

Systematic Reviews of Research: Postsecondary Transitions - Identifying Effective Models and Practices



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Executive Summary

This paper focuses on transition programs for youth to postsecondary education, broadly considered. We address the following questions: (a) What models or programs of transition exist? (b) On what basis can we say one transition program is more effective than another? In other words, how is successful transition defined? (c) How are transition models and programs evaluated? and (d) What is the impact of transition programs, specifically those that aim to facilitate transition from one educational system to another, to program completion, or to specific career-related employment for disadvantaged youth?

We identified 16 different general paths that transition programs could potentially address and targeted 9 for this systematic review. A literature search of over 8,000 citations yielded over 100 studies that warranted further examination. Most paths we identified as potential targets for interventions appear not to have been studied using a comparison group design, and we were only able to meta-analyze two paths, which we combined, that had 19 studies of interventions that aim to keep students in college once they get there.

The 19 studies suggest small but potentially important effects on short-term grades earned by program participants. However, several studies employed comparison groups that appear to lead to an artificial underestimation of program effects (e.g., by comparing students on academic probation to students not on academic probation), and some interventions were relatively weak (e.g., adding a journal writing component to an English composition class). Studies that employed more comprehensive interventions and that used relatively more appropriate comparison groups showed more effective results than did studies that used weaker interventions, relatively less appropriate comparison groups, or both.

Even the best studies included in this review are methodologically suspect, with poor

reporting on quality indicators (such as attrition) and an almost exclusive reliance on quasi-experimental designs. As such, these studies do not provide a very strong basis for making policy recommendations. However, this review suggests that there is reason to be optimistic about the potential for relatively comprehensive interventions to help students earn better grades and stay in school, at least in the short term. From a public policy perspective, this review points to the need for more investment in rigorous studies that investigate, at a finer level of detail, the specific aspects of programs that are associated with program success. Rigorous studies are also needed that investigate the interaction between programs and student characteristics in order to determine what types of programs are most effective for which students.

**Systematic Reviews of Research:
Postsecondary Transitions – Identifying Effective Models and Practices**

This paper reports on a systematic review of research on transition programs designed to help disadvantaged populations move into and through postsecondary education. We have defined transition as individual movement from pre-college educational systems into and through the first two years of postsecondary education or into related employment. The purpose of this review is to (a) describe the various transition interventions that exist around postsecondary education, (b) assess the inferential strength of the research on those intervention programs that seek to ease transitions into and through postsecondary education and to work, and (c) determine the impact these programs have had on successful student transition.

The National Center for Education Statistics (NCES, 2008) defines postsecondary education as:

The provision of a formal instructional program whose curriculum is designed primarily for students who are beyond the compulsory age for high school. This includes programs whose purpose is academic, vocational, and continuing professional education, and excludes avocational and adult basic education programs.

Students plan to participate in postsecondary education for a variety of reasons. However, the great majority of them are probably motivated, at least in part, by the economic returns associated with postsecondary education. In debates over who should pay for and who benefits from investment in postsecondary education, most agree that education beyond high school is both a public and a private good.

As a public good, it seems clear that a nation's economic status depends in part on the quality and quantity of postsecondary education available (Barton, 2008; Paulsen & St. John,

2002). Although a higher level of education is not the only factor involved in earning higher wages (Kemple, 2008), there are, on average, advantageous economic returns for increased levels of education: Returns to baccalaureate degrees surpass returns to associate degrees, and those with an occupational certificate (equivalent to two semesters of full-time study) have higher earnings than those with just some college but no degree (Grubb, 2002; Marcotte, Bailey, Borkoski, & Kienzl, 2005). Worker groups with more education, including career-related education (Kemple, 2008) tend to have higher employment rates (Krolik, 2004; Prince & Jenkins, 2005), and an educated citizenry makes fewer demands on state social service resources, such as welfare and corrections (National Center for Public Policy and Higher Education [NCPPE], 2004). People with higher levels of income also generate more tax revenue and economic activity (Barrow & Rouse, 2005; Barton, 2008).

