Chapter 11
Public Policy and Higher Education Attainment in a Twenty-First-Century Racial Demography: Examining Research from Early Childhood to the Labor Market

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Introduction

After decades of attention to improving college access, attention has now turned to college completion. Consideration of college completion rates presents a stunning picture of stagnation, putting a damper on the appearance of progress and again raising questions about the factors that are operating to limit progress along the larger educational pipeline (Turner, 2004). Whereas college enrollment rates have increased over the past 20 years, college completion rates have generally not. Some groups did manage to experience a slow but steady increase in college completion rates, while others, such as Hispanics, actually experienced declining completion rates (Kurlaender & Flores, 2005). On average, low-income and underrepresented minority groups, defined here as students who are Black, Latino, and Native American, continue to exhibit even lower rates of completion than the overall US population (Kurlaender & Felts, 2008). Moreover, the USA has failed to improve college completion rates during a period of time when college degree completion has increasingly become the necessary condition for entry into the middle class and other similarly industrialized countries have experienced substantial improvements in college completion, potentially compromising the US global competitiveness (Lewin, 2010).

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Why does the United States have such poor college completion rates? Has US educational policy moved beyond questions of college access to those of completion? Should these two markers of educational achievement be considered together or separately? How do other parts of the US educational pipeline, such as the early childhood education to kindergarten sector, the middle school sector, and the high school sector, contribute to the larger goals of college access and completion? A more holistic view of who stays in and who exits the educational pipeline before college completion indicates that the problems preventing completion begin well before college entry.

By the mid-2000s, social science research in various disciplines as well as policy analysts from legislative arenas argued that, to address the problem of college access and completion for low-income and underrepresented students in the USA, a K-16 approach would be more comprehensive and better suited to identifying effective strategies (Gándara, 2002; Louie, 2007; Trent, Orr, Ranis, & Holdaway, 2007). Louie, for example, documents a growing research consensus calling for an integrative model that bridges the gap in research, policy, and practice between K-12 schooling and higher education—in other words, a K-16 perspective. The essays make recommendations for state policymakers to establish stronger legislative links between K-12 and higher education, for universities and community organizations to create additional partnerships, and for researchers to stretch their disciplinary and organizational boundaries by adopting a K-16 perspective. In this chapter, we use a conceptual approach that builds on this third recommendation with one key alteration. We extend the K-16 pipeline to include early childhood initiatives that have been found to have an effect on long-term educational outcomes such as high school completion, college enrollment, and college completion.

The P-16 framework we apply to understanding the educational pipeline in this review includes numerous interventions that have been suggested to affect the immediate, intermediate, and long-term outcomes associated with college success. For example, consideration of the barriers that limit high school completion particularly for very low-income individuals, English language learners, and many males of color, suggests that high school completion is a critical step in the college access and completion process (Callahan, Wilkinson, & Muehler, 2010; Saenz & Ponjuan, 2009; Tyler & Lofstrom, 2009). We therefore argue that, while the research on college access and completion places the postsecondary institution at the center of such interventions, these institutions are by no means the only actors in the solutions required to help those currently least likely to earn a college degree to reach this goal. The American high school, with its crucial relationship to the pre-K-8 sector and the college-related activities that can occur during high school (such as enrolling in rigorous course work and the college application process), is clearly a key actor in the P-16 pipeline. In this chapter, we offer an expanded view of the various segments of the US educational pipeline, from early childhood to college completion. Within each segment, we identify policies and programming designed to improve postsecondary outcomes and ultimately lead to college completion. That is, we discuss specific policies and practices related to the college access and completion of low-income and minority students and share insights into how we know

from available theory and research whether such practices work as well as what remains to be learned about these particular potential solutions.

We engage the research in this chapter in the following manner. Education research varies in method and purpose and draws on multiple disciplinary perspectives. The research on postsecondary access and completion reviewed in this chapter is by no means exhaustive; we review research from education, economics, sociology, and public policy, limiting the discussion to studies that directly and indirectly examine policies that affect postsecondary performance. Chapters in previous editions of this handbook also offer excellent strategies for understanding the role of methods when assessing particularly complex issues, such as financial aid (Cheng, 2008; DesJardins, 2003; Goldrick-Rab, Harris, & Trostel, 2009). We refer the reader to this work for an additional methodological review.

Roadmap

We begin with a demographic portrait that utilizes geographic information system (GIS) methods to describe two key outcomes of interest—completion of a high school diploma and completion of a baccalaureate degree. Using a P-16 pipeline framework, we then provide an assessment of research from the early childhood education/kindergarten sector to the high school level, with a particular focus on policies and programs that are designed to influence high school graduation, college access, and college completion outcomes. We next examine the postsecondary institution sector of the P-16 pipeline, which we categorize as a dichotomy between the "elite" and the "access" institutions, noting the important debates that translated into policy and programmatic interventions within the most selective US colleges and the community college sector. We end with recommendations for areas of future research.

The Demography of Educational Attainment

Sociologists interested in schools and educational attainment have long incorporated demographic indicators into analyses of educational attainment, even if demographers, who apply particular methods in the study of population processes, have not always engaged with education variables in a similar manner (Marlani, 2009). Nonetheless, educational attainment—and, for the purposes of this chapter, high school completion, college enrollment, and college completion—is closely associated with the demographic characteristics of the individuals who achieve or do not achieve these educational milestones. For example, research reveals that not attaining a high school diploma has costs for both the individual and society. Tyler and Lofstrom (2009) note that not addressing the dismal rate of failure in obtaining a high school diploma has significant social implications, such as low tax revenues,

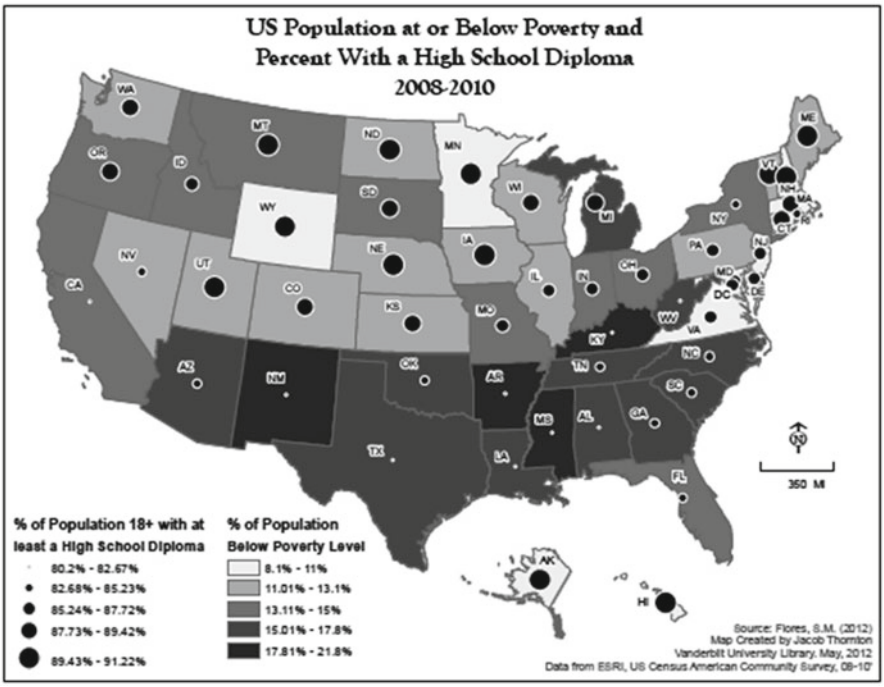

Fig. 11.1 US population at or below poverty and percent with a high school diploma 2008–2010

increased spending on health and entitlement programs, and higher crime rates. Because low-income students and racial minorities such as African Americans and Latinos are more likely to drop out of high school than White students, the individual costs of dropping out of school fall more heavily on the economically and educationally disadvantaged. Earning a postsecondary credential also has documented individual and social benefits. At the individual level, as has been well established, educational attainment leads to higher earnings (Card, 1999). Moreover, a community whose population has a higher rate of college graduates and even high school graduates is associated with higher wages for other individuals in that community (Moretti, 2004).

Using GIS techniques, Figs. 11.1 and 11.2 illustrate the relationship between the completion of educational credentials and such demographic indicators as race/ethnicity and poverty. Using data from the American Community Survey for 2008–2010, Fig. 11.1 displays the percentages of individuals over age 18 who have earned a high school diploma in each state. We present these figures using black dots with a white outline; the percentage of the population that lives below the federal poverty level is represented for each state by the shades that range from white to gray to black. Wyoming, for example, has the lowest percentage of individuals age 18 and over living in poverty, which is presented in white, whereas New Mexico and Kentucky, which have some of the highest percentages of individuals age 18 and

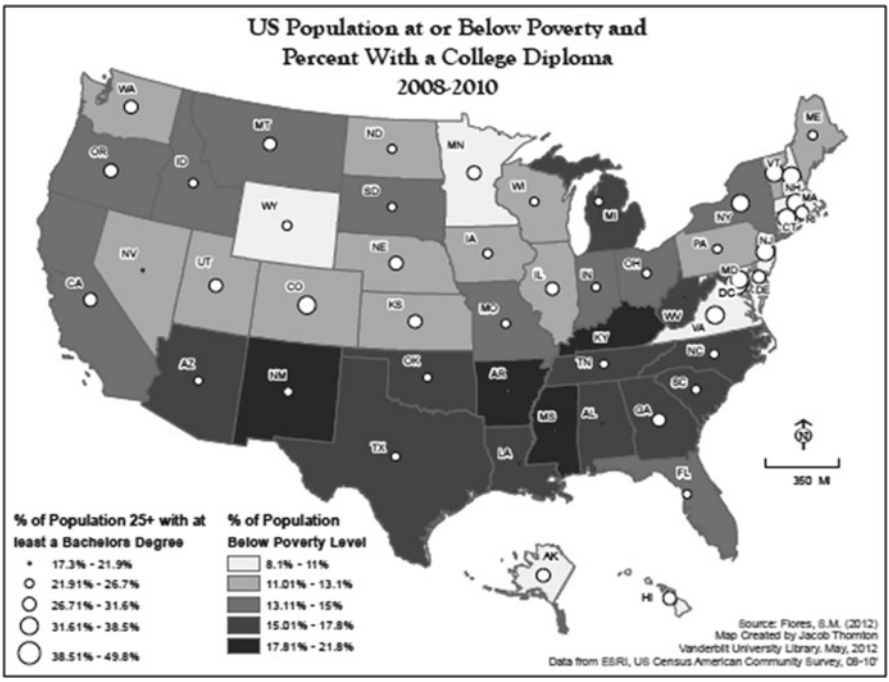

Fig. 11.2 US population at or below poverty and percent with a college diploma 2008–2010

over living in poverty, are presented in gray. The data show that a number of southern states have the highest percentage of the population living in poverty, including Arkansas, Kentucky, and Mississippi. States with the next highest percentage of those living in poverty are Texas, Arizona, and the rest of the southern states. The percentage of individuals age 18 and over in each state who have earned a high school diploma suggests the relationship between poverty and educational attainment. The four states with the highest percentage of individuals age 18–24 who have at least a high school diploma are Wyoming (91.2%), Minnesota (90.9%), Vermont (90.8%), and New Hampshire (90.7%); these are states with low poverty rates. Conversely, the states with the lowest percentage of high school graduates age 18–24 include states with the highest rates of poverty, most notably Texas (80.2%), Mississippi (80.3%), and Louisiana (86.6%). The states with the lowest percentage of high school graduates also have either large African American populations (Mississippi and Louisiana) or large immigrant and Hispanic populations (Texas and California).

Similarly, Fig. 11.2 presents American Community Survey data related to the percentage of individuals over age 25 in each state who have completed a bachelor's degree, also for the years 2008–2010, relative to the percentage of individuals in each state who live below the poverty line. While the states with the highest poverty level remain the same as in Fig. 11.1 (the darker the shade of gray, the higher the

percentage of poverty), the states at the top and bottom of the bachelor's degree completion distribution vary from those at the top and bottom of the high school completion distribution. That is, the states with the highest percentages of high school degree completion are not necessarily the states with the highest percentages of bachelor's degree completers. The states with the highest percentages of individuals over age 25 who have completed a bachelor's degree are Massachusetts (38.5%), Colorado (36.2%), Connecticut and Maryland (35.6%), and New York (34.9%). States at the bottom of the distribution for earning a bachelor's degree are West Virginia (17.3%), Arkansas (19.0%), Mississippi (19.6%), and Kentucky (20.5%). While the focus of this review is not necessarily state policy, we present the educational condition of states to provide a context for the programs and interventions we examine. These illustrations may also be interpreted in the context of the research described earlier about the relationship between degree attainment and crime as well as increased earnings for communities (Moretti, 2004; Tyler & Lofstrom, 2009). We now turn to the policy research on key milestones in the pre-K-16 pipeline—early childhood, middle school, high school, and college entry.

Early Childhood: Precollege Predictors of College Access and Completion

Economists, developmental psychologists, and education researchers have documented the impact early childhood education has on the college attainment of those who participate in such programs (Deming, 2009; Duncan, Ludwig, & Magnuson, 2007; Garces, Thomas, & Currie, 2002; Lee & Burkam, 2002; Ludwig & Miller, 2007). Additional research from neuroscience also suggests that early learning experiences, including early education programs, encourage brain development that has lifelong implications on the ability to learn (Nelson, 2000; Shonkoff & Phillips, 2000). Thus, in this section, we examine early childhood/early education programs associated with two milestones that lead to college completion, high school graduation, and college entry, as well as college completion itself. We also discuss current research on early childhood programs and argue that understanding students' early childhood education experiences is important in ensuring their long-term educational success. The studies we examine utilized experimental designs with the goal of establishing the causal impact of early childhood education on young adult educational outcomes.

Preschool and College Completion

The Perry Preschool intervention was a randomized experiment that provided half-day home and educational services to low-income, low-IQ African American children in Ypsilanti, Michigan, in the 1960s. All Perry Preschool teachers had at

least a bachelor's degree. Children were randomly assigned to participate in this preschool intervention, which included 1–2 years of services. The Abecedarian program, which began in 1972, served low-income African American women in Chapel Hill, North Carolina. The program participants, who were randomly selected, received year-round child care, health care, and other social services for the first 5 years of their children's life. Beginning as infants, the children of the selected participants were provided with transportation to and from the program site, and they received individualized educational activities in a classroom setting with low teacher-child ratios.

Researchers found that the Perry program had long-term effects on program participants' high school completion rates—66% of the Perry participants compared with only 45% of the control group graduated high school—but there was no effect of the program on participation in postsecondary education (Schweinhart et al., 2005). In contrast, the long-term effects of the Abecedarian intervention for the children of participants included college entry rates 2.5 times higher than those of the control group: 36% of Abecedarian participants went on to pursue postsecondary education, while 13% of the control group did so (Barnett & Masse, 2007; Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002).

While these studies concluded that these early childhood education programs had promising effects on the long-term educational success of program participants, a reanalysis of the data suggests that the program effects of the two interventions may have been overstated (Anderson, 2008). Anderson reexamined the studies, applying a de novo design to correct for the problem of multiple inferences. After reducing the number of hypotheses tested and combining multiple outcomes into a summary index across the preteen, adolescent, and adult life stages, Anderson concluded that earlier studies overstated the programs' effects on low-income male students. While both programs boasted improved high school graduation rates, Anderson's reanalysis suggested that this was due to improvements in female program participants' graduation rate, not males. Anderson also concluded that the improved college rates for the Abecedarian participants were also due primarily to females' higher likelihood of entering college.

