U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study (ELS), 2002.
Vygotsky, L. (1978). *Mind in society.* Cambridge, MA: Harvard University Press.

Walton, G. M., & Cohen, G. L. (2011). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science, 331*(6023), 1447-1451. doi: 10.1126/science.1198364

Walton, G. M., & Cohen, G. L. (2007). A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology, 92*(1), 82-96. http://dx.doi.org/10.1037/0022-3514.92.1.82

Weinstein, C. E., & Mayer, R. E. (1986). The teaching of learning strategies. In M. Wittrock (Ed.), *Handbook of research on teaching* (315-327). New York: Macillan.

Wentzel, K.R. (1993). Does being good make the grade? Social behavior and academic competence in middle school. *Journal of Educational Psychology, 85*(2), 357-364. doi:10.1037//0022-0663.85.2.357

Xie, Y., & Shauman, K. A. (2003). *Women in science: Career processes and outcomes.* Cambridge, MA: Harvard University Press.

Yeager, D. S., & Walton, G. M. (2011). Social-psychological interventions in education: They're not magic. *Review of Educational Research, 81*(2), 267-301. doi:10.3102/0034654311405999

Yeager, D. S., Walton, G. M., Brady, S. T., Akcinar, E. N., Paunesku, D., Keane, L., . . . Dweck, C. S. (2016). Teaching a lay theory before college narrows achievement gaps at scale. *Proceedings of the National Academy of Sciences,113*(24). doi:10.1073/pnas.1524360113

Yonezawa, S. (2013). Increasing federal financial aid access for California Community College students. *PATHWAYS to Postsecondary Success.* Retrieved from University of California *All Campus Consortium On Research for Diversity*: https://pathways.gseis.ucla.edu/publications/201304_FinancialAidPR.pdf

Zimmerman, D. J. (2003). Peer effects in academic outcomes: Evidence from a natural experiment. *Review of Economics and Statistics, 85*(1), 9-23. doi:10.1162/00346530376268767 7

Zimmerman, B. J., & Martinez-Pons, M. M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal, 23*(4), 614-628. doi:10.3102/00028312023004614

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About

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