Most people consider education to be a bridge to a better life, playing a fundamental role in improving the socioeconomic status of individuals, families, and communities from one generation to the next. In the United States, colleges and universities offer a sense of “limitless possibilities for all” (Trow, 2001, p. 121), a key element of the American dream of equal opportunity. Unfortunately, postsecondary education enrollment and completion patterns do not reflect this ideal. According to the Organization for Economic Cooperation and Development (OECD, 2006, as cited in The National Center for Higher Education Management Systems [NCHEMS], 2007), the United States ranks near the bottom of industrialized countries in the percentage of 25- to 34-year-olds with an associate’s degree or higher and the percentage of entering students who complete a degree program. The likelihood of improving U.S. placement in the rankings seems low, given that in 29 states, the 4-year graduation rate for public high schools has dropped below 75%; in 10 states, fewer than half of high school graduates enroll in

postsecondary education within one year. These facts do not bode well for increasing postsecondary enrollment, persistence, and completion (NCHEMS, 2007).

The majority of positions that pay wages or salaries high enough to support a family—and almost two-thirds of all jobs—require skills associated with at least some education beyond high school (Carnevale & Derochers, 2003). In fact, although high school grades and behaviors are associated with long-term employment and earnings outcomes (Rosenbaum, DeLuca, Miller, & Roy, 1999), many researchers would agree with Rosenbaum’s (2001) assertion that high school records (i.e., grades, attendance, test scores) have little relationship to employment or earnings immediately after high school. Employers place little stock in such records; further, recent high school graduates are rarely hired for demanding careers—they often receive entry-level jobs instead. Many students thus enroll in postsecondary education (e.g., university, community college, or programs designed to lead to qualification for skilled jobs) in an attempt to improve their employment prospects.

Mere postsecondary enrollment is insufficient, however. When postsecondary education totals less than a year, earnings increases are negligible (Grubb, 2002). Understanding the educational transitions that students must navigate into and through postsecondary systems is therefore critical to improving opportunities for all students and for disadvantaged students in particular. Dropout can occur at several stages in the process of moving from secondary into and through postsecondary education. For example, students may not have been adequately prepared for the academic requirements of postsecondary education. They may have difficulty balancing employment, family, and education commitments; they may believe that they are not suited for college; or they may feel out of place and find it difficult to make friends and find social support

in the college setting. Transition programs help students succeed in the face of such challenges and attain their educational goals.

This review begins with a description of the theoretical frameworks that address college choice and postsecondary student departure processes, followed by a literature review of the transition landscape, including the typology adopted for this review. The Methods section describes the search strategy used to locate studies and provides specific information on how we extracted data, evaluated studies for inclusion, and synthesized the results of the studies that were found. In the Discussion section, we highlight the most important findings, discuss the need for funding of additional rigorous research on transitions, and suggest characteristics of research that are important for framing public policy.

Theoretical Frameworks

Researchers and practitioners often use theoretical formulations to better understand how their efforts can be more effective. In order to understand and address the challenges related to secondary to postsecondary transition, several theoretical perspectives are reviewed here. The integration of multiple theoretical perspectives is currently a strong trend in the study of college choice and student persistence phenomena. Researchers have drawn from economic (e.g., Cabrera, Nora, & Castaneda, 1993; St. John, Paulsen, & Carter, 2005), sociological (e.g., Paulsen & St. John, 2002; Perna & Titus, 2005), organizational (e.g., Bean, 1980, 1983), and psychological (e.g., Astin, 1984; Eaton & Bean, 1995) theoretical and conceptual models to understand these ill-structured problems. Below we review some of these considerations.

College Choice Process

Student college choice is described as a “complex, multi-stage process during which an individual develops aspirations to continue formal education beyond high school, followed later

by a decision to attend a specific college, university, or institution of advanced vocational training” (Hossler, Braxton, & Coopersmith, 1989, p. 234). Students cycle through three stages: predisposition, search, and choice (Hossler & Gallagher, 1987). Throughout their primary, middle, and high school experiences, students determine whether to attend postsecondary education, search for information about institutions and financial aid, narrow the options, and then decide on an institution (Hossler et al., 1989; McDonough, 2004).

More recent research approaches the college choice process with an integrated conceptual model that draws from economics of human capital models and sociological theories of cultural and social capital (Perna, 2006). Human capital theory predicts that an individual’s investments (in this case, investing time and financial resources in education and training) to increase his or her abilities will pay off in improved financial and quality of life status (Becker, 1993). Sociological theories of cultural, social, and economic capital recognize that resources vary among socioeconomic strata of society, and these resources, or capital, take many forms. Cultural capital refers to the system of characteristics that defines an individual’s class status. Resources such as language skills, cultural knowledge, and mannerisms derived in part from one’s parents are examples of cultural capital (Bourdieu, 1986; Bourdieu & Passeron, 1977). Social capital theory focuses on how individuals acquire human, cultural, and other forms of capital through their memberships in social networks (Coleman, 1988). For example, through their relationships with teachers, advisors, and peers, high school students may or may not learn about a wide array of postsecondary options, careers, or financial aid resources.