The program effects for males related primarily to reducing antisocial behaviors, such as criminal activity and drug use, but even these effects were weak and inconsistent. Anderson's study did confirm a positive effect of participating in the Perry program on monthly earnings for male participants. Nonetheless, he concluded that "the indicated treatment effect heterogeneity calls into question the external applicability of these experiments … If treatment effects vary by gender, then they likely also vary by race or class" (p. 1494). Such work highlights the possibility that educational interventions may indeed affect social groups differentially and signals that policy formulations should take these differences into account.

Despite mixed evidence on the effects of participation in the Perry or Abecedarian programs on high school completion and college enrollment, researchers have found that other early childhood education initiatives (e.g., Head Start) increased high school completion rates and college attendance rates for participating students (Garces et al., 2002; Ludwig & Miller, 2007). Using a nationally representative

sample of children who participated in Head Start programs, which was acquired from a one-time supplemental survey to the Panel Survey of Income Dynamics of all adult household members from a representative sample of households, and comparing the differences in educational outcomes between siblings who did and did not participate in Head Start programs, Garces et al. found that non-Hispanic White children who participated were more likely than their siblings enrolled in other types of preschool or no preschool to (1) complete high school (by about 22 percentage points) and (2) to attend college (by about 19 percentage points). Among African Americans, the high school and college enrollment effects were small and not significant, respectively.

Ludwig and Miller (2007) used data from the National Education Longitudinal Study and US Census county-level income measures and examined the 300 poorest counties in the country, and while they did not report actual high school completion rates for study participants, they did conclude that participation in Head Start increased the level of schooling attained by one-half year and increased the likelihood of attending college by 15%. These positive effects of program participation were identified for both the Black and non-Hispanic White samples and are comparable to the results identified by Garces et al. (2002).

Using another dataset with a more recent cohort of Head Start participants, the National Longitudinal Survey of Youth 1979 (NLSY) and the National Longitudinal Mother-Child Supplement, which surveyed mothers of NLSY participants every 2 years from 1986 to 2004, Deming (2009) also identified long-term effects for people who participated in Head Start from 1984 to 1990. Confirming the positive effects of participation in Head Start on long-term educational outcomes, Deming found that Head Start participants were 8.5% age points more likely to graduate from high school and 6 percentage points more likely to have attended 1 year of college than non-Head Start participants. The higher graduation rates were driven largely by females and students who were children of mothers with low Armed Forces Qualification Test (AFQT) scores. Gains in high school completion and college enrollment were also greater for African American students than White students in this sample. Head Start participants whose mothers had high AFQT scores were more likely to attend college than Head Start participants whose mothers had low AFQT scores. Using a six-item index of adult outcomes (representing high school graduation, college attendance, idleness, crime, teen parenthood, and health status), Deming identified significantly greater scores for Head Start participants than for those who did not attend preschool; the .228 standard deviation difference translates into about 75% of the Black-White outcome gap in the sample. Much of the test-score improvement shown among Head Start participants was driven by gains in male test scores—a finding that challenged earlier researchers who had found that early childhood interventions primarily advantage girls (Anderson, 2008; Deming, 2009).

In short, the available research evidence on the effect of early childhood education programs on high school completion and college enrollment is generally positive, although the magnitude of the effects varies by social identity groups and to some extent by the time period when the cohorts were preschool age.

Class Size Reduction and College Completion

The final study reviewed in this section is one of the first to evaluate the effects of early education interventions such as class size reductions on college progress and college completion. Dynarski, Hyman, and Schanzenbach (2011) utilized data from the Tennessee Student/Teacher Achievement Ratio (STAR) randomized experiment and college data from the National Student Clearinghouse on former STAR students who were 12 years out of high school, presuming an on-time 1998 high school graduation (see full paper for a discussion of the appropriateness of using National Student Clearinghouse data to capture rates of college attendance). They found that assignment to a small class via participation in the STAR experiment increased the likelihood of students attending college, completing more semesters of college, and finishing college over non-STAR participants. The authors also split the sample into quintiles, based on the propensity to enroll in college, and found the largest effect of STAR was on the college enrollment of students with the lowest propensity to enroll. Students who experienced STAR also had a greater likelihood of enrolling in college on time and remaining enrolled in college than non-STAR participants, regardless of enrollment propensity. Dynarski et al. found that the treatment group spent .22 more semesters in college than the control group and that this effect was substantially greater for students with the lowest expected probability of attending college. College completion and the age at degree completion also increased by 1.6 percentage points for the treatment group. That is, through their late twenties, students assigned to small classes during childhood because of STAR secured college degree at higher rates than their peers.

Like other research reviewed in this section, Dynarski et al. (2011) examined the heterogeneity of effects by racial group, gender, and class and found that the treatment effect was largest for groups with the lowest average levels of college success. In other words, small class size had more than five times the effect on the college success of Black students than White students, twice the effect on college success for boys than girls, and a larger effect for children eligible for free or reduced-price lunch than for ineligible children. While the greater positive effect on the college participation of Black students and economically disadvantaged students confirms past researchers' findings (Garces et al., 2002; Ludwig & Miller, 2007), the greater positive effect of program participation on college success for boys than girls extends Deming's (2009) conclusion that early childhood education programs do not only benefit female participants.

In summary, this section demonstrates the importance of educational interventions in the early stages of the education pipeline for the academic progress and ultimate educational attainment of diverse student groups, including boys, a group that has recently experienced substantially lower achievement in the pre-K-16 sector than girls (Conchas & Vigil, 2012; Saenz & Ponjuan, 2009).

The studies reviewed in this section include both older and more recent cohorts of participants in early childhood education initiatives. The studies use experimental designs of small-scale early education programs, as well as matched comparisons of

large-scale federal early education interventions. While the research summarized here made various attempts to control for measures of respondents' family background, neighborhood, and living environments, there were limitations of these studies that potential future research might remedy. For example, it would be helpful to understand why parents enrolled some of their children and not others in a preschool program such as Head Start, whether the program benefits for the participating siblings had spillover effects on the college-related outcomes of nonparticipating siblings, and what the added effect of spillover on these similar college-related outcomes could be. Future national and state studies of early educational intervention programs also should include a more representative sample of today's youth. Hispanic students, for example, outnumber all other racial and ethnic groups in Texas, a trend that a number of other states will soon experience (Unmuth, 2011). With this demographic group in mind, issues such as language and immigrant status need to be accounted for appropriately in order for teachers, administrators, and research groups to analyze this growing group of children. In sum, the analysis required to assess the effects of these programs on students' college-related outcomes has become more complex with the changing demographics. Finally, the early childhood education programs now available are more diverse (e.g., they are run by private companies and are state-funded programs), and research has not sufficiently established whether the effects on educational outcomes depend on the particular program a student accesses.

Middle School Experiences: The Long-Term Impact of Math Achievement

Research has clearly established that completion of algebra and more advanced math courses is critical to continued academic achievement (Adelman, 1999, 2006). Students who do not complete algebra are less likely to enroll in college (Adelman, 1999, 2006; Oakes, 2003). Suggesting growing awareness of this research finding, 29% of all 13-year-olds (i.e., eighth graders) were enrolled in algebra in 2004, up from 22% in 1999 and 16% in 1986 (Perie, Moran, & Lutkus, 2005).

Research also shows a positive relationship between mathematics coursework and other college-related outcomes. Spielhagen (2006a) used system-level data for a large school district to show that, controlling for ability, students who took algebra in the eighth grade scored higher on the SAT I and were more likely to attend college than their peers who did not take algebra or remain on a mathematics pathway throughout high school. Using the same dataset, Spielhagen (2006b) also showed that the level of eighth-grade achievement in algebra is not predicated on seventh-grade mathematics scores—thus suggesting that mathematics gains are achievable over short periods of time, given access to strong math instruction. These findings are consistent with national studies (e.g., Gamoran & Hannigan, 2000; Stein, Kaufman, Sherman, & Hillen, 2011) that indicate that all students show gains in achievement after taking algebra.

Nonetheless, participation in high levels of mathematics varies across demographic groups. Using data from the Early Childhood Longitudinal Study-Kindergarten Cohort, Walston and McCarroll (2010) showed that algebra coursework in the eighth grade is primarily accessed by Asian, White, and high-SES students, as well as private school students. Students enrolled in advanced mathematics courses through the end of high school continue to be disproportionately Asian or White and from high-SES homes (Bozick & Ingels, 2008). Walston and McCarroll also found regional differences, with the West and the Northeast having higher percentages of students taking algebra than the Midwest and South. Data from the Early Childhood Longitudinal Study-Kindergarten Cohort also show that higher proportions of students from low-income families do not have advanced mathematics classes available in their school, even if parents and students report knowing that completing advanced mathematics coursework is important for later educational success. Walston and McCarroll also found that, while high math test scores in the fifth grade predicted algebra enrollment in the eighth grade, one-quarter of fifth-grade students with the highest quartile math scores and one-half of those with the second highest math scores did not enroll in algebra by the eighth grade, reminding researchers that high test scores are not a sufficient condition for algebra enrollment.

Gamoran and Hannigan (2000) used data from the National Educational Longitudinal Study of 1988 and found positive effects of algebra on student test scores, albeit small, particularly for students with prior mathematics achievement in the lowest quintile. The authors also considered what might occur if schools were to move entire systems (not just individual students) to algebra and found that "students gain no less from algebra when their schools include more diverse populations of algebra-takers, compared to schools with more homogeneous populations of students taking algebra" (p. 241). In other words, having all students complete algebra, regardless of initial score proficiency, does not have negative effects on a student's subsequent performance on math tests.

In contrast, Allensworth, Nomi, Montgomery, and Lee (2009) evaluated a Chicago policy that ended remedial classes and mandated college preparatory course work for all students. Using an interrupted time-series cohort design with multiple comparisons, the authors found that the policy reduced inequities in ninth-grade coursework by entering ability and race/ethnicity. However, while more students completed ninth grade with credits in algebra and English I, failure rates in these courses also increased, and the grades earned in these courses declined slightly. Test scores did not improve and students were no more likely to enter college with the college preparatory curriculum mandates.

Finally, using information from three national longitudinal datasets: the ECLS-B (Birth Cohort), the ECLS-K, and the National Education Longitudinal Study of 1998 (NELS:88), Lee (2012) examined the extent to which various math proficiency standards predicted college access and completion behavior. The analyses identified large disparities between actual (e.g., particular standardized score) and desired (e.g., score predictive of outcome) math achievement levels for college access and completion. More specifically, students who entered four-year colleges actually scored at the national average in math, which is equivalent to the level between the

current national standard and state proficiency standards, whereas those students who ultimately graduated college with a bachelor's degree scored *above* the national average in math, which is equivalent to scoring "high" on the TIMSS or "proficient" on the NAEP. Students who completed associate's degrees met the average state's math test proficiency standard, while students who merely entered a two-year college had scores in the bottom quartile of national achievement, a level far below the average state proficiency standard. In short, these analyses demonstrate that the various math proficiency standards that are currently in place do not equate to college enrollment and completion for the students in this sample and do a relatively poor job of forecasting college enrollment (Lee, 2012).

Modeling math achievement trajectories by racial groups and parental education levels, Lee (2012) also found that Asian and White students were on track for completing a four-year college degree as early as elementary school, whereas Latinos were on track for a four-year degree only through the third grade. Black students were behind all other groups—they were never on track for completing a four-year college, and they were on track for completing a two-year college only through elementary school; by middle and high school, Black students' trajectory was toward entering a two-year college. Not surprisingly, students whose parents had college degrees were on track through high school to enter and complete college. Lee defined being "on track" by comparing actual college behavior against test scores students earned during their elementary and middle school years. Using this approach, Lee identified as early as elementary school whether particular student groups were on a trajectory for college enrollment and completion.

While the research presented in this section demonstrates the importance of access to advanced mathematics curriculum, research does not establish how to best serve a classroom of students with diverse mathematical abilities. In a review of algebra coursework, Stein et al. (2011) concluded that, when studies evaluate individual students and their movement to algebra, the achievement results are positive, but in studies that evaluate entire classrooms or systems, the results are mixed likely because researchers are not able to control for differences within classrooms. Nonetheless, in schools with policies mandating strong academic support for struggling students, the overall results are positive (Stein et al., 2011).

The movement of many states to standardize the curriculum raises the question of how best to serve students with varied prior ability. Although Lee's (2012) study demonstrates the utility of generating growth curves at the aggregate national level that simulate the full range of P-12 growth trajectories to examine the links between varying math achievement and college access and completion, one of the shortcomings is that limited inferences can be made when the same student is not followed longitudinally. Lee's study also considers outcomes based on only one math standard even though students enroll in a variety of courses throughout their educational careers. There is no research to support that assessments at different grade levels are comparable across a student's trajectory. Finally, using aggregate data from the sources listed above, Lee could not account for different states policies and standards that could influence the study findings. These limitations underscore the value of databases that span the education pipeline.

High School Experiences

The experiences that students engage in during their critical 4 years of high school can determine the types of opportunities that will be available to them post-high school. This section identifies areas that primarily relate to a student's academic ability and conditions for learning (Achieve, 2012; Center for American Progress, 2009; Center for Education Policy, 2010, 2011). We focus on existing research while also highlighting the research that still needs to be undertaken in order to understand how to ensure student success. We begin with research on standardized testing including high school exit examinations and college admission tests. We also include attention to academic experiences that contribute to performance on these assessment practices including the rigor of the high school experience, whether students graduate from schools that offer opportunities for advanced coursework, and whether students graduate from high school having completed at least a minimum academic curriculum. We selected these particular experiences because they are at the forefront of discussions about how best to prepare students during the high school years to succeed in college and careers.

High School Exit Exams and the Racial Achievement Gap

Although 83% of the nation's students of color and 75% of low-income students reside in states with high school exit exam requirements (Dietz, 2010), there is mixed evidence for the effects of exit exams on student achievement and other educational outcomes. As of the 2010–2011 school year, 25 states required a passing grade on a high school exit exam to earn a high school diploma. Six other states have in place or plan to have a high school exit exam, but do not require a passing grade on the test for students to graduate. Three states, Georgia, North Carolina, and Tennessee, had required a minimum passing score, but now use this score as only one part of the grade in a final course requirement. A high school exit exam can take the form of a minimum competency exam (MCE) (i.e., minimum skill levels), comprehensive exam, or end-of-course exam. By 2015, MCE's will be phased out and high school exit exams will take the form of comprehensive or end-of-course exams with higher standards than minimum skills.

Eleven states require students to take the SAT or ACT college entrance exam, but a minimum score is not required. Sixteen states also offer college or career readiness assessments (nine use ACT assessments, five using PSAT assessments, and two use state developed assessments), and "although many states are using college and career readiness assessments to determine how well students are being prepared for success after high school, very few colleges and universities actually use these assessments for college admission or placement" (CEP, 2011, executive summary). One explanation for this conclusion may be that the current college and career assessments are not aligned with the high school curriculum. This situation may change when the new assessments developed for the common core state standards are developed (CEP).

Available research shows little to no effect of minimum competency exams (MCEs) and test-score gains on student outcomes (Bishop, Mane, Bishop, & Moriarty, 2000; Jacob, 2001). Examining students in the bottom decile for reading, Jacob identified small reading gains for the students in states with MCEs. Also examining students in the bottom quartile of test scores, Reardon, Atteberry, Arshan, and Kurlaender (2009) found no effect of exit exams on student achievement; their analyses also found lower performance on exit exams for Black and Hispanic students than for White students. Reardon and colleagues (2009) and Bishop and colleagues (2000) found no overall effect of MCEs and test-score gains, although Bishop and colleagues did identify small test-score gains for students who had a C grade average, compared to students with A or B grade averages. Although there was no achievement effect for middle- and high-ability students (as might be expected), most studies reviewed also found no effect on those at the bottom level of achievement (see Holme, Richards, Jimerson, & Cohen, 2010, for expanded discussion).