Theories of Postsecondary Student Departure

Considered paradigmatic in stature, Tinto’s Interactionist theory (1975, 1987, 1993) primarily addresses voluntary student departure decisions within postsecondary institutions.

Tinto (1975) postulated that students possess various characteristics that directly influence their decisions to stay in or leave college. Central to Tinto's theory is the degree to which a student becomes integrated into the academic and social realms of the institution. Academic and social integration influence a student's subsequent commitments to the institution and to the goal of college graduation. Finally, Tinto postulates that the greater the levels of institutional commitment and commitment to the goal of college graduation, the more likely the individual will persist in college.

Tinto's (1982, 1986, 1987, 1993) revisions to his theory addressed the importance of financial resources within the set of background characteristics with which a student enters a postsecondary institution, and acknowledged the role communities external to the institution (e.g., family, work, and community) play in students' departure decisions. Similarly, Bean and Metzner's (1985) model builds on Tinto's but emphasized the importance of external influences on the persistence of nontraditional students, such as those at community colleges. More recently, Braxton, Hirschy, and McClendon's (2004) theory of student departure in commuter institutions gives greater importance to the internal campus atmosphere (e.g., academic communities and institutional environment) and students' life circumstances away from campus.

Literature Review: The Transition Landscape

Many aspects of transition intervention programs must be considered in any systematic review of transition: These include the legislative foundation for government-funded interventions, the populations for whom such interventions have been developed, and the types of transition programs in existence. We briefly discuss each of these considerations.

Federal Laws on Transition to Education and Employment

The United States has a long history of federal legislation providing for investment in the

education and training of the American people (e.g., the Morrill Acts of 1862 and 1890 granting land to states to create educational institutions; the G.I. Bill of 1944 [also known as the Servicemen's Readjustment Act], and the Higher Education Act of 1965). Such laws have been developed in response to economic conditions and forecasts, census and educational attainment data, and inequities in opportunity or outcomes. Historically, federal intervention has enabled and supported programs financially and sought to maintain some level of public policy uniformity across the United States and its territories.

Several current federal laws address inequities in opportunities for education and training:

- Section 504 of the Rehabilitation Act of 1973
- The Americans with Disabilities Act of 1990 (ADA)
- Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (known as the Welfare Reform Act)
- Workforce Investment Act of 1998 (WIA)
- No Child Left Behind Act of 2001 (NCLB)
- Individuals with Disabilities Education Improvement Act of 2004 (IDEA)
- Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV)
- Higher Education Opportunity Act of 2008

These laws provide opportunities to populations that historically have experienced disappointing outcomes in education or the labor market, including low-income workers, people with disabilities, migrant students, students at risk of dropping out of high school, Native Americans, low-skilled adults, and dislocated workers. Such populations are considered disadvantaged in various legislative contexts.

Current legislation addresses the need to support learners through the transition from their current level of education into higher-level education and training and ultimately employment. The points at which such transitions are made are key junctures in learner advancement, in part because the next step in a trajectory is not always clear to the learner, and disadvantaged students often lack the “college knowledge” (Vargas, 2004) to know how to access that information. A goal of much federal legislation is to improve successful movement through those transition points.

Despite the recognition of the importance of transition, the term remains undefined by much of the relevant legislation. Only IDEA and the vocational rehabilitation portion of WIA—both focused on improving opportunities for people with disabilities—included a specific definition of transition or transition services. IDEA defines transition services as “a coordinated set of activities” focused on facilitating the “movement from school to post-school activities” (Sec. 602, parag. 34). Similarly, in WIA, transition services are “a coordinated set of activities for a student, designed within an outcome-oriented process, that promotes movement from school to post-school activities” (WIA, Sec. 6, parag. 37). In contrast, the term *transition* is used without definition in Perkins IV, NCLB, and the Welfare Reform Act.

Populations Targeted for Transition Interventions

For purposes of this review, the term *disadvantaged student* refers to a student who, due to educational, economic, cultural, environmental, experiential, or familial circumstances, may be less likely to aspire to, enroll in, or succeed in higher education relative to his or her non-disadvantaged peers (Revised Code of Washington, 2009). Generally, this includes individuals with disabilities, individuals from economically disadvantaged families, individuals who are academically low performing, and individuals with limited English proficiency. Some transition

interventions target more than one of these groups, and elements of these programs are likely to be customized to address the specific concerns, needs, barriers, or preferences of their target groups.