Early research showed some evidence that MCEs are negatively related to educational outcomes for low-achieving students and Black males specifically (Bishop & Mane, 2001a, 2001b; Jacob, 2001). As the rigor of exit exams has increased, some research suggests that exit exam policies contribute to increased dropout rates for low-achieving students and students in high-poverty urban schools (Bishop et al., 2000; Reardon et al., 2009; Warren, Jenkins, & Kulick, 2006). The evidence is mixed, however, as other researchers found no differences or even increased completion with rigorous exit exams (Greene & Winters, 2004; Warren & Jenkins, 2005).

Some of the dropout effect may be due to the psychological effects of high-stakes testing that discourages students from persisting. In a study that compared the high-stakes California high school exit exam with performance on the low-stakes California Standards Test, Reardon and colleagues (2009) found evidence of stereotype threat. That is, racial and ethnic minority students underperformed at higher rates on high-stakes tests than on low-stakes tests compared to their White peers. In addition to their mixed findings on exit exams and high school completion, Reardon and colleagues also concluded that these exams may be depressing the academic performance of racial and ethnic minorities, which subsequently leads to high school dropout.

The available research on the effects of MCEs and more rigorous exit exams on college enrollment also has mixed results. Using nationally representative datasets, Bishop and Mane (2001a, 2001b) reported that MCEs were associated with a slightly increased likelihood of enrolling in college. Bishop et al. (2000) extended the examination to 2 years post-high school and identified that these enrollment effects were stronger for higher-ability students than for lower-ability students. However, using public use microdata samples of over one million students from the American Community Survey, Dee (2003), Dee and Jacob (2006), and Warren, Grodsky, and Lee (2008) each found no evidence that MCEs are associated with increased college enrollment. The only racial and ethnic difference was identified by Dee and Jacob; this study found that MCEs did predict college enrollment among Hispanic females. While the move to more rigorous tests coupled with the

subsequent attainment of a minimum passing score is meant to signal increased college readiness, research shows mixed impact on an average student's likelihood of attending college.

We now move to a review of high school coursework patterns and the relationship to college enrollment, as well as the factors that predict whether a school will offer advanced coursework to its students.

Advanced Placement Access, Curricular Intensity, and College Achievement

Research shows mixed evidence that access to advanced courses is stratified along racial and ethnic lines. As of 2010, only one-third of US public schools offered AP or IB courses in the four core subject areas of English, mathematics, natural sciences, and the social sciences (College Board, 2011). Using data from North Carolina public schools, Darity, Castellino, Tyson, Cobb, and McMillen (2001) found that racial and ethnic minorities had more access to AP courses than White students but that this was largely due to the fact that the White population in North Carolina tends to be concentrated in small, rural schools throughout the state. Using data from the Texas Schools Microdata Panel, Klopfenstein (2004a) examined how the expansion of the AP program across the nation impacted racial and ethnic minorities' access to AP curriculum. The Texas data used by Klopfenstein are particularly advantageous in examining racial and ethnic minorities, given the state's diverse population. Klopfenstein found that, while government incentive programs did increase AP course availability in Texas schools, access to these courses by racial and ethnic minorities did not increase. That is, racial and ethnic minority students' likelihood of enrolling in an AP course did not increase despite the increased course availability. Using nationally representative data from the NELS, Attewell and Domina (2008) also found racial differences in accessing advanced coursework with Asian and White students accessing advanced curricula at greater rates than Hispanic and Latino students, even within the same schools.

Like other researchers (Adelman, 2006; Perkins, Kleiner, Roey, Brown, 2004), Attewell and Domina (2008) found small to medium differences between racial and ethnic groups in curricular intensity, and medium differences in curricular intensity based on socioeconomic status (SES). White high school students were more likely to be enrolled in curricular intense courses than their racial and ethnic counterparts; higher-SES students were more likely to be enrolled in more curricular intense courses than low-SES students. However, controlling for prior academic performance eliminated differences in curricular intensity by racial and ethnic group, with Black students even more likely than White students to enroll in an intense course curriculum. The authors also found that, although prior academic achievement was a strong predictor of academic intensity, differences in curricular intensity based on SES persisted after controlling for prior academic performance. They also showed that curricular differences based on SES and race and ethnicity reflect differences

within schools rather than between schools; within the same school, racial and ethnic minorities and low-SES students enrolled in more intense curricular tracks at lower rates than their White and higher-SES peers who attend the same school. This finding is consistent with earlier research on curricular tracking (Lucas & Berends, 2002; Oakes, 2005; Oakes & Guiton, 1995).

Using data from the National Educational Longitudinal Study (NELS) and the High School and Beyond survey (HS&B), scholars have observed a positive relationship between students' curricular intensity in high school and their movement through college (Adelman, 1999, 2006; Horn, Kojaku, & Carroll, 2001). Organizing students into different curricular intensity levels from the most demanding to least demanding curriculum, Attewell and Domina (2008) found positive effects of intensity on academic outcomes, but these effects are not consistent across levels of intensity. They found smaller effects of intensity on college enrollment and completion for students at the highest levels of curricular intensity, with greater differences among students from lower-intensity quintiles.

One marker of curricular intensity is enrollment in the Advanced Placement curriculum. Using data from students enrolled in the University of California system, Geiser and Santelices (2004) found that students who completed AP courses had comparable college achievement as students who had enrolled in a standard college preparatory curriculum. In contrast, using a sample of 3,781 AP and/or dual-enrollment students and 2,760 non-AP and non-dual-enrollment students, McCauley (2007) found that enrollment in AP courses or dual-enrollment programs (i.e., programs that allow students to earn college credit while in high school) was positively related to college completion. While the Geiser and Santelices study did not find unique effects of AP coursework and college achievement as the McCauley study did, both studies noted that all students in the sample had fulfilled a rigorous academic curriculum in order to gain admission to the university and, therefore, that the findings establish the importance of a high level of academic rigor during high school.

Since one of the main conclusions of available research is the importance of academic coursework (Attewell & Domina, 2008; McCauley, 2007), in this review we also include the results of studies conducted by scholars who aim to establish which course sequences in high school result in the successful completion of college-level courses. Using a subset of high school graduate ACT test-takers in 2003 who had taken the PLAN (i.e., four curriculum-based assessments in English, math, reading, and science) as sophomores and the ACT as juniors or seniors, and controlling for prior academic achievement, ACT (2005) identified course sequences in math, science, and English that translated into greater achievement gains and success in college courses, as measured by passing the college-level course in those respective subject areas. ACT also identified cross-disciplinary course benefits. For example, successful completion of college English composition was associated with having completed at least 1 year of foreign language study in high school. Completing upper-division math was associated with successful completion of college biology. A recent review and synthesis by Long, Conger, and Iatarola (2012) identified a general consensus among scholars of the positive effect of rigorous course-taking

on a variety of academic outcomes identified by the ACT study. Long and colleagues organized course rigor according to three levels identified by the Florida Department of Education with level three being the most rigorous and level one being least rigorous. Employing panel data from public school students in the state of Florida and propensity score matching, Long et al. found that taking rigorous courses resulted in a greater likelihood of earning high test scores, completing high school, and enrolling in college for the students in this study, and that these effects were larger for disadvantaged students and students attending disadvantaged schools. In terms of the subject areas that contribute to increases in math Florida Comprehensive Assessment Test (FCAT) scores, math had the largest effect, with smaller effects for science and social studies and followed by English and foreign language. In terms of predictors of the reading FCAT scores, English and social studies had the largest effect, followed by smaller effects with science, math, and foreign language. Taking level 3 math coursework was positively related to high school graduation and college attendance although the effects were strongest among those who enrolled in just one other level 3 course; the effects diminished and became insignificant for those who enrolled in level 3 coursework in all four subjects. For college attendance, each additional rigor level of coursework by subject was associated with greater likelihood of college attendance.

The second part of Long et al.'s (2012) analysis considered whether the estimated effects of curriculum rigor were comparable across different schools and different types of students, with special attention given to students with slightly above average scores on the FCAT, since "expansion of access to rigorous courses will likely attract or be targeted to slightly above average ability students" (Long et al., p. 307). Taking a level 3 course increased the likelihood of earning a high school diploma more for poor students than for nonpoor Black and Hispanic students as compared to White students and for slightly high-ability students than for above average high-ability students. Taking level 3 courses was also associated with increased rates of attending a two-year, but not a four-year, college among poor students and for slightly high-ability students. Completing rigorous level 3 courses was equally predictive of college enrollment among all racial groups. The authors concluded that most of the beneficial effect on test scores and high school graduations was associated with moving from having no rigorous coursework to one rigorous course in a given area. For college enrollment, each additional level of coursework completed had an additional positive effect.

Although short of experimental design, Long and colleagues (2012) also showed the positive effects of curriculum rigor on a number of college outcomes. Like Attewell and Domina (2008), Long et al. found that the effects of academic rigor on academic outcomes varied by level of intensity, with greater effects on academic outcomes for students on the lower end of ability and with less intensely rigorous curriculum.

Because research generally suggests that Advanced Placement course-taking is related to college enrollment and success (Long et al., 2012), we also review literature that establishes the predictors of a student enrolling in Advanced Placement coursework and the predictors of a school offering Advanced Placement courses. Klopfenstein

(2004b) used Texas data from the 1998–1999 school year to explore the predictors of a student's decision to enroll in AP courses. The largest predictor of non-enrollment among all racial and ethnic groups was low-income status. Predictors of AP enrollment included the presence of role models of the same race for the Black male sample, as well as the presence of an outreach program that incentivized AP participation for Black students overall. Limited English proficiency negatively predicted AP course enrollment for Hispanics who took at least one AP course and for Hispanics who took the SAT.

While researchers have established a relationship between school characteristics and students' academic success as well as individual student prior academic performance and success, Iatarola, Conger, and Long (2011) further contribute to the discussion. They measured course offerings in two ways: whether any student took an AP or International Baccalaureate (IB) course in a given year and the number of students in a given high school who took such a course in a given year. Students' prior academic performance was then divided into three achievement levels: far above average, slightly above average, and below average. The authors found that higher numbers of instructional staff had only a small positive effect on AP/IB offerings, and that the education and experience of teachers was unrelated to these course offerings. Iatarola and her colleagues found that the greatest predictor of AP/IB course availability in high school was having a "critical mass of students with very high eighth grade achievement scores" (p. 342). However, the positive effect of this variable varied across subject area AP/IB course offerings, with the greatest effect on science, followed by math and English; there was virtually no effect on social studies AP/IB course availability. The positive effect also did not operate consistently among students with slightly above average test scores, and in some cases operated negatively. For every 100 slightly above average test score students who enrolled in a given high school, the number of AP/IB courses offered in science and English actually decreased. Finally, schools that enrolled students with below average test scores actually showed an increased probability of offering courses in all four subject areas as did schools with larger non-White populations. Nonetheless, the odds of AP/IB courses being available declined as the percentage of students on free/reduced-price lunch programs increased. Finally, by adding fixed district-level effects and examining changes over time, Iatarola and colleagues showed that the effect of the above average student on the number of students taking advanced courses increased over time. They also showed that schools were offering advanced courses more often regardless of achievement levels, but that these courses continue to be accessed by students with the highest levels of prior achievement.

College Admissions Exams and Stratification Outcomes by Race and Ethnicity

One predictor of entry into a four-year institution is strong SAT or ACT test scores (Alon & Tienda, 2007). Nonetheless, the role of standardized tests in college admissions is a topic of concern among researchers and policymakers, especially given

the continued test-score gaps between racial and ethnic groups and for students from disadvantaged backgrounds (Alon & Tienda). Testing agencies argue, and public perception is, that standardized tests are objective measures of knowledge and can dismantle social stratification by enabling the students with the greatest merit to access and succeed in postsecondary education. Nonetheless, standardized testing can also be viewed as reinforcing hierarchies of privilege because of the persistent test-score differences between groups and the mixed evidence of the predictive power of determining college success among various social identity groups.

Although multiple studies affirm the predictive power of both the old and new SAT scores on college grades (Camara & Echternacht, 2000; Kobrin, Patterson, Shaw, Mattern, & Barbuti, 2008; Ramist, Lewis, & McCamley-Jenkins, 2001), the predictive power tends to be smaller for females, bilinguals, English language learners, and racial and ethnic minorities than for other students (Bridgeman, McCamley-Jenkins, & Ervin, 2002; Grodsky, Warren, & Felts, 2008; Kobrin et al., 2008; Young, 2001). Using data on the fall 2006 cohort entering 110 institutions, Mattern, Patterson, Shaw, Kobrin, and Barbuti (2008) found that the validity and predictive ability of SAT I scores with first year college grade point average varied considerably among students of various background characteristics. The SAT was more highly correlated with grades for females (.52 to .58 across the three sections) than males (.44 to .50), for White students (.53) than underrepresented students of color (.40 to .46), and for monolingual English speakers (.47 to .54) than either bilingual students (.41 to .50) or, worse, English language learners (ELL, .28 to .42). SAT scores also underpredict female and ELL performance and overpredict performance for students of color and bilingual students. In other words, given their SAT score, females and ELLs are expected to earn better grades than they actually do.

Similar analyses have been conducted with those taking the ACT. Using data across cohorts, Noble and Sawyer (2002) found that ACT scores were better predictors of high first-year grade averages but had poorer performance predicting midrange and low first-year grade averages. The authors' conclusion, which was also echoed by Mattern and colleagues (2008), was that the combination of high school grades and test scores tended to yield the most accurate estimates of first-year grades and that test scores varied among students from different social identity groups.

Whether or not one accepts the notion that SAT or ACT scores have utility and predictive ability, one major shortcoming is that statistical analyses of their effects generally do not consider the contribution to test performance of many unmeasured characteristics, such as private coaching, tutoring, test-preparation classes, and sitting for practice exams. Instead, differences in test performance are attributed primarily to family background and formal schooling processes. These educational activities tend to occur outside of formal schooling, and thus have been termed "shadow education" (Buchmann, Condron, & Roscigno, 2010; Stevenson & Baker, 1992), and may help to explain the persistent test-score gaps and subsequent achievement of test-takers identified in the previous paragraph. In a study employing data from the National Educational Longitudinal Survey, Buchmann and colleagues established that higher-income families make greater use of costly private tutoring and private test-preparation courses to increase scores, thereby contributing to their

higher test-score performance and possibly leading to increased advantages in the college application process.

While many published studies establish the validity and predictive power of the SAT, these same studies can be interpreted in another way, in that the findings do not show strong support or overstate the predictive ability of the SAT or ACT score, and that the variability in college grades is better explained by class rank, high school curriculum, or a parent's social class (Adelman, 1999, 2006; Kao & Thompson, 2003). These conclusions, in concert with the previous discussion of high school exit exams, suggest the value of considering more than test scores and high school GPAs when trying to ascertain the future college performance of underrepresented students.

The public and institutional focus on college entrance exams leads us to discuss the sectors in which these exams are most and least likely valued in admissions decisions. To that end, we turn to an examination of literature on the privilege and access institutions.

College Access by Sector: The "Access" and "Privilege" Institutions

The work presented thus far highlights key policies and interventions that influence the complex path to college—from early childhood programs, to middle school predictors of success in high school, to high school curricular and exit policies, to the role of standardized tests for college admissions. The actual process of applying to and enrolling in college, however, presents another set of complicated decision structures that are part of the higher education landscape in the United States that must also be understood. To help achieve this understanding, we focus on two major sectors of postsecondary entry that are often influenced by policies executed at the state, federal, and institutional level. These sectors are both the most and least likely places where our populations of interest—underrepresented students and low-income students—enroll. We identify these sector locations as (1) institutions of access, which include the community college sector, and (2) institutions of privilege, or the elite/selective sector of higher education that includes four-year private and public institutions. By 2009, two-year institutions enrolled 40% of low-income students, a majority of Latino students, and number of other underrepresented minority students (Adelman, 2006; Baum, Little, & Payea, 2011; Hagy & Staniec, 2002). Meanwhile, as admission rates at selective colleges and universities continue to hit record lows for all students (Avery & Levin, 2009), the percentage of underrepresented minority students who enter such institutions is even smaller. The four-year nonselective sector of higher education has also grown in importance given rising tuition and the increased value of a four-year college degree. Thus, we focus on key policy questions and debates surrounding the sectors that present the widest gateways and the most barriers to entry into US higher education. Debates about the institutions of access such as the community college sector include functions of democratization versus

diversion to the four-year sector, the effectiveness of remedial/developmental education, transfer formulas, and statewide policy on articulation agreements between two- and four-year institutions. Debates within the privileged institutions regarding underrepresented students include the ongoing controversial role played by such interventions as affirmative action, as well as replacement programs that do not consider race in college admissions (that is, race-conscious versus race-neutral programming). The decision to separate our research review into a framework of institutions of access versus institutions of privilege lies in the deeper issue of how educational quality contributes to the goal of increasing educational attainment in the form of a bachelor's degree for underrepresented students. Students who attend the more selective institutions are more likely to graduate than similar students who attend less selective institutions, particularly those offering less than two-year programs (Bowen, Kurzweil, Tobin, & Pichler, 2005). Students who begin their college career at a community college are significantly less likely than students who begin at a four-year institution to earn a bachelor's degree (Doyle, 2009; Long & Kurlaender, 2009). The effect of where one attends college influences outcomes beyond degree completion as well. Recent research shows the role college quality plays in future earnings by race and gender (Andrews, Li, & Lovenheim, 2011) and suggests that college quality plays a role in earnings and job choices after bachelor's degree completion (Long, 2010). Indeed, most research showing the economic returns from attending selective colleges and universities finds that this return remains in effect for decades (Black & Smith, 2006; Dale & Krueger, 2002; Hoekstra, 2009; Hoxby, 2009; Long, 2010). Long reports that the greatest returns for all groups occurred in the 1980s and 1990s, although the economic return from attending a selective college or university is particularly large for low-income and some minority groups. Such institutions remain the most likely vehicles for reaching positions of power and influence and achieving economic prosperity (Bowen & Bok, 1999; Bowen et al., 2005). However, the community colleges enroll the great majority of underrepresented and low-income students (Adelman, 2004, 2006). We now turn to this polarity of enrollment patterns.

The "Access" Institutions: From Remediation to Transfer

The question of whether community colleges serve as an agent of democratization versus diversion for educational attainment such as transfer to the four-year institution has been debated since before the publication of Brint and Karabel's acclaimed *The Diverted Dream* (1989). Since this important work, authors from economics, sociology, political science, and educational policy have contributed to this debate (Brint, 2003; Dougherty, 1994; Doyle, 2009; Long & Kurlaender, 2009; Rouse, 1995). Community colleges serve 50% of beginning college students, and researchers find that as many as 70% of entering community college students aspire to eventually earn a bachelor's degree or higher (Bailey, Jenkins, & Leinbach, 2006). Bragg (2001) reminds us that community colleges serve as an important point of postsecondary

entry for many students who otherwise might not have had the opportunity to pursue a higher education, including low-income students, students of color, recent immigrants, and students who are the first in their families to attend college.

Before delving into the role of this sector in educational attainment, it is important to acknowledge the multiple and often conflicting roles that community colleges assume. Among their many functions, community colleges serve as spaces for lifelong learning; they prepare students for earning associate's degrees and certificates, they offer professional development courses for adult learners, they prepare students to transfer to four-year institutions, they serve as dual-enrollment institutions for high school students who want to earn college credit, and they increasingly offer baccalaureate degree programs. With multiple, sometimes competing functions, it is not surprising that community colleges come under fire for not serving their students well. In this section, however, we do not review their competing functions, but focus instead on those functions directly related to postsecondary attainment, including developmental/remedial education, transfer policies with four-year colleges, and structural conditions that facilitate transfer and degree completion.

Developmental/Remedial Education

Developmental/remedial education is an issue of concern for most postsecondary sectors because of the large number of students (50%) who require such services (Bailey, Jeong, & Cho, 2010). We discuss the issue within the section on institutions of access, because developmental/remedial education is primarily relegated to this sector (Cohen & Brawer, 2008; Shaw, 1997; Zeitlin & Markus, 1996). For a short period in the 1970s, most developmental education was not mandated for entering students by two-year institutions, yet with the costs incurred by an increasing number of dropouts and failed remediation, two-year institutions pushed to mandate student assessments to determine placement in a course requisite with a student's academic skill level. Fonte (1997) asserts that, by the 1990s, despite lawsuits alleging unequal college access for disadvantaged and minority students, the trend was to continue the mandated assessments for all students entering community colleges. Studies of community college faculty and administrators affirm the need for mandatory testing (Berger, 1997; Perin, 2006). Yet, despite mandatory placement into remedial courses if minimum scores were not met, evidence is mixed regarding the short-term benefits on course completion or the long-term benefits on degree completion for students who enroll in developmental/remedial education (Boylan, Bliss, & Bonham, 1997).

In a study using data on 68,000 remedial math students and 24,000 remedial reading students in Florida and employing a regression discontinuity design, Calcagno and Long (2008) found positive effects of math remediation on persistence from the first to second year of college and on the accumulation of college credits (including nondegree credits, noncollege-level credits, and college-level

credits), but no effect on college-level credit accumulation or degree completion. In a study using data from 445,000 students enrolled in colleges in Texas and also employing a regression discontinuity design, Martorell and McFarlin (2011) found negative effects on college-level credit accumulation and persistence, but no effect on degree completion. Bettinger and Long (2004), using data from nonselective four-year institutions in Ohio, showed that placing students in remedial education did not decrease their likelihood of attaining a bachelor's degree, but did increase their likelihood of withdrawing from college.

Another avenue of research on developmental education is whether the placement scores predict later educational success. According to Parsad, Lewis, and Greene (2003), 92% of two-year institutions use the scores from ACCUPLACER or COMPASS to determine placement into remedial education classes. After reviewing studies of the predictive validity of the ACCUPLACER and COMPASS assessments, Hughes and Scott-Clayton (2010) conclude that placement scores do a reasonably good job of predicting who will earn a grade of B or higher in the course level they tested into (59–72% accuracy), and who will pass a course with a grade of C or better (63–84% accuracy). They then state the limitations of predictive validity studies, including the fact that, while these studies can predict who will successfully pass a course, they do not offer insights into eventual student success, such as degree completion or the accumulation of course credits. The authors conclude that the "evidence is not as strong as desirable given the stakes involved" (p. 17). They also offer alternatives to special placement, including multiple assessment measures, but conclude that better empirical evidence is needed to determine how to move students successfully through developmental/remedial education.

Researchers and policymakers have used data from remedial education programs to compare different types of service delivery in these programs (Boylan, 2002; Boylan et al., 1997). Such studies compare outcomes associated with integrating remedial coursework into credit-bearing courses rather than relegating these students to nondegree or noncredit courses (Shaw, 1997; Zeitlin & Markus, 1996) or examining whether remedial courses are housed together in one unit (centralized) or housed separately within academic disciplines (decentralized) (Boylan et al.). In a national evaluation study on developmental education, Boylan et al. (1997) and Boylan (2002) identified short-term gains of developmental education on course passing rates but not such long-term gains as baccalaureate degree attainment and identified better course retention and degree completion for students in developmental education at four-year than two-year colleges. The authors speculate that four-year students entered college better prepared than the two-year students, a conclusion similar to that reached by Bettinger and Long (2004) who evaluated four-year college students.

The overall conclusion from research on developmental and remedial education is that the relationship to short-term outcomes such as earning solid college grades is positive, but the long-term effects of remedial and developmental education on degree attainment are not found for students who enroll during their community college years (Hughes & Scott-Clayton, 2010). Developmental/remedial education

appears to have positive effects when students at four-year institutions are included in the sample (Bettinger & Long, 2004).

One of the major challenges in studying developmental/remedial education and establishing a causal link to later academic outcomes is that students who enter developmental or remedial education have weaker academic records than other college students who do not have to enroll in developmental education prior to college entry. Thus, comparing their progress with the progress of students enrolled in regular classes proves problematic. Such comparisons are also problematic because most states and individual institutions have their own policies on whether developmental/remedial education enrollment is required, and each institution may have its own assessments and cutoff scores to determine who requires remediation. Of the studies conducted on remediation, many look at four-year college effects even though most remediation occurs at the two-year level. Further, research on developmental education has been criticized for not explaining how much of any effect is the direct result of the developmental education practices rather than attributable to the combination of services provided to remedial students.

Community College Transfer, Structural Conditions, and Degree Completion

Using propensity score matching with the BPS student survey sample, Doyle (2009) finds that students who first enroll in a community college have lower rates of baccalaureate degree completion than students who begin at a four-year college. Many community college students start their higher education careers with the aspiration of transferring to a four-year school and earning a baccalaureate degree, yet few ultimately do so (Bradburn, Hurst, & Peng, 2001; Horn & Nevill, 2006; Roksa, 2009). Estimates of the share of community college students who transfer to four-year institutions range from 3 to 82%, depending on the data source and the definition of transfer, and whether the analysis includes transfer across states or across institutions within the same state (Cohen, 1994; Florida Community College System, 2001; McHewitt & Taylor, 2004; Moore & Shulock, 2010). The odds of earning any educational credential are lower for community college students than for those who begin at other types of colleges (Adelman, 2006), often because of ineffective counseling, misinformation, lack of remedial support, and other factors (Moore, Shulock, & Offenstein, 2009).

In an effort to facilitate degree completion, some state governments have created legislation regarding transfer and institutional articulation. Statewide articulation agreements are meant to ensure that students do not lose credits in the transition between colleges. From a survey of state administrators, WICHE (2010) identified a range of activities related to transfer and articulation across the 50 states. Some states did not report any articulation activity, 15 reported having a general education common core curriculum, 7 reported a common course numbering system, 22 reported major statewide articulations, 20 reported block credit transfer, and 31

reported a transferable associate's degree. Researchers have established that without such agreements, transfer students risk losing credits or taking incoherent sequences of courses that do not count toward the degree (Bailey, 2003; McCormick, 2003). Nonetheless, the WICHE findings highlight the complexity of researching articulation policies given the range of articulation-like policies available across states.

While statewide articulation agreements are advanced as a promising solution for low transfer rates (WICHE, 2010), evidence on the efficacy of statewide articulation policies is mixed and reflects differences in the definitions of transfer, samples, and analytic methods (Anderson, Sun, & Alfonso, 2006; Roksa, 2009). Roksa evaluated three individual-level studies using nationally representative longitudinal data and reported no relationship between statewide articulation policies and a student's transition from a two-year college to a four-year college. She also examined several institutional-level studies in which the researchers concluded that institutional transfer rates are higher in states with statewide articulation policies compared to states without articulation policies.

In an examination of successful completion of a two-year college, it is important to consider student behaviors as well as institutional contexts that are related to successful completion. A review of recent research that used a variety of national-, state-, and institutional-level data establishes that students are most likely to complete two-year degrees and transfer to four-year colleges if they accumulate transferable credits, are continuously enrolled in their degree programs, withdraw from fewer courses, and enroll in school during the summer months (Moore & Shulock, 2009; Moore et al., 2009). The positive credit accumulation effect on degree completion affirms students' need for access to credit-bearing courses rather than noncredit courses. We encourage readers to review work by Belfield and Bailey (2011) and Goldrick-Rab (2010) for a more detailed discussion of research examining the relationship between student academic behavior and preparation within the two-year college and four-year educational attainment.

In examining institutional issues and college completion, Calcagno, Bailey, Jenkins, Kienzl, and Leinbach (2008) use individual-level data from the National Educational Longitudinal Study and institutional data from IPEDS and establish that attending a large institution with greater percentages of part-time faculty and minority students is negatively correlated with the probability of completing college or transferring. While Calcagno et al. also found that spending on academic support was negatively correlated with degree completion or transfer, other research identified positive relationships between such expenditures and degree attainment (Bound, Lovenheim, & Turner, 2009; Howell, Kurlaender, & Grodsky, 2010). While the bulk of research on two-year students evaluates student behaviors, increasingly researchers (Bound et al., 2009; Calcagno et al., 2008; Howell et al., 2010) are identifying unique effects of the structural components of an institution on two-year and four-year degree completion, an area that also needs investigation in order to understand fully the movement between postsecondary education sectors.

As research on the transfer process from the two-year to the four-year college sector develops substantively and methodologically, the definition of transfer continues to be debated. Indeed, there is little consensus as to which students should be included

in the determination of who constitutes a transfer student. Moreover, the debate about the appropriate definition of transfer is more than a mathematical concern given growing concerns about accountability in higher education (Roksa, 2009). Researchers employ definitions that use varying criteria including aspirations, number of credits completed at the community college level, number of credits completed at the four-year college, transfer status, and markers for college-ready status. Other researchers include students who have completed a specific number of college credits, or calculate transfer based on the number of students who report an interest in transferring, or calculate transfer based on students who enroll in particular college-level transfer courses (Cohen, 1994; Cohen & Brawer, 2008; Hagedorn, 2005, Wassmer et al., 2004). Bradburn et al. (2001) demonstrate the definitional challenge using the Beginning Postsecondary Students Longitudinal Study (BPS). Employing eight different potential transfer student criteria, their analyses showed the pool to be anywhere from 11 to 71% of first-time community college students. Other researchers have attempted similar simulations with other national datasets and state and institutional data, ending up with a similar number of potential pools and wide-ranging transfer rates (de los Santos & Wright, 1989; Dowd & Melguizo, 2008; Wassmer et al., 2004). Thus, establishing who should be included when calculating a transfer pool continues to be an important avenue for future research.

Students who choose to directly apply to and enroll in a four-year selective institution face a series of other challenges mitigated by federal, state, and institutional policies. We now turn to the policy debates within selective colleges and universities.

Access to Elite Colleges and Universities: The Privilege Institutions

Debates concerning the access and success of underrepresented students in elite institutions have focused primarily on the effects of affirmative action, or race-conscious programming, as an intervention to increase racial and ethnic diversity in student bodies in US postsecondary education. Debates have ranged from moral and philosophical discussions regarding the use of this intervention to whether employing such a policy is a more efficient method of admitting a diverse and qualified student body than a system of admissions with no such intervention (Arcidiacono, 2005; Chan & Eyster, 2003; Fryer, Loury, & Yuret, 2008; Moses & Marin, 2006). By 2005, a new line of research documenting the educational benefits of diversity for all students changed the debate from benefits to the individual to benefits to the classroom (Gurin, Dey, Hurtado, & Gurin, 2002). This research was particularly relevant in the 2003 US Supreme Court decision, *Grutter v. Bollinger*, which made the use of race as a factor in college admissions legal once again but with added clarity. While *Grutter* provided much-needed guidance to universities across the nation, the decision could be ignored or legally trumped by institutional autonomy or by state ballot initiatives, as seen in referenda passed in five states across the nation: California, Nebraska, Michigan, Washington, and Arizona (Howell, 2010). The 1990s thus

proved to be the beginning of continued public controversy around the admission of underrepresented students to selective colleges and universities and solidified this issue in American higher education policy. Moreover, the fate of precedents set by *Grutter* is now being reconsidered by the US Supreme Court in *Fisher v. Texas*, which challenges the constitutionality of the Texas' Top Ten Percent Plan and the consideration of race by a traditional affirmative action program.