Students with disabilities. Postsecondary enrollment among students with disabilities has increased dramatically since the passage of a series of acts aimed at ending discrimination against individuals with disabilities. These include Section 504 of the Rehabilitation Act of 1973, the ADA of 1990, and the IDEA amendments of 1997 (now supplanted by IDEA 2004; NCES, 2000). Between 1987 and 2003, the college participation rate of students with disabilities more than doubled, rising from 15% to 32% (Newman, 2005). According to the 1995–1996 National Postsecondary Student Aid Study (NPSAS: 96), about 6% of undergraduates reported having a disability; of those reporting, the percentage by type included learning disability (29%), orthopedic impairment (23%), hearing impairment, (16%), and speech impairment (3%). Twenty-one percent of the undergraduates who reported a disability stated they had another health-related disability (NCES, 2000). The aforementioned study did not include psychiatric disabilities as a category, but this category is of growing concern; among college students, psychiatric disabilities appear to be even more common than learning disabilities (Sharpe, Bruininks, Blacklock, Benson, & Johnson, 2004). For example, from Spring 2000 to Spring 2005, the number of college students who said they had been diagnosed with depression increased sharply from 10% to 16% (American College Health Association, 2000, 2006).

Although access by individuals with disabilities to postsecondary education has improved, the news is not all encouraging. Youth with disabilities drop out of high school at about twice the rate of their peers without disabilities: In one study, 28% of out-of-school youth with disabilities had left high school with no academic credential (Wagner, Newman, Cameto,

Garza, & Levine, 2005). The rate of postsecondary attendance of these students is less than half that of their nondisabled peers (Murray, Goldstein, Nourse, & Edgar, 2000), though the pattern of institutional enrollment differs for students with disabilities. Students in the general population are over four times as likely as those with disabilities to attend a four-year institution; however, at the community college level, the likelihood of enrollment is similar for students with and without disabilities (Wagner et al., 2005).

An earlier study found an association between poverty and having a disability and also found that students with disabilities coupled with few financial resources were less likely than their more financially well-off peers with disabilities to be enrolled in postsecondary education, an investment that could offer needed economic rewards over time (Wagner & Blackorby, 1996). The authors of this study also noted that categories of disadvantaged status frequently overlap.

Students from economically disadvantaged families. Kane (2001) reported “persistent and widening gaps” in college attendance among students from different family income levels (p. 2). Comparing postsecondary enrollment (any vocational/technical, 2-year, or 4-year college) between 1980 and 1997, the gap in college attendance between students from the highest and lowest parental income quartiles increased from 23 to 30 percentage points. Further, during the same time period, the earnings differential between high school graduates and college attendees more than doubled. Clearly, low-income students who do not attend college experience limited economic mobility.

Students from low-income backgrounds, especially those who attend K-12 schools with few academic resources, are often underprepared for the tasks involved in selecting a college, such as exploring potential institutions, investigating financial aid options, and understanding the application timeline and process (McDonough, 1997, 2004). In a study of youth from working

poor backgrounds, McSwain and Davis (2007) noted the lack of guidance students received in navigating the college decision-making process, in which many felt alone and unsupported in their quest for postsecondary education.

Further, although getting into college is one hurdle for students from disadvantaged socioeconomic backgrounds, earning a degree is an even greater challenge (Dickert-Conlin & Rubenstein, 2007). Though students whose families live in or near poverty are often eligible for grants and federally subsidized loans, the full level of financial need for tuition and fees is often not met (McSwain & Davis, 2007). Students' fragile financial status is often compounded by a conflict between work and school, leading many to enroll part time initially and then drop out if their employment circumstances change. Enrolling in fewer courses may affect the amount and type of financial aid students are eligible for and is also associated with lower levels of degree attainment (Calcagno, Crosta, Bailey, & Jenkins, 2006; McSwain & Davis, 2007).

Another vulnerable population is youth in foster care. As a group, their rate of high school dropout ranges from two to five times higher than youth in the general population. Similarly, these young people attend postsecondary education, earn credits, and complete degrees at low rates (Berzin, 2008).