Affirmative Action as an Intervention

Considerable scholarship that employs various methodological approaches has since emerged, with a particular focus on the effectiveness of affirmative action programs and on whether the absence of this type of intervention equalizes the applicant pool by not giving minority students the advantage of admission with lower test scores. Such work builds on economics research pertaining to taste-based discrimination (Becker, 1957), statistical discrimination (Arrow, 1973; Phelps, 1972), and the effects of affirmative action in the labor market (Coate & Loury, 1993; Lundberg, 1991). In an evaluation of a selective public institution in California, Chan and Eyster (2003) found that adopting an admissions rule that ignores standardized test scores and other measures of academic ability traditionally identified by admissions officers for all applicants is actually inefficient, because doing so does not select the best candidates from any ethnic group. That is, institutions that seek to ban affirmative action because it "lowers" student quality in fact achieve a result that backfires by lowering the quality of all admitted students. Fryer and colleagues (2008) expand on the work of Chan and Eyster by providing a complex theoretical and empirical experiment on what they call the limits of race-neutral approaches, that is, an admissions plan that does not consider race but another factor unrelated to race, such as geography or grade point average. They analyze student outcomes under three regimes: a color-sighted approach that uses traditional affirmative action practices; a color-blind approach that is the equivalent of a race-neutral approach, which instead may incorporate proxies for race and ignore other measures of academic ability; and a laissez-faire approach that essentially does not incorporate affirmative action practices but operates more like a cutoff score, whereby applicants who meet a particular standard are admitted and those who do not are not admitted. These expanded analyses also confirm the findings of Chan and Eyster regarding the inefficiency of a color-blind admissions approach. That is, by measuring the average predicted college rank of the admitted class which they define as the performance of the policy, Fryer and colleagues find that employing color-blind admissions rather than traditional affirmative action results in a loss of efficiency from less than one percentage point to just over six percentage points, depending on the college characteristics including differences in the size and location of elite institutions. Thus, the work of Fryer and colleagues suggests that colleges and universities that are constrained by a color-blind or race-neutral system will employ rules that are likely to lead to an admissions outcome in which some

less-qualified candidates will have a greater chance of being accepted and some more qualified candidates will have less chance of acceptance.

In sum, research that examines the outcome of admitting a well-qualified, racially and ethnically diverse student body in the absence of the intervention of a race-conscious admissions program, or affirmative action, finds that alternative admissions practices that ignore race in selective colleges and universities and instead privilege other less rigorous academic criteria actually yield a less academically qualified group of students of all backgrounds. In essence, the research strongly suggests that affirmative action/race-conscious practices are actually the most efficient method of admitting a qualified and racially and ethnically diverse class of students.

The data used to arrive at such conclusions are varied and diverse in origin and timeframe. The methodologies also rely largely on rigorous econometric techniques. While Chan and Eyster (2003) incorporate administrative data from a highly selective university in California, a state with a formal ban on the use of race in college admissions and an alternative admissions practice, Fryar and colleagues use data from a slightly older national database that includes a much larger sample of selective postsecondary institutions, thereby generating broader and more generalizable analysis. Research suggests that, at both the state and national level, outcomes related to affirmative action as an efficient method of selecting highly qualified underrepresented students at selective colleges and universities is more effective than an admissions system that does not consider race and ethnicity as a factor in college admissions.

What remains unknown is the effect of a multiple admissions plan that includes systematic outreach and financial aid at one university, or even at a state level, as it is methodologically difficult to isolate the effect of one particular intervention among many (Pallais & Turner, 2007). While some research has suggested that a ban on affirmative action does not affect student behavior in terms of sending SAT/ACT score reports (Card & Krueger, 2005), other research finds a significant effect on the college enrollment of underrepresented minority students to selective flagship universities as a result of geographically targeted scholarships (Domina, 2007). Institutional programs targeting low- to middle-income high-achieving students, such as the so-called "no loan" policies, may also play a role in the enrollment of underrepresented students who are also low income. While datasets have expanded to account for a number of demographic and time-varying factors, it is more difficult to account for particular institutional support other than aid (such as the student support programs and programs that facilitate faculty-student interaction) particularly in studies conducted at the national level (Braxton, Hirschy, & McClendon, 2004). Understanding the effects of more isolated interventions, such as the introduction of a new admissions system or the retraction of a program like a ban on affirmative action, provides different angles of analyses to this important policy question. We now turn to these additional interventions and/or retractions regarding college admissions, including state-specific race-neutral admissions programs (e.g., college percent plans) and state bans on affirmative action in college admissions passed by legislation or voter referenda. The research on access to selective institutions is particularly important to low-income and underrepresented

student since the payoff to attending such colleges is higher than for other groups (Dale & Krueger, 2002).

The Percent Plan as an Intervention

The studies synthesized are useful for understanding the tradeoffs in efficiency that may affect institutions employing these race-neutral practices with later cohorts of applicants. The Texas' Top Ten Percent Plan is perhaps the most frequently evaluated such plan in the literature to date; however, its automatic admissions structure recently was modified to a lower percentage in one of the state's premier flagship institutions, the University of Texas at Austin. In a revision of the original version of the percent plan known as House Bill 588, Senate Bill 175 instituted caps on the percentage of entering students who were Top Ten Percent beneficiaries (Horn & Flores, 2012), the result being that a maximum of 75% of enrolled freshmen could be admitted through the percent plan legislation. Such a cap only applies to the University of Texas at Austin and not to other public institutions in the state, as capacity issues do not exist at the same level at other institutions. Nonetheless, more than a decade of policy research on the effectiveness of percent plans as an alternative to a race-conscious/affirmative action approach now exists. This research has focused primarily on two questions: first, is the level of racial diversity achieved with a race-neutral percent plan system the same as it was under a race-conscious admissions system, and second, are students admitted under a race-neutral regime persisting and completing college at reasonable rates (Niu & Tienda, 2010)?

In terms of the relative effects of race-conscious and race-neutral admissions systems on the level of racial diversity at a selective institution, the research overwhelmingly fails to find that a percent plan system increases racial and ethnic diversity to levels achieved under an affirmative action program. Any documented increases were the result of a growing Hispanic student population and not of the alternative admissions policy itself. For example, Long and Tienda (2008) found that the change to a percent admissions plan did not lead to a rebound in the diversity numbers experienced under a traditional affirmative action (i.e., race-conscious) plan. In an earlier study, Kain, O'Brien, and Jargowsky (2005) found some restoration of diversity to pre-ban numbers, but they attributed this finding to the increasing percentage of the minority population over time and not to an "effective" race-neutral program. More recently, Harris and Tienda (2012) confirmed the importance of accounting for the changing demographics in Texas, most notably the increasing percentage of Hispanics, finding that after accounting for the demographic changes in the high school graduation cohorts shows Hispanics at a significant disadvantage to Whites in enrollment outcomes at the state's top two institutions. That is, although the percentage of Hispanic high school graduates had increased over time, their presence in flagship institutions had not. They also find that Hispanic students experienced their lowest application and admissions rates during the years the percent plan was in effect, which resulted in their having a reduced presence at the state's flagship institutions compared to years when affirmative action was in place.

The implementation of a new admissions plan (percent plan) after the retraction of a previously employed model (affirmative action) provides the opportunity to examine such changes via a natural experiment analysis approach often employed in the field of economics and sociology. Such studies employ these methods using a series of datasets at the institutional, state, and national level. Using original survey data complemented by administrative state data, these studies offer unique and thorough analyses of college enrollment while accounting for precollege characteristics of the curriculum, as well as the high school context. The experience of Texas, then, has provided a framework for analyzing multiple changes in admissions plans for other states that are experiencing changes in their admissions system.

What is less known, despite careful attention to rigor and demography, is the extent to which other state higher education policy may be playing a role. For example, other legislative changes to state financial aid programs during a similar policy window are more difficult to isolate. Institutional outreach to particular regions of a state also may have influenced enrollment, although it is not clear to what extent university leadership and institutional presence in the form of regional offices in particular cities may have contributed to such outcomes. Such challenges exist for all policy research of this genre, and understanding how to attend to these external forces with current and future data is an important methodological lesson.

State Bans on Affirmative Action as an Intervention

The thorough and data-rich analyses of Texas admissions policies provide a model for other state-specific work. However, analyses of the effects of race-conscious programs and practices at the national level are also relevant and critical to the larger story of college access in the USA. More recent research on the effects of multiple bans on race-conscious admissions policies that use various national datasets finds remarkably similar results across states: the elimination of affirmative action in the admissions systems of selective institutions lowers the rate of college enrollment for underrepresented students, particularly Black students. Arcidiacono (2005) found that removing affirmative action programs would have the greatest effect on the percentage of Black students attending top-tier schools, which is not an unexpected finding, as it is at selective institutions where affirmative action practices matter most. He estimated that the percentage of Black males attending colleges with an average SAT score above 1,200 falls by over 40%. Removing financial aid advantages would reduce the percentage of Black students who enroll by approximately 9%.

Similarly, in an examination of the effect of a recent series of multiple bans on affirmative action in college admissions, Hinrichs (2012) showed a significant drop in underrepresented student populations at the nation's most selective colleges and universities. In a study controlling for important state-level policies, such as a high-stakes accountability system, a high school exit exam, and a percent plan, Backes (2012) found that fewer Black and Latino students enrolled at the most selective institutions as a result of the state bans, although affirmative action apparently

had not increased the overall enrollment of Black students attending less selective institutions. In short, the effects of affirmative action, as noted in other studies, were limited to the nation's most selective colleges and universities.

Finally, building on the work of Arcidiacono (2005), Howell (2010) provided an analysis that is one of the first to model an individual's choice from a portfolio of colleges by specifying college application decisions as a nonsequential search problem. This model may be applied to other areas, such as the elimination of legacy preferences. The policy simulations show that a nationwide ban on affirmative action would decrease minority enrollment nationally by 2%, although this figure increases significantly after accounting for selectivity. Specifically, implementing race-neutral admissions across the nation would decrease minority enrollment at selective four-year colleges by 10.2%. Howell concludes that instituting heavy recruitment of minority students is the strategy most likely to increase minority enrollment to some extent, but no other method offered, including financial incentives, would increase minority enrollment to pre-ban levels.

While remarkably similar in outcome, the data used to execute each of these "ban-effect" studies vary widely. For example, Arcidiacono (2005) utilizes the NLS 72 and simulates a policy ban, while Hinrichs (2012) and Backes (2012) employ data that fit the policy periods relevant to the bans under review. However, Hinrichs utilizes individual-level data from the CPS and ACS, thus allowing a more detailed perspective on individual student decisions, while Backes incorporates aggregate-level data from IPEDS, essentially trading off this individual-level detail but gaining a larger set of institutions not captured in the census data. Finally, Howell (2010) provides a model of analysis that can be applied to other elite college policies, such as legacy admissions, although like Arcidiacono she employs a policy simulation with unique and rigorous detail relating to the larger application and admissions process that goes beyond the outcome of enrollment.

What remains to be answered among these particularly detailed analyses of affirmative action ban effects? The studies reviewed (e.g., Arcidiacono, 2005; Backes, 2012; Hinrichs, 2012), although with some exception in the Howell (2010) publication, appear to assume that an effect of the bans is largely an individual-level consequence and do not discuss whether this effect might spill over to an institution's reputation or alumni base. Understanding larger contextual and reputational effects for all students, such as the consequences of a reduction in the level of diversity in the student body for all and not just those who are underrepresented, would be a worthy complement to this research base. Understanding the data that would relate to this inquiry would be a logical first step in this line of suggested research.

Data, Demography, and Policy Analysis

Twelve years into the new millennium, educators and policymakers find themselves with unprecedented access to data. In this section, we provide a brief analysis of the advantages and challenges of the data used in the studies reviewed that address the

various stages of the educational pipeline. Each stage of the P-16 pipeline could be examined using data from federal, state, district, and institutional sources. The research reviewed in this chapter included analyses of census data (e.g., ACS, IPUMS, CPS), national datasets (e.g., NLS, NLS, HSB, NELS:88, NAEP, IPEDS), state datasets (e.g., California, Texas, Florida, Tennessee), district- and school-level data (e.g., cohorts within school districts, a freshman cohort at a single university), and international assessments (e.g., TIMSS, PISA). The studies we reviewed carefully chose data sources that fit their questions of interest and provide information on the effectiveness of new and older educational interventions and programs. In this section, we also assess how these data systems might connect with each other and how well they are poised to examine outcomes for the current and projected demographics of the US population. We begin with an assessment of data for demographic analyses and follow with attention to select datasets associated with the P-16 interventions and programs examined.

Understanding the New Demography

The 2010 US Census and associated databases like the American Community Survey provide exceptional opportunities to assess the changing demographics of the United States. Access to such data is now widely available, thereby allowing policymakers, higher education institutions, nonprofit organizations, and local communities that have the appropriate skill set to assess their own demographics rather than wait for such information to be available from formal governmental reports. This broad range of census data helps to create a portrait of the complex changes in the demographic composition and racial identification in the USA. For example, Latinos as defined today were not so identified in the US Census and other government databases until after 1960, and mixed-race individuals only recently have been able to account for their multiple racial and ethnic origins.

As evidenced in this review, the American Community Survey and the Current Population Survey provide excellent sources of data for understanding the effects of a state-level policy on the educational outcomes of diverse populations by race, ethnicity, citizenship status, household composition, and geographic status. These advantages in measuring changes in educational policy or policy related to educational outcomes are primarily due to the robust representation of state-level data. The details of the variables within these datasets, including in some cases their easy accessibility, provide important opportunities to capture the criteria of the policies under review. The limitations of these data, however, include being unable to assess more detailed measures of educational performance, since the datasets often do not provide data related to transcripts or the school experience. In addition, these data are primarily cross-sectional in nature and thus do not allow for the longitudinal analysis provided by other national datasets, such as the NELS, ELS, the NLSY, and High School and Beyond (HS&B). Nevertheless, the national longitudinal datasets are not as well suited to examine distinct state policies because they are not representative at the state level.

Finally, growing research considers the impact education has on occupational wages across different decades. Census data offer a number of variables related to the labor market, such as wages, occupational status, and some employment characteristics. The capacity of such datasets to link to other labor market data that is based on the state or county identifier provides even further avenues of research, as the field of educational policy analysis continues to examine the effects of postsecondary attendance and completion. In sum, while the census-related databases are not able to capture academic variables other than educational completion milestones from high school to postsecondary levels, they do provide snapshots of individual behavior that may or may not have been influenced by local, state, or national policies. We now comment on the benefits offered by longitudinal datasets at the national and state level within the P-16 sector.

Early Childhood/Middle School/High School Education Data

Studies that evaluate the long-term effects of interventions in the early childhood and early schooling sectors examined in this review use randomized experiments, as well as data from national longitudinal surveys and associated supplements that are updates to these surveys. The analyses largely examine the impact of programmatic interventions on high school, college enrollment, and college completion outcomes. In some cases, such as the analysis of the STAR class-size experiment in Tennessee, the researchers examine the type of college sector entered (e.g., four-year or two-year, selective or nonselective). The strength of these data and designs lies in the length of time allowed to measure different educational milestones. However, the time and region in which survey respondents were questioned limits the generalizability of the findings, given the demography of that era. That is, we learn a good deal about Black-White differences and gender and income, but not about other racial and ethnic groups that now comprise the largest minority (Hispanics), as well as the fastest growing minority (Asian), in the nation. These growing groups have characteristics such as country of origin and language that likely require alterations of research designs, as well as researcher knowledge of such populations. Nevertheless, the older studies and datasets are models for future research examining the effects of early childhood and early schooling interventions on long-term educational outcomes. Although survey attrition remains an issue for all of these surveys, understanding the issues associated with attrition for various social and cultural groups, including their initial engagement in the survey process, may provide important lessons for researchers.

Access is also a key component of the potential utility of the data for measuring future interventions. The national longitudinal surveys are largely available online, although confidential extracts require additional application and security provisions. While randomized experiments are the gold standard in evaluation research, they are not easily implemented or funded. Researchers should consider coordinating with states and school districts to conduct these types of experiments. We also encourage historical and political analyses of the context in which successful experiments

such as the Tennessee STAR project were designed, executed, and sustained. Legislative histories of policy development may provide an important piece of information for promoting better research methods and project implementation.

The middle school program interventions assessed in this review focus on the effect of mathematics as a stepping stone to more rigorous curriculum. These studies are particularly relevant because of the quality and detail of the data utilized; these data largely come from school district or system databases (Allensworth et al., 2009; Spielhagen, 2006b; Stein et al. 2011). Research on the effects of curriculum interventions demands quality data on students and the schools they attend in order to understand whether curriculum choices are a function of student decisions, the school infrastructure capacity, or some other option not yet evaluated. Such data sources are also attuned to patterns of local curriculum structuring with regard to characteristics of the teaching force and the timing of course offerings.

Such detail is also required for curriculum analyses at the high school level. Our review summarizes research using state databases in Texas and Florida (Conger, Long, & Iatorola, 2009; Long, Iatorola, & Conger, 2009; Long & Tienda, 2008; Martorell & McFarlin, 2011; Harris & Tienda, 2012). Of even greater value are state education systems that link the various stages of the education pipeline via large-scale administrative databases. Much of the college access work has focused on students' experiences of the high school curriculum, which is useful in understanding the effects of college readiness on the likelihood of completing college. However, we ask what value there might be in understanding the middle school curricular context as an influence in the choice of the high school curriculum, and perhaps of college access and completion outcomes. The research consistently points to math, and early algebra more specifically, as a key step toward achieving college access (Adelman, 1999, 2006; Gamoran & Hannigan, 2000; Spielhagen, 2006a, 2006b). What else might be gained by further unpacking the role of math, and perhaps other courses such as science and social studies, earlier in the educational pipeline if good data were available?

We transition now to additional research needs as they relate to the two-year sector across the areas presented in this review.

Community Colleges: Remediation, Transfer, and Articulation Data

Efforts have been made by national nonprofit educational organizations to assist community colleges to develop more systematic data collection initiatives, including the 2003 Achieving the Dream: Community Colleges Count Initiative (ATD) and the Developmental Education Initiative (DEI). The ATD strategy is to have member colleges contribute to newly created state longitudinal data systems to engage in more data-driven policies. The success of this initiative is reflected in the increased capacity of institutional leaders and researchers to collect and analyze data (ATD website, 2012; Lorenzo, 2011). DEI assesses innovations in developmental education and

encourages more rigorous data-driven research related to developmental education (ATD website). Another strategy to assess remediation is to develop standard assessment procedures and cut scores to determine who is placed in remediation in the 50 states. In a recent review of state assessment practices, the National Center for Higher Education Management Systems (NCHEMS) Transitions Study (Ewell, Boeke, & Zis, 2008) concludes that, while there is still some variability in assessment and placement procedures, the trend is toward standardization so that every state employs the same criteria. Hughes and Scott-Clayton (2010) also summarize multistate assessments and reinforce the position held by the NCHEMS review (Ewell et al.). This trend toward standardization, however, does not address important questions, including what cutoff is appropriate for college-level coursework? And, are institutions also moving to standardize their curricula so they align across institutions and across states? In short, future research establishing the effects of remediation on student outcomes should include attention to criteria for placement, transcript data to evaluate student progress, and programmatic information from multiple institutions to ensure comparisons between the same elements. It would also be useful to have more information about the academic support services that are (or should be) available to remedial education students (Bailey et al., 2010; Fonte, 1997).

For many of the questions posed in this section on continued data needs, we turn to the advantages and challenges of state administrative data systems.

The Opportunity of State Administrative Databases in Understanding College Completion for Underrepresented Students

The last 10 years of educational policy research have seen an increasing number of econometric-related studies that use longitudinal, state-level administrative data generally known as student unit record (SUR) data systems. As of 2009, 44 states and the District of Columbia have at least one SUR data system; the total number is 59. Demographic and postsecondary data are among the standard information collected, although to our knowledge, these data generally fail to contain detailed information on such attributes as parental education, number of generations a student has been in the USA, and some English language learner identification variables; such variables are critical to understanding the educational experiences and outcomes of underrepresented populations. The structure of the data systems, which is mandated by a governing agency in each state, varies in terms of the level of attainment in education and in many cases the details of employment that are collected. For example, one state may have a unified system of data that includes K-12, postsecondary, and labor market data, while another may have two or more systems with separate data for K-12, two-year colleges, four-year colleges, financial aid records, and/or labor force participation. Other challenges also remain, such as not being able to link data on teachers and instructors to students in a course offering, although some states such as New York have made progress in this area. Nonetheless, state administrative data systems have numerous advantages, as no national longitudinal

data system has the ability to measure the universe of students, including the mobility of students across and within dimensions of the P-16 pipeline.

Nonetheless, one measure of the growing capacity of these state administrative data systems is the increasing number that share, link, or exchange data with other state agencies (Garcia & L'Orange, 2010). Some states, including Florida and Virginia, also have increased ability to track students into other state service or correctional facilities, which is an area of unexplored outcomes for disadvantaged students. In addition, 32 states collect data on academic history from the K-12 sector, while 15 collect data on labor, workforce, and/or unemployment insurance records (see Garcia & L'Orange, for a GIS presentation of SUR data availability across the USA). States that have the capacity to measure the full spectrum of the education-to-employment pipeline include Alaska, California, Florida, Georgia, Kansas, Kentucky, Maryland, Missouri, New Mexico, North Dakota, Nevada, Oregon, Texas, Washington, and Utah with additional states gaining such capacity over time (See update, for example, in Garcia & L'Orange, 2012).

Yet simply establishing these data systems is insufficient. Increased use of these data also depends on researchers, policymakers, and education leaders receiving required training. Data accessibility and training seminars using federal datasets have become common, thanks to national education agencies, as well as programs offered by universities and think tanks, programs that often are sponsored by private foundations and the federal government. However, we know far less about how to access state data systems in such states as Washington, New York, Illinois, and Georgia. As a start, the State Higher Education Executive Officers has produced a report that surveys varying state rules regarding protocols for accessibility (Ott & DesJardins, 2009). Understanding the policy and procedures to access available data should be as much a part of educational policy discussions as the educational interventions we are studying.

Recommended Areas for Future Policy Research

The 2010 Census reminded us that non-White population growth was at the center of the nation's demography. With a US population of 308 million by 2010, Hispanics constituted over half of the 27.3 million population increase from 2000, although Asians were the fastest growing ethnic group (Ennis, Rios-Vargas, & Albert, 2011). Some regional growth rates within the USA were also particularly notable, with states in the South and West experiencing the largest population growth from 2000 to 2010: Nevada had the fastest rate of growth, while Texas had the greatest increase in numbers (Mackun & Wilson, 2011). By 2010, the USA saw the emergence and growth of a number of "majority-minority" states. As of 2010, five states were officially designated majority-minority: Hawaii (77% minority), California and New Mexico (60%), and Texas (55%); the District of Columbia remained majority-minority with 65% (Humes, Jones, & Ramirez, 2011). Arizona, Florida, Georgia, Maryland, and Nevada are not far from reaching the 50% minority mark. The changing

racial demographics of these states and the nation in general foreshadow important sociocultural, economic, and educational trends the P-16 school sectors will have to face in the near future, a trend that future educational policy analysis and research will also need to more deeply incorporate.

With this context in mind, and in response to our review of research examining the effects of programmatic and policy interventions affecting the nation's college access and completion rates throughout the P-16 sector, we see two main areas that could be further integrated into educational pipeline research. The first is labor market participation both during school and as an outcome of postsecondary credentials earned. Data from the American Community Survey indicate that the economic downturn that occurred from 2008 to 2010 created a labor market in which all groups have experienced a decrease in participation (Howard, 2009). However, despite the hit in labor market opportunities taken by all, individuals with less education, Hispanics, Blacks, and men have (unsurprisingly) fared worse than others (Hoynes, Miller, & Schaller, 2012).

The second area for further research is to disaggregate the effects of student preparation on college completion in a racially and ethnically diverse demography and postsecondary institutional market. Such research includes more attention to college completion by race/ethnicity, as well as differences in the relationship by type of institution beyond the two- versus four-year divide. We recommend particular attention to completion in the four-year nonselective sector that also includes minority-serving institutions.

The Labor Market as Part of the Postsecondary Path

Research on the economic returns to schooling as measured by earnings has been well documented and has helped solidify the importance of education in US society (Card, 1999). The recent proliferation of research (Long, 2010; Yakusheva, 2010) on the connection between postsecondary credential completion and labor market outcomes will likely continue and be enhanced by advances in data availability, including more opportunities to understand population groups beyond characteristics such as gender. Nonetheless, although the role of employment is of great importance to an individual's economic survival, employment during school or as an outcome of school can be a complex pattern to disentangle. Employment is not an educational intervention, but can promote completion by providing financial relief as well as inhibit degree completion by displacing the likelihood of educational achievement.

In regard to outcomes in the P-16 pipeline, we recommend additional research on the relationship between increasingly rigorous high school diploma and measures of employment in a post-2010 economy. In a multidisciplinary review of the relationship between passing the MCE and the earnings in the labor market, Holme and colleagues (2010) conclude that the relationship is ambiguous. While some authors find heterogeneous effects by gender and race (Dee & Jacob, 2006), others do not (Warren et al., 2008). One exception, although particular to one state context, is

Martorell's (2004) study which finds that students who failed the "last chance exit" exam by a small margin had lower earnings than students who passed the exam by a small margin, although this earnings advantage dissipated over time. Research has established that earning a high school diploma does have a causal effect on reducing crime and the type of crimes committed (Lochner & Moretti, 2004). However, it is not clear whether earning the "improved" high school credential will be rewarded by higher wages. A critical question then is whether these newly designed high school diplomas may have more value in the college persistence pipeline leading to college completion than the labor market opportunities for high school graduates.

More research is also needed to understand the extent to which working in college influences postsecondary choice, persistence, and, most importantly, completion. Working while attending a postsecondary institution is a common activity for American youth, as approximately 80% of students work while in college, according the National Center for Education Statistics (2002). Emerging research using national databases finds that students who begin their higher education at a community college or are from a disadvantaged background usually put in longer hours of paid employment, which ultimately has negative consequences for degree attainment (Roksa, 2010). While the role of working while in college has received increased attention, less research has considered whether the relationship holds across different states and varying local economies. Accounting for state context and local economies is one way to begin to disentangle the relationship between choosing to work and choosing to enter and complete college within a particular timeframe.

The Diverse Nonselective Four-Year Sector

Our consideration of the effects of policy and programmatic interventions at selective four-year and nonselective two-year institutions leads us to recommend that future research also consider the four-year nonselective sector of postsecondary education, a sector that includes most minority-serving institutions. Bound et al. (2009) examine the question of whether declines in college completion rates are mostly due to changes in student preparation for college or the institutional characteristics of the schools attended. They hypothesize that the supply side of higher education may matter more for college completion for some students than the preparation levels with which they enter college. Their analyses show that, overall, preparation (as measured by math scores), institutional resources, and sectoral shifts related to where students first attend college explain the decline in college completion. While this study is noteworthy in the questions it asks about who and what accounts for college completion rates, the authors do not consider differences by race and ethnicity. To engage this angle, we recommend attention to college completion outcomes using robust data systems that include the minority-serving institution (MSI) sector—postsecondary institutions, both public and private, that include Historically Black Colleges and Universities, Hispanic-Serving Institutions,

Tribal Colleges and Universities, and the newly emerging Black-Serving Institutions (See Li, 2007 for further explanation of terms). Attention to this sector, from a rigorous policy analysis perspective, is paramount given the changing demographics in US higher education. In terms of student "customers," MSIs currently enroll more than 2.3 million students, or approximately 14% of all higher education students (Harmon, 2012). HBCUs enroll about 16% of Black students, while HSIs represent approximately 42% of all Hispanic students—a percentage that is significantly higher in states with high percentages of Hispanic students (Harmon). The merging of state administrative databases, national datasets such as IPEDS with a rich set of institutional characteristics, and information on geographic sector and local labor markets may be fruitful sources of data for accounting for important social context characteristics.

Conclusion

Our efforts to assess P-16 policy research on the college access and outcomes of low-income and underrepresented have yielded a number of insights to guide policy and future research. First, the chapter demonstrates that not all policies have clear, neutral, and consistent effects. The early childhood to college project findings indicate that preschool may help boys in more ways than previously assessed and that the effects of policy experiments across different decades differ to some degree across race and ethnic groups. While methodological advances have strengthened research findings over time, the general conclusion is that participation in such programs yields benefits in years well beyond elementary school. The research on the effects of high school exit exams is much more mixed with regard to outcomes leading to high school graduation, college enrollment, and labor market returns. The inconsistent findings may signal that these state-mandated exams are not working as intended or perhaps that their effect will not be seen for some time. In either case, states continue to adopt these policies despite clear effects. This is not to say that increased standards should not be part of a school development plan. However, policymakers should consider the extent these mechanisms are working toward intended goals before subsequent policy adoption. Remediation is another area of uncertain effects although the short-term benefit of remediation on course completion is perhaps the most consistent finding in this area of research. Profound variation across institutions even within a state system of higher education suggests the need for continued review of whether such variation ultimately benefits or disadvantages the students who fall in this academic category.

The demographic story is also of great consequence for the future of higher education. As the student body shifts to comprise a majority of non-White college enrollees, postsecondary institutions will need to adjust and welcome these students in ways that more effectively address their educational needs than in the past. The elite institutions have remained remarkably stable in their level of race and ethnic diversity in their student bodies over the last 30 years, yet the resistance

to policies that promote diversity from external parties such as voters and some state legislatures is as prominent as ever. Stated differently, the capacity to implement diversity-related policies such as race-conscious admissions has in many cases been taken away from institutions and placed in the hands of state legislatures and voters.

In sum, we have learned that the student pathway to college completion is long, dynamic, and responsive to both program interventions as well as retractions. We have also learned that college completion may be deeply linked with earlier educational interventions. While we do not propose a decrease in attention to college completion, the research indicates that other sectors of the pipeline may be able to contribute to the completion agenda, bringing to light the continued importance of the road to college access for underrepresented students. Given this complexity, the research challenges to isolating impacts of interventions on student outcomes will thus continue. The advantages of new data and the changing demographic groups within the US population will keep the field of educational policy research both intriguing and in need of continued attention.

References

Achieve. (2012). *College and career readiness agenda*. Retrieved June 15, 2012, from http://www.achieve.org/college-and-career-ready-agenda

Achieving the Dream (ATD). (2012). Downloaded on April 10, 2012, from http://www.achievingthedream.org/goal/solution

ACT. (2005). *Courses count: Preparing students for postsecondary success*. Iowa City, IA: ACT Policy Report.

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

Allensworth, E., Nomi, T., Montgomery, N., & Lee, V. E. (2009). College preparatory curriculum for all: Academic consequences of requiring Algebra and English I for ninth graders in Chicago. *Educational Evaluation and Policy Analysis, 31*(4), 367–391. doi:10.3102/0162373709343471.

Alon, S., & Tienda, M. (2007). Diversity, opportunity, and the shifting meritocracy in higher education. *American Sociological Review, 72*(4), 487–511.