Academically low-performing students. Many students, whether coming directly from high school or returning as older learners, fail the college placement test and are redirected to remedial education. The actual number of students requiring remediation varies with the location and type of institution (i.e., urban or rural, community college or four-year college or university), but in 2000, 42% of freshman students in community and technical colleges were enrolled in at least one remedial course (Parsad & Lewis, 2003).

Students can underperform academically for a variety of reasons. For example, they may

have relatively low levels of academic skills, face competing demands for their time (such as a job or family responsibilities), or experience social or academic adjustment issues. These challenges might impede their ability to demonstrate acceptable academic progress. This could threaten a student's ability to maintain good academic standing, retain a scholarship, or graduate within a reasonable time frame.

Students with limited English proficiency. Educational attainment levels differ between young adult U.S. citizens and immigrants. In 2005, among students aged 18-24, 86% of U.S. citizens graduated from high school compared to 70% of immigrant youth. Although almost 50% of native-born students attended at least some college, only about a third of immigrants enrolled in postsecondary education (Erisman & Looney, 2007). Attainment levels vary among immigrants by region of origin, age, and generation status. Latin American and Caribbean immigrant educational attainment is generally lower than that of European, African, and Asian immigrants. The highest percentage of young adult immigrants (aged 18-24) comes from Latin America; Asian countries send the highest percentages of adult immigrants aged 25-54 (Rumbaut, 2004, as cited in Erisman & Looney, 2007). Compared to the first generation immigrant, second generation immigrants are more likely to get a high school diploma but are less likely to earn an advanced degree (Haskins, 2008). An important consideration in educating immigrant populations is to acknowledge that their cultural characteristics vary, implying that programs targeting these individuals will likely need to be significantly tailored to their specific backgrounds and characteristics. Such attributes may differ by individual, family, language status, and neighborhood and schooling environments (Rong & Preissle, 2008).

A significant barrier for immigrant educational attainment is limited English proficiency. Ruiz-de-Velasco and Fix (2000) reported that during the 1993-1994 school year, less than half of

English as a Second Language (ESL) public high school students were enrolled in ESL classes or bilingual education programs (as cited in Erisman & Looney, 2007). Without instructional support to improve their English proficiency, immigrant youths may surrender their educational aspirations during high school. For example, in the classroom, students with limited English proficiency are often not able to keep up with the pace of instruction and some instructors do not make any adjustments for students who speak little English (Clark, Hernandez, & Burkey, 2007). These students may also lack role models. As a specific example, the Indiana state public school system enrollment of limited English-speaking students increased each year between 1992-1993 (total 4840) and 2006-2007 (total 42,728). During that same time span, the percentage of minority teachers in the system declined slightly from 5.2% to 5.0% (Clark et al., 2007, 2007). Not surprisingly, the lack of bilingual role models, staff, and counselors pose significant barriers to high school and postsecondary attainment.

Higher education presents a pivotal opportunity for many immigrant students and their families. Similar to other disadvantaged students, without sufficient transition support at all education levels, individuals with limited English language skills may resign themselves to low-wage jobs and limited social mobility and give up on achieving the American dream (Erisman & Looney, 2007).

Transition Program Typology

Transition programs can be categorized along a number of dimensions and address several domains in a student's life. One general dimension is whether programs are preparatory, supportive, or both. Programs may be academically preparatory in nature, such as those teaching content and skills that are valuable in college. Other programs are more supportive, providing information about applying for college and financial aid, economic assistance to qualified

students, or social services that address the barriers a student may face. Many programs are both preparatory and supportive, intervening as necessary to improve transition outcomes.

Another dimension along which to categorize transition programs is the target audience. Target groups include age groups or grades in school as well as a range of populations, described below. A third dimension is program content elements. In some cases, an element of program content (such as career exploration) is the defining element of an entire program, whereas in other cases, the same element is a minor aspect of a wider-ranging program. Other program elements, such as dual enrollment, occur with high frequency or exclusively in a particular timeframe within the transition sequence. Still others, such as self-advocacy skills, occur primarily or only in association with a particular target group.

Although there are others, the dimension along which we have chosen to categorize transition programs for this review is the educational level of the transition. Figure 1 represents the many types of transition programs across secondary and postsecondary education levels.

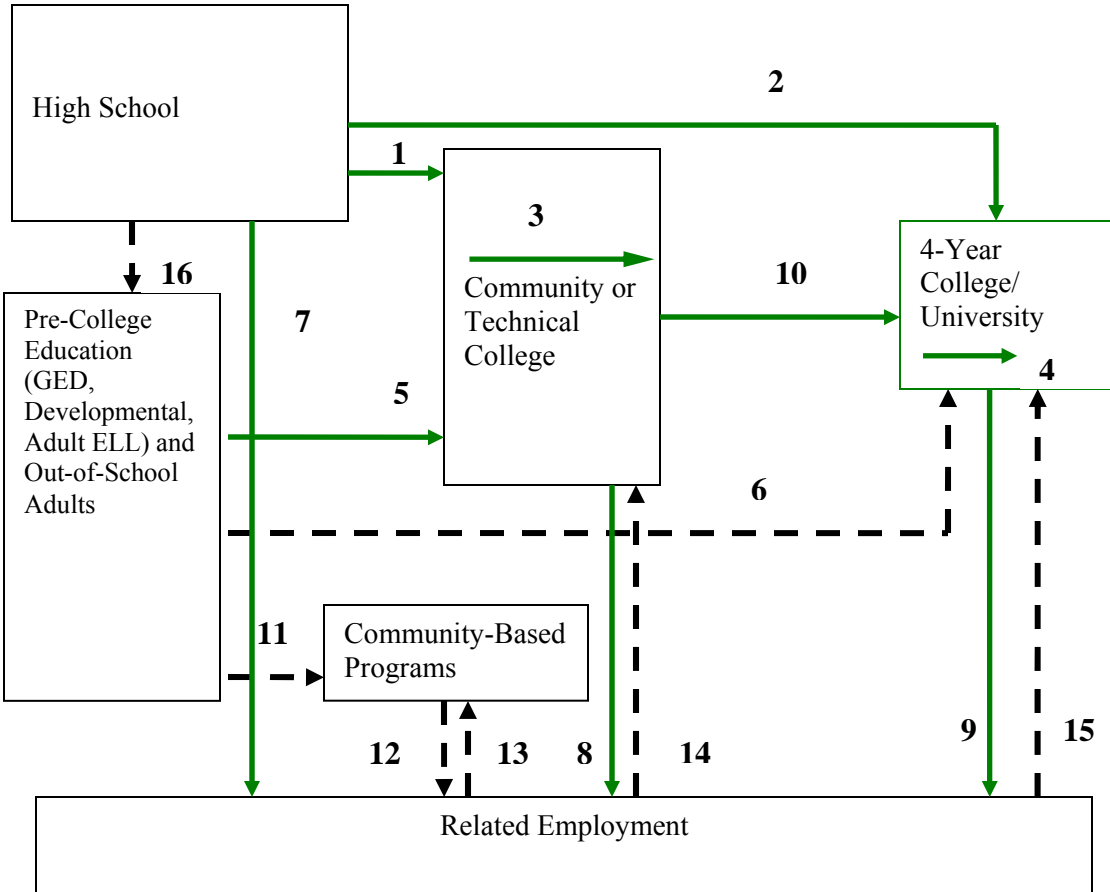


Figure 1. Transition program typology. *Note.* The solid arrows indicate priorities for this review.

The solid lines in Figure 1 indicate priorities for this review and define its scope. Thus the transition paths that were reviewed here are: (a) high school to postsecondary education (Paths 1 and 2, see Figure 1); (b) retention and completion of either a community college program or the first two years at a 4-year institution (Paths 3 and 4); (c) for out-of-school youth only, pre-college and out-of-school programs leading to postsecondary education (Paths 5 and 6); (d) school (including high school, community/technical college, and university) to career-related employment (Paths 7, 8, and 9); and (e) community college to 4-year university (Path

10). The dashed lines (Paths 6, 11-16) indicate areas of transition that we considered to be outside the scope of this review.

Many transition programs cluster onto these paths, although the scope of some programs might include more than one line. Below, each transition path that was researched for this review is described.

High school to community or technical college (Path 1). Most of the programs that work to ease the transition from high school to postsecondary education were designed for the transition to a four-year college. However, Tech Prep is a credit-based transition program that is more specific to community college. In Tech Prep, high schools and community colleges develop articulation agreements so that students need not take technical or occupational content in college that they have already learned in high school. Tech Prep links the final two years of high school and two years of community college through a sequenced program of study in a CTE field, usually leading to an associate degree, often in less time than non-Tech Prep students. However, it is a general transition program, not one developed for the at-risk populations that are the subject of this paper.

High school to 4-year college/university (Path 2). Interventions to ease the transition from high school to four-year colleges and universities vary greatly, from preparatory options such as career academies, dual enrollment, and extracurricular programs, to support interventions that provide students with the cultural capital they will need to succeed.

State government has a role in easing the transition from high school to college. Boswell (2000) described 10 policy options that states should consider in this regard, including aligning the skills required for high school graduation with college placement requirements, providing distance learning options for high school students, developing programs to identify and help at-

risk students early in their academic careers, and developing computerized information systems that allow students to be tracked through the K-12 system, postsecondary education, and the workforce.

Dounay (2006) collected high school graduation requirements and four-year college admissions requirements across all 50 states and concluded that there is often a gap between the number of Carnegie units – and the specific courses in those units – required for high school graduation and those required for admission to a four-year college or university. Similar examinations of smaller subsets of states have yielded the same results (Brown & Niemi, 2007; Callan, Finney, Kirst, Usdan, & Venezia, 2006; Hughes & Mechur Karp, 2006), creating a clear policy direction for states interested in increasing the numbers of students moving from high school to four-year colleges and universities. The National Governors Association (2009a) recognized this imperative, but also included other means of aligning secondary and postsecondary education, such as increasing student participation in rigorous college preparatory courses and holding the K-12 system accountable for student success entering postsecondary education.

Some of the ways in which this alignment is already being developed are through credit-based transition programs. These include dual enrollment, middle and early college high schools, Advanced Placement, and International Baccalaureate programs (Mechur Karp & Hughes, 2008), the latter two of which are designed for higher-achieving students and will not be reviewed here. Dual enrollment and middle and early college high school programs share certain elements with more targeted interventions, such as a focus on improving student achievement and preparation for postsecondary education.

Interventions aiding the transition from high school to four-year postsecondary institutions often include both academic and preparatory components, as seen in familiar programs such as AVID (Advancement Via Individual Determination), Upward Bound, or GEAR UP (Gaining Early Awareness and Readiness for Undergraduate Programs). Although these programs differ from one another in various ways, they also have several elements in common, such as the dual focus on academic preparation and social enrichment. Many of these programs offer tutoring or study skills, and they often also offer academic enrichment in the form of Saturday, after school, or summer sessions. Some of these programs, including Upward Bound and GEAR UP, may also offer scholarships.

Completion of community or technical college (Path 3). The transition through postsecondary, especially at the community college level, is a difficult one that many students never complete. Tinto's theory of social and academic integration is often invoked to help explain why community college students fail to complete their programs. Because community colleges are often commuter colleges, it is harder for students to become committed to the institution and therefore complete their degrees (Bean & Metzner, 1985). As such, interventions designed to increase institutional engagement might effectively be employed to increase graduation rates (Mechur Karp, Hughes, & O'Gara, 2008). Alternative explanations for the failure of many community college students to complete programs include (a) unrelated external pressures on students such as work or family demands and (b) changes in students' stated goals from initial enrollment (Bailey, Leinbach, & Jenkins, 2006).

Given these issues and the fact that for many students, a degree is not their stated goal, it is difficult to gauge the effectiveness of community colleges in helping students persist through a certificate or degree program. However, there is no shortage of programs and interventions to

address this transition. Some common practices include (a) student services such as advising, counseling, mentoring, and orientation programs, (b) learning communities, in which students go through a program in a cohort in order to have more engaging experiences and more opportunities for intellectual and social interaction, (c) developmental education and other services for academically underprepared students, and (d) college-wide reform, including focused attention on research and the use of data to drive program improvement (Bailey & Alfonso, 2005). Other recommendations to improve student outcomes include supplemental instruction, trained tutors, incorporating subjects such as math or writing instruction into other classes, professional development on different learning styles, and emailing personalized interim reports to students (Bashford & Slater, 2008).

Some research has found that students who reach certain milestones (e.g., obtaining 20 credits or completing 50% of a program) have a higher probability of graduating (Calcagno et al., 2006). These milestones are sometimes called “momentum points.” Guides have been developed that allow colleges to use longitudinal student record data to examine momentum points in order to learn which college-specific practices are associated with successful student outcomes (Leinbach & Jenkins, 2008).