Anderson, M. (2008). Multiple inference and gender differences in the effects of early intervention: A reevaluation of the abecedarian, Perry preschool, and early training projects. *Journal of the American Statistical Association, 103*(484), 1481–1495. doi:10.1198/016214508000000841.

Anderson, G., Sun, J., & Alfonso, M. (2006). Effectiveness of statewide articulation agreements on the probability of transfer: A preliminary policy analysis. *The Review of Higher Education, 29*(3), 261–292.

Andrews, R. J., Li, J., & Lovenheim, M. (2011). *Quantile treatment effects of college quality on earnings: Evidence from administrative data in Texas* (NBER Working Paper). Cambridge, MA: National Bureau of Economic Research.

Arcidiacono, P. (2005). Affirmative action in higher education: how do admission and financial aid rules affect future earnings? *Econometrica, 73*(5), 1477–1524.

Arrow, K. (1973). The theory of discrimination. In O. Ashenfelter & A. Rees (Eds.), *Discrimination in labor markets*. Princeton, NJ: Princeton University Press.

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

Avery, C., & Levin, J. D. (2009). *Early admissions at selective colleges* (Working Paper 14844). Cambridge, MA: National Bureau of Economic Research.

Backes, B. (2012). Do affirmative action bans lower minority college enrollment and attainment? Evidence from statewide bans. *Journal of Human Resources, 47*, 435–455.

Bailey, D. S. (2003). Swirling changes to the traditional student path. *American Psychological Association Monitor on Psychology, 34*, 36.

Bailey, T. R., Jenkins, D., & Leinbach, D. T. (2006). *Is student success labeled institutional failure? Student goals and graduation rates in the accountability debate at community colleges* (CCRC Working Paper No. 1). New York: Community College Research Center, Teachers College, Columbia University.

Bailey, T., Jeong, D. W., & Cho, S. W. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. *Economics of Education Review, 29*(2), 255–270.

Barnett, W., & Masse, L. N. (2007). Comparative benefit-cost analysis of the abecedarian program and its policy implications. *Economics of Education Review, 1*, 113–125.

Baum, S., Little, K., & Payea, K. (2011). Trends in community college education: Enrollment, prices, student aid, and debt levels. New York: The College Board. Retrieved July 2, 2012 from http://advocacy.collegeboard.org/sites/default/files/11b_3741_CC_Trends_Brief_WEB_110620.pdf

Becker, G. (1957). *The economics of discrimination*. Chicago: University of Chicago Press.

Belfield, C., & Bailey, T. (2011). The benefits of attending community college: A review of the evidence. *Community College Review, 39*(1), 46–68. doi:10.1177/0091552110395575.

Berger, D. M. (1997). Mandatory assessment and placement: The view from an English department. *New Directions for Community Colleges, 100*, 33–41.

Bettinger, E., & Long, B. T. (2004). *Shape up or ship out: The effects of remediation on students at four-year colleges* (No. w 10369). Cambridge, MA: National Bureau of Economic Research.

Bishop, J. H., & Mane, F. (2001a). The impacts of minimum competency exam graduation requirements on college attendance and early labor market success of disadvantaged students. In G. Orfield & M. L. Kornhaber (Eds.), *Raising standards or raising barriers? Inequality and high-stakes testing in public education* (pp. 51–83). New York: Century Foundation Press.

Bishop, J. H., & Mane, F. (2001b). The impacts of minimum competency exam graduation requirements on high school graduation, college attendance and early labor market success. *Labour Economics, 8*, 203–222.

Bishop, J. H., Mane, F., Bishop, M., & Moriarty, J. (2000). *The role of end-of-course exams and minimum competency exams in standards-based reforms* (CAHRS Working Paper 00-09). Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for Advanced Human Resource Studies.

Black, D. A., & Smith, J. A. (2006). Estimating the returns to college quality with multiple proxies for quality. *Journal of Labor Economics, 24*, 701–728.

Bound, J., Lovenheim, M., & Turner, S. (2009). *Why have college completion rates declined? An analysis of changing student preparation and collegiate resources*. Cambridge, MA: National Bureau of Economic Research.

Bowen, W. G., & Bok, D. (1999). *The shape of the river: Long-term consequences of considering race in college and university admissions*. Princeton, NJ: Princeton University Press.

Bowen, W. G., Kurzweil, M. A., Tobin, E. M., & Pichler, S. C. (2005). *Equity and excellence in American higher education*. Paper presented to Thomas Jefferson Foundation Distinguished Lecture Series. Charlottesville, VA: University of Virginia Press.

Boylan, H. R. (2002). *What works: Research-based best practices in developmental education*. Boone, NC: Continuous Quality Improvement Network with the National Center for Developmental Education, Appalachian State University.

Boylan, H. R., Bliss, L. B., & Bonham, B. S. (1997). Program components and their relationship to student performance. *Journal of Developmental Education, 20*(3), 2–8.

Bozick, R., & Ingels, S. J. (2008). *Mathematics course taking and achievement at the end of high school: Evidence from the education longitudinal study of 2002* (ELS:2002) (NCES 2008-319). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Bradburn, E. M., Hurst, D. G., & Peng, S. (2001, June). *Community college transfer rates to 4-year institutions using alternative definitions of transfer* (No. NCES 2001-197). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

Bragg, D. D. (2001). Community college access, mission, and outcomes: Considering intriguing intersections and challenges. *Peabody Journal of Education, 76*(1), 93–116.

Braxton, J. M., Hirschy, A. S., & McClendon, S. A. (2004). Understanding and reducing college student departure. *ASHE-ERIC Higher Education Report, 30*(3), 128.

Bridgeman, B., McCamley-Jenkins, L., & Ervin, N. (2000). *Predictions of freshman grade-point average from the revised and recentered SAT I: Reasoning test* (Research Report 2000–1). New York: College Entrance Examination Board.

Brint, S. (2003). Few remaining dreams: Community colleges since 1985. *Annals of the American Academy of Political and Social Science, 586*, 16–37.

Buchmann, C., Condron, D., & Roscigno, V. (2010). Shadow education, American style: Test preparation, the SAT, and college enrollment. *Social Forces, 89*(2), 435–462.

Calcagno, J., Bailey, T., Jenkins, D., Kienzl, G., & Leinbach, T. (2008). Community college student success: What institutional characteristics make a difference? *Economics of Education Review, 27*(2008), 632–645. doi:10.1016/j.econedurev.2007.07.003.

Calcagno, J. C., & Long, B. T. (2008). *The impact of postsecondary remediation using a regression discontinuity approach: Addressing endogenous sorting and noncompliance* (NBER Working Paper 14194). Cambridge, MA: National Bureau of Economic Research.

Callahan, R., Wilkinson, L., & Muller, C. (2010). Academic achievement and course taking among language minority youth in U.S. Schools: Effects of ESL placement. *Educational Evaluation and Policy Analysis, 32*, 84–117.

Camara, W., & Echternacht, G. (2000). The SAT I and high school grades: Utility in predicting success in college. *The College Board Research Notes, RN-10*, 1–12.

Campbell, F., Ramey, C., Pungello, E., Sparling, J., & Miller-Johnson, S. (2002). Early childhood education: Young adult outcomes from the abecedarian project. *Applied Developmental Science, 6*, 42–57.

Card, D. (1999). The causal effect of education on earnings. *Handbook of Labor Economics, 3*, 1801–1863.

Card, D., & Krueger, A. B. (2005). Would the elimination of affirmative action affect highly qualified minority applicants? Evidence from California and Texas. *Industrial & Labor Relations Review, 58*, 416–434.

Center for American Progress. (2009). *Improving academic preparation for college: What we know and how state and federal policy can help*. Washington, DC: Author.

Center on Education Policy. (2010). *Slow and uneven progress in narrowing gaps*. Washington, DC: Author.

Center on Education Policy. (2011). *Progress lags in high school, especially for advanced achievers*. Washington, DC: Author.

Chan, J., & Eyster, E. (2003). Does banning affirmative action lower college student quality? *The American Economic Review, 93*, 858–872.

Cheng, R. (2008). Financial aid and student dropouts in higher education: A heterogeneous research approach. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XXIII, pp. 209–240). Dordrecht, the Netherlands: Springer.

Coate, S., & Loury, G. C. (1993). Will affirmative-action policies eliminate negative stereotypes? *The American Economic Review, 83*, 1220–1240.

Cohen, A. M. (1994). Analyzing community college transfer rates. In A. M. Cohen (Ed.), *Relating curriculum and transfer* (New directions for community colleges, No. 86, pp. 71–79). San Francisco: Jossey-Bass Publishers.

Cohen, A. M., & Brawer, F. B. (2008). *American community college*. San Francisco: Jossey-Bass.
College Board. (2011). Retrieved April 10, 2012, from http://completionagenda.collegeboard.org/percentage-public-high-schools-offering-ap%C2%AE-or-ib-courses-four-core-subject-areas
Conchas, G. Q., & Vigil, J. D. (2012). *Street smart school smart. Urban poverty and the education of adolescent boys*. New York: Teachers College Press.
Conger, D., Long, M. C., & Iatarola, P. (2009). Explaining race, gender, and poverty disparities in advanced course-taking. *Journal of Policy Analysis and Management, 28*(4), 555–576.
Dale, S. B., & Krueger, A. B. (2002). Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables. *Quarterly Journal of Economics, 117*(4), 1491–1528.
Darity, W. Jr., Castellino, D., Tyson, K., Cobb, C., & McMillen, B. (2001). *Increasing opportunity to learn via access to rigorous courses and programs: One strategy for closing the achievement gap for at-risk and ethnic minority students*. Report prepared for the North Carolina Department of Public Instruction.
de los Santos Alfredo, G., & Wright, I. (1989, Summer). Community college and university student transfers. *Educational Record, 70*(3–4), 82–84.
Dee, T. (2003). The first wave of accountability. In P. E. Peterson & M. R. West (Eds.), *No child left behind: The politics and practice of accountability*. Washington, DC: Brookings Institution.
Dee, T. S., & Jacob, B. A. (2006). *Do high school exit exams influence educational attainment or labor market performance?* Cambridge, MA: National Bureau of Economic Research.
Deming, D. (2009). Early childhood intervention and life-cycle skill development: Evidence from head start. *American Economic Journal, 1*(3), 111–134.
DesJardins, S. L. (2003). Event history methods: Conceptual issues and an application to student departure from college. In J. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XVIII, pp. 421–471). Dordrecht, the Netherlands: Springer.
Dietz, S. (2010). *State high school tests: Exit exams and other assessments*. Washington, DC: Center on Education Policy.
Domina, T. (2007). Higher education policy as secondary school reform: Texas public high schools after Hopwood. *Educational Evaluation and Policy Analysis, 29*, 200–217.
Dougherty, K. J. (1994). *The contradictory college: The conflicting origins, impacts, and futures of the community college*. Albany, NY: State University of New York Press.
Dowd, A., & Melguizo, T. (2008). Socioeconomic stratification of community college transfer access in the 1980s and 1990s: Evidence from HS&B and NELS. *The Review of Higher Education, 31*(4), 377–400.
Doyle, W. R. (2009). The effect of community college enrollment on bachelor's degree completion. *Economics of Education Review, 28*, 199–206.
Duncan, G., Ludwig, J., & Magnuson, K. (2007). Reducing poverty through preschool interventions. *The Future of Children, 17*(2), 143–160.
Dynarski, S., Hyman, J. M., & Schanzenbach, D. W. (2011). *Experimental evidence on the effect of childhood investments on postsecondary attainment and degree completion* (NBER Working Paper No. 17533).
Ennis, S. R., Rios-Vargas, M., & Albert, N. G. (2011). *The Hispanic population: 2010*. Washington, DC: US Census Briefs, US Census Bureau.
Ewell, P., Boeke, M., & Zis, S. (2008). *State policies on student transitions: Results of a fifty-state inventory*. Boulder, CO: National Center for Higher Education Management Systems (NCHEMS).
Florida Community College System. (2001). *AA transfers to the SUS*. Tallahassee, FL: Department of Education.
Fonte, R. (1997). Structured versus laissez-faire open access: Implementation of a proactive strategy. *New Directions for Community Colleges, 100*, 43–52.
Fryer, R. G., Jr., Loury, G. C., & Yuret, T. (2008). An economic analysis of color-blind affirmative action. *Journal of Law, Economics, and Organization, 24*, 319–355.

Gándara, P. (2002). Meeting common goals: Linking K-12 and college interventions. In W. G. Tierney & L. S. Hagedorn (Eds.), *Increasing access to college: Extending possibilities for all students* (pp. 81–103). Albany, NY: State University of New York Press.

Gamoran, A., & Hannigan, E. C. (2000). Algebra for everyone? Benefits of college preparatory mathematics for students with diverse abilities in early secondary school. *Educational Evaluation and Policy Analysis, 22*(3), 241–254.

Garces, E., Thomas, D., & Currie, J. (2002). Longer-term effects of head start. *The American Economic Review, 92*(4), 999–1012.

Garcia, T. I., & L'Orange, H. P. (2010). *Strong foundations: The state of state postsecondary data systems*. Boulder, CO: State Higher Education Executive Officers.

Geiser, P., & Santelices, V. (2004). *The role of advanced placement and honors courses in college admissions* (Center for Studies in Higher Education Working Paper). University of California, Berkeley.

Goldrick-Rab, S. (2010). Challenges and opportunities for improving community college student success. *Review of Educational Research, 80*(3), 437–469. doi:10.3102/0034654310370163.

Goldrick-Rab, S., Harris, D. N., & Trostel, P. A. (2009). Why financial aid matters (or doesn't) for college success: Toward a new interdisciplinary perspective. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research*. Dordrecht, the Netherlands: Springer.

Greene, J. P., & Winters, M. A. (2004). *Pushed out or pulled up? Exit exams and dropout rates in public high schools* (Education Working Paper 5). New York: Center for Civic Innovation at the Manhattan Institute.

Grodsky, E., Warren, J., & Felts, E. (2008). Testing and social stratification in American education. *Annual Review of Sociology, 34*, 395–404. doi:10.1146/annurev.soc.34.040507.134711.

Grutter v. Bollinger, 539 U.S. 306 (2003).

Gurin, P., Dey, E. L., Hurtado, S., & Gurin, G. (2002). Diversity and higher education: Theory and impact on educational outcomes. *Harvard Educational Review, 72*(3), 330–366.

Hagedorn, L. S. (2005). How to define retention. In A. Seidman (Ed.), *College student retention: Formula for success*. Westport, CT: ACE/Praeger Publishers.

Hagy, A. P., & Staniec, J. (2002). Immigrant status, race, and institutional choice in higher education. *Economics of Education Review, 21*(4), 381–392.

Harmon, N. (2012). The role of minority-serving institutions in national college completion goals. Washington, DC: Institute for Higher Education Policy.

Harris, A. L., & Tienda, M. (2012). Hispanics in higher education and the Texas top 10% law. *Race and Social Problems, 4*(1), 57–67.

Hinrichs, P. (2012). The effects of affirmative action bans on college enrollment, educational attainment, and the demographic composition of universities. *The Review of Economics and Statistics, 94*(3), 712–722.

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

Holme, J. J., Richards, M. P., Jimerson, J. B., & Cohen, R. W. (2010). Assessing the effects of high school exit examinations. *Review of Educational Research, 80*, 476–526.

Horn, C. L., & Flores, S. M. (2012). When policy opportunity is not enough: College access and enrollment patterns among Texas Percent Plan Eligible Students. *Journal of Applied Research on Children, 3*(2), Article 9.

Horn, L., Kojaku, L., & Carroll, C. D. (2001). *High school academic curriculum and the persistence path through college: Persistence and transfer behavior of undergraduates 3 years after entering 4-year institutions* (NCES 2001-163). Washington, DC: National Center for Education Statistics, U.S. Department of Education, Office of Educational Research and Improvement.