Community colleges are also accelerating their programs by integrating what was previously considered noncredit or prerequisite material into credit-bearing courses so that students more quickly gain the knowledge, skills, and credentials required to enter specific careers and maintain the motivation to stay in school (Bragg et al., 2007). The best examples of career/employment transition programs integrate academic subject matter with technical skills training so that as students continue in the program, they not only gain occupational skills but also become more prepared for further education. This type of intervention is usually provided

early in a student's college career and is not seen as necessary to support students' transition from postsecondary education to employment.

In addition to the institutional interventions listed above, other attempts to improve community college student success include developing state policies such as publicizing community college enrollment and completion data, targeting funding to specific populations or occupations, and more closely overseeing the quality of programs (Palmer, 1998). But notwithstanding such practices, Bailey, Calcagno, Jenkins, Kienzl, and Leinbach (2005) noted that some of the strongest correlations between institutional factors and student success have disturbing implications. Examining a large institution, they found that having relatively large percentages of part-time and minority students negatively correlated with successful student outcomes. This suggests that colleges wishing to improve their completion statistics might do so by inappropriately limiting access to some groups of students. Bailey et al. recommended further research to identify those community college characteristics and policies that promote student success.

Completion of 4-year college/university (Path 4). This transition, especially the completion of the freshman year, has been abundantly studied in recent years because many students enter colleges and universities, but just a fraction actually complete a degree. Only 43% of students from the class of 1992 completed a postsecondary degree within eight years of graduating high school (National Center for Education Statistics, 2006, Table 306). According to these data, another 30% of Class of 1992 students began college but did not complete a degree program. Clearly student persistence is an issue, and the transition from high school to college extends into the first years of the four-year college experience.

As described above, the most-cited theoretical framework for college integration, persistence, and success was laid out by Tinto (1975, 1987, 1993). This model has become the starting point for deeper examinations of the factors involved in student success. For example, Robbins et al. (2004) suggested that psychosocial factors (such as academic self-efficacy) play a large role in determining whether students will persist beyond the first year. Building on this work, the Educational Policy Institute (Texas Guaranteed Student Loan Corporation and the Educational Policy Institute, 2008) offered specific strategies to increase student retention and success. Their book outlined specifics on how faculty and staff can help support student engagement on campus and delineated three types of advising that are important for student success: (a) academic advising, which may direct students to first-year success programs, tutoring, and study skills or time management courses, (b) financial advising, which can help students grapple with the high cost of education—including tuition, fees, books, and living expenses—without accumulating excessive debt, and (c) career counseling, which may fill students' need for information about desired careers and what it takes to succeed in them.

In addition to these kinds of advising, colleges and universities are addressing social or personal barriers to success. For instance, many students must continue to work while attending school in order to support their families. This extends the time period of commitment to education, which negatively affects the likelihood of completion. Students may be the first in their families to go to college, so they may need orientation and integration support. They may have cultural, disability, or health issues that present barriers to success. All of these issues may be addressed through various kinds of support services including counseling, mentoring, or assistance with transportation.

Pre-college education to community or technical college (Path 5). As pressing as the needs are for secondary students to meet postsecondary admissions requirements, adults make up a large part of the underprepared population. They range from native-born Americans who did not complete high school to immigrants who need to learn English before they can transition to higher education or employment. The transition stages for adults are often multiple: from adult basic education (ABE) or English as a Second Language (ESL) through the General Educational Development (GED), often to community college developmental education, and finally to college-level coursework. There are many steps along the way during which adults may “stop out” or take a break from enrollment.

In order to help adults make these transitions faster, adult career pathways have been developed by various organizations and institutions (Bragg et al., 2007). The Center for Occupational Research and Development (CORD) defined an adult career pathway as consisting of “the guidance, remediation, curricula, and other support elements required to enable career-limited adults to enter the workforce and progress in rewarding careers” (Hull & Hinckley, 2007, p. vii). The elements of adult career pathways listed by Hull and Hinckley are similar to those in secondary-level transition programs, only developed for adults rather than adolescents. For example, common support elements for adults transitioning into postsecondary education include child care and transportation aid. With respect to curriculum, adult career pathways are often designed to integrate remediation with introductory career preparation in order to accelerate adults’ completion of certificate and training programs (Prince & Jenkins, 2005).

High school to related employment (Path 7). Career and technical education (CTE) is one program area in high school that can ease the transition from school directly to work for students who do not have immediate plans to attend college. An economic study showed that the

returns to CTE coursework (in terms of labor market payoffs) for students who entered work immediately after high school were higher than for academic coursework (Mane, 1999). This advantage held true for both the short and medium term (i.e., up to seven years after graduation). The study