Horn, L., & Nevill, S. (2006). *Profile of undergraduates in U.S. postsecondary education institutions: 2003-04 with a special analysis of community college students* (NCES 2006-184). Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Howard, D. J. (2009). *Labor force participation rates for selected age groups, 2008 and 2009*. Washington, DC: U.S. Census Bureau.

Howell, J. S. (2010). Assessing the impact of eliminating affirmative action in higher education. *Journal of Labor Economics, 28*(1), 113–166.

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.

Hoxby, C. M. (2009). *The changing selectivity of American colleges*. Cambridge, MA: National Bureau of Economic Research.

Hoynes, H. W., Miller, D. L., & Schaller, J. (2012). *Who suffers during recessions?* (Working Paper 17951). Cambridge, MA: National Bureau of Economic Research.

Hughes, K., & Scott-Clayton, J. (2010). *Assessing developmental assessment in community colleges: A review of the literature* (CCRC Working Paper No. 19). New York: Community College Research Center, Teachers College, Columbia University.

Humes, K. R., Jones, N. A., & Ramirez, R. R. (2011). *Overview of race and Hispanic origin: 2010*. Washington, DC: U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau.

Iatarola, P., Conger, D., & Long, M. C. (2011). Determinants of high schools' advanced course offerings. *Educational Evaluation and Policy Analysis, 33*, 340–359.

Jacob, B. (2001). Getting tough? The impact of high school graduation exams. *Educational Evaluation and Policy Analysis, 23*, 99–121.

Kain, J. F., O'Brien, D. M., & Jargowsky, P. A. (2005). *Hopwood and the top 10 percent law: How they have affected the college enrollment decisions of Texas high school graduates*. Dallas, TX: University of Texas at Dallas, Texas School Project.

Kao, G., & Thompson, J. S. (2003). Racial and ethnic stratification in educational achievement and attainment. *Annual Review of Sociology, 29*, 417–442.

Klopfenstein, K. (2004a). Advanced placement: Do minorities have equal opportunity? *Economics of Education Review, 23*(2), 115–131.

Klopfenstein, K. (2004b). The advanced placement expansion of the 1990s: How did traditionally underserved students fare? *Education Policy Analysis Archives, 12*(68), 1–14.

Kobrin, J. L., Patterson, B. F., Shaw, E. J., Mattern, K. D., & Barbuti, S. M. (2008). *Validity of the SAT for predicting first-year college grade point average* (College Board Research Rep. No. 2008-5). New York: The College Board.

Kurlaender, M., & Felts, E. (2008). Bakke beyond college access: Investigating racial/ethnic differences in college completion. In P. Marin & C. Horn (Eds.), *Realizing Bakke's Legacy: Affirmative action, equal opportunity, access to higher education*. Sterling, VA: Stylus Publishers.

Kurlaender, M., & Flores, S. M. (2005). The racial transformation of higher education. In G. Orfield, P. Marin, & C. L. Horn (Eds.), *Higher education and the color line: College access, racial equity, and social change* (pp. 11–32). Cambridge, MA: Harvard Education Press.

Lee, J. (2012). College for all: Gaps between desirable and actual p-12 math achievement trajectories for college readiness. *Educational Researcher, 41*(2), 43–55. doi:10.3102/0013189X11432746.

Lee, V. E., & Burkam, D. T. (2002). *Inequality at the starting gate: Social background differences in achievement as children begin school*. Washington, DC: Economic Policy Institute.

Lewin, T. (2010, July 23). Once a leader, US lags in college degrees. *The New York Times*. Retrieved May 21, 2011, from http://www.nytimes.com/2010/07/23/education/23college.html

Li, X. (2007). *Characteristics of minority-serving institutions and minority undergraduates enrolled in these institutions* (NCES 2008-156). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Lochner, L., & Moretti, E. (2004). The effect of education on crime: Evidence from prison inmates, arrests, and self-reports. *The American Economic Review, 94*(1), 155–189.

Long, B. T., & Kurlaender, M. (2009). Do community colleges provide a viable pathway to a baccalaureate degree? *Educational Evaluation and Policy Analysis, 31*(1), 30–53.

Long, M. C. (2010). Changes in the returns to education and college quality. *Economics of Education Review, 29*, 338–347.

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.

Long, M. C., Iatarola, P., & Conger, D. (2009). Explaining gaps in readiness for college-level math: The role of high school courses. *Education Finance and Policy, 4*(1), 1–33.
Long, M. C., & Tienda, M. (2008). Winners and losers: Changes in Texas university admissions post-Hopwood. *Educational Evaluation and Policy Analysis, 30*, 255–280.
Lorenzo, G. (2011). The revitalization of American Community Colleges: A synthesis of current initiatives, programs, issues, and challenges. *The SOURCE on community college issues, trends, & strategies* (pp. 1–18). Retrieved May 29, 2012, from http://www.edpath.com/images/CCPaperFinal.pdf
Louie, V. (2007). Who makes the transition to college? Why we should care, what we know, and what we need to do. *Teachers College Record, 109*(10), 2222–2251.
Lucas, S. R., & Berends, M. (2002). Sociodemographic diversity, correlated achievement, and defacto tracking. *Sociology of Education, 75*, 328–348.
Ludwig, J., & Miller, D. (2007). Does head start improve children's life chances? Evidence from a regression discontinuity design. *Quarterly Journal of Economics, 122*(1), 159–208.
Lundberg, S. J. (1991). The enforcement of equal opportunity laws under imperfect information: Affirmative action and alternatives. *Quarterly Journal of Economics, 106*, 309–326.
Mackun, P., & Wilson, S. (2011). *Population distribution and change: 2000 to 2010.* Washington, DC: 2010 Census Briefs, U.S. Census Bureau. Retrieved May 1, 2012, from http://www.census.gov/prod/cen2010/briefs/c2010br-01.pdf
Marlani, V. (2009). The transition to college from a demographic perspective: Past findings and future possibilities. *Teachers College Record, 109*(10), 2287–2300.
Martorell, F. (2004). *Do high school graduation exams matter? A regression discontinuity approach.* Unpublished manuscript. University of California Berkeley. Retrieved May 28, 2012, from http://www.utdallas.edu/research/tsp-erc/pdf/wp_martorell_2004_high_school_graduation_exams.pdf
Martorell, P., & McFarlin, I., Jr. (2011). Help or hindrance? The effects of college remediation on academic and labor market outcomes. *The Review of Economics and Statistics, 93*, 436–454.
Mattern, K. D., Patterson, B. F., Shaw, E. J., Kobrin, J. L., & Barbuti, S. M. (2008). *Differential validity and prediction of the SAT®* (College Board Research Rep. No. 2008-4). New York: The College Board.
McCauley, D. (2007). *The impact of advanced placement and dual enrollment programs on college graduation*. Applied Research Projects, Texas State University-San Marcos. Paper 206
McCormick, A. C. (2003). Swirling and double-dipping: New patterns of student attendance and their implications for higher education. In J. King, E. L. Anderson, & M. E. Corrigan (Eds.), *Changing student attendance patterns: Challenges for policy and practice* (New Directions for Higher Education, No. 121, pp. 13–24). San Francisco: Jossey-Bass.
McHewitt, E. R., & Taylor, G. (2004). *VCCS transfer: "Cohen Measure" rates for 1993, 1995,and 1997 cohorts*. Retrieved from http://www.vccs.edu/vccsasr/Research/trfcoh04_3yr_rrs.pdf
Moore, C., & Shulock, N. (2009). *Student progress toward degree completion: Lessons from the research literature*. Sacramento, CA: Institute for Higher Education Leadership & Policy.
Moore, C., & Shulock, N. (2010). *Divided we fail: Improving completion and closing racial gaps in California's community colleges*. Sacramento, CA: Institute for Higher Education Leadership and Policy.
Moore, C., Shulock, N., & Offenstein, J. (2009). *Steps to success: Analyzing milestone achievement to improve community college student outcomes*. Sacramento, CA: Institute for Higher Education Leadership & Policy.
Moretti, E. (2004). Estimating the social return to higher education: Evidence from longitudinal and repeated cross-sectional data. *Journal of Econometrics, 121*, 175–212.
Moses, M. S., & Marin, P. (2006). Informing the debate over race-conscious policy. *Educational Researcher, 35*(1), 3–5.
National Center for Education Statistics [NCES]. (2002). *Profile of undergraduates in U.S. postsecondary institutions: 1999–2000* (NCES 2002-268). Washington, DC: U.S. Department of Education.

Nelson, C. A. (2000). Neural plasticity and human development: The role of early experience in sculpting memory systems. *Developmental Science, 3*(2), 115–136.
Niu, S. X., & Tienda, M. (2010). Minority student academic performance under the uniform admission law: Evidence from the University of Texas at Austin. *Educational Evaluation and Policy Analysis, 32*(1), 44–69.
Noble, J., & Sawyer, R. (2002). *Predicting different levels of academic success in college using high school GPA and ACT composite score* (ACT research report series). Iowa City, IA: ACT, Inc.
Oakes, J. (2003). *Critical conditions for equity and diversity in college access: Informing policy and monitoring results* (UC/ACCORD). Los Angeles: University of California.
Oakes, J. (2005). *Keeping track: How schools structure inequality* (2nd ed.). New Haven, CT: Yale University Press.
Oakes, J., & Guiton, G. (1995). Matchmaking: The dynamics of high school tracking decisions. *American Educational Research Journal, 32*, 3–33.
Ott, M., & DesJardins, S. (2009). *Protection and accessibility of state student unit record data systems at the postsecondary level*. Denver, CO: State Higher Education Executive Officers. Retrieved May 1, 2011, from http://www.sheeo.org/sites/default/files/publications/SUR_Final_Report-20091118.pdf
Pallais, A., & Turner, S. E. (2007). Access to elites. In S. Dickert-Conlin & R. Rubenstein (Eds.), *Economic inequality and higher education: Access, persistence and success* (pp. 128–156). New York: Russell Sage.
Parsad, B., Lewis, L., & Greene, B. (2003). *Remedial education at degree-granting postsecondary institutions in fall 2000* (NCES 2004-101). Washington, DC: U.S. Department of Education, National Center for Education Statistics.
Perie, M., Moran, R., & Lutkus, A.D. (2005). *NAEP 2004 trends in academic progress: Three decades of student performance in reading and mathematics* (NCES 2005-464). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
Perin, D. (2006). Can community colleges protect both access and standards? The problem of remediation. *Teachers College Record, 108*(3), 339–373.
Perkins, R., Kleiner, B., Roey, S., & Brown, J. (2004). *The high school transcript study: A decade of change in curricula and achievement, 1990-2000*. Washington, DC: US Department of Education, National Center for Education Statistics.
Phelps, E. S. (1972). The statistical theory of racism and sexism. *The American Economic Review, 62*, 659–661.
Ramist, L., Lewis, C., & McCamley-Jenkins, L. (2001). *Using achievement tests/SA- II: Subject tests to demonstrate achievement and predict college grades: Sex, language, ethnic, and parental education groups*. New York: College Entrance Examination Board.
Reardon, S. F., Atteberry, A., Arshan, N., & Kurlaender, M. (2009, April 21). *Effects of the California High School Exit Exam on student persistence, achievement, and graduation* (Working Paper 2009-12). Stanford, CA: Stanford University, Institute for Research on Education Policy & Practice.
Roksa, J. (2009). Building bridges for student success: Are higher education articulation policies effective? *Teachers College Record, 111*(10), 2444–2478.
Roksa, J. (2010). Bachelor's degree completion across state contexts: does the distribution of enrollments make a difference? *Research in Higher Education, 51*(1), 1–20. doi:10.1007/s11162-009-9146-7.
Rouse, C. E. (1995). Democratization or diversion? The effect of community colleges on educational attainment. *Journal of Business & Economic Statistics, 13*, 217–224.
Saenz, V. B., & Ponjuan, L. (2009). The vanishing Latino male in higher education. *Journal of Hispanic Higher Education, 8*(1), 54–89.
Schweinhart, L., Montie, J., Xiang, Z., Barnett, W. S., Belfield, C., & Nores, M. (2005). *Lifetime effects: The high/scope Perry preschool study through age 40*. Ypsilanti, MI: High/Scope Press.

Shaw, K. M. (1997). Remedial education as ideological battleground: Emerging remedial education policies in the community college. *Education Evaluation and Policy Analysis, 19*, 284–296.

Shonkoff, J. P., & Phillips, D. A. (2000). *From neurons to neighborhoods: The science of early childhood development*. Washington, DC: National Academy Press.

Spielhagen, F. R. (2006a). Closing the achievement gap in math: Considering eighth grade algebra for all students. *American Secondary Education, 34*(3), 29–42.

Spielhagen, F. R. (2006b). Closing the achievement gap in math: The long-term effects of eighth-grade algebra. *Journal of Advanced Academics, 18*(1), 34–59.

Stein, M. K., Kaufman, J. H., Sherman, M., & Hillen, A. F. (2011). Algebra: A challenge at the crossroads of policy and practice. *Review of Educational Research, 81*(4), 453–492. doi:10.3102/0034654311423025.

Stevenson, D., & Baker, D. P. (1992). Shadow education and allocation in formal schooling: Transition to university in Japan. *The American Journal of Sociology, 97*(6), 1639–1657.

Trent, W. T., Orr, M. T., Ranis, S. H., & Holdaway, J. (2007). Transitions to college: Lessons from the disciplines. *Teachers College Record, 109*(10), 2207–2221.

Turner, S. (2004). Going to college and finishing college: Explaining different educational outcomes. In C. Hoxby (Ed.), *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 13–56). Chicago: University of Chicago Press.

Tyler, J. H., & Lofstrom, M. (2009). Finishing high school: Alternative pathways and dropout recovery. *The Future of Children, 19*(1), 77–103.

Unmuth, K. (2011). Hispnaic students now majority in Texas public schools. *Dallas Morning News*. Retrieved April 30, 2012, from http://irvingblog.dallasnews.com/2011/03/hispanic-students-now-majority.html/

Walston, J., & McCarroll, J. C. (2010, October). *Eighth-grade algebra: Findings from the eighth-grade round of the early childhood longitudinal study, kindergarten class of 1998-99* (Issue Brief No. 016). National Center for Education Statistics. Washington, DC: U.S. Department of Education.

Warren, J. R., & Jenkins, K. N. (2005). High school exit examinations and high school dropout in Texas and Florida, 1971–2000. *Sociology of Education, 78*, 122–143.

Warren, J. R., Jenkins, K. N., & Kulick, R. (2006). High school exit examinations and state-level completion and GED rates, 1975–2002. *Educational Evaluation and Policy Analysis, 28*, 131–152.

Warren, R. W., Grodsky, E., & Lee, J. C. (2008). State high school exit examinations and postsecondary labor market outcomes. *Sociology of Education, 81*(1), 77–107.

Wassmer, R., Moore, C., & Shulock, N. (2004). Effect of racial/ethnic composition on transfer rates in community colleges: Implications for policy and practice. *Research in Higher Education, 45*(26), 651–672.

WICHE, 2010 (articulation) Western Interstate Commission for Higher Education. (2010). *Promising practices in statewide articulation and transfer systems*. Boulder, CO: Author.

Yakusheva, O. (2010). Return to college education revisited: Is relevance relevant? *Economics of Education Review, 29*(6), 1125–1142.

Young, J. W. (2001). *Differential validity, differential prediction, and college admissions testing: A comprehensive review and analysis* (College Board Research Report 2001–6). New York: College Board.

Zeitlin, A. N., & Markus, T. C. (1996). Should remediation be mandatory in the community college? *Community Review, 14*, 27–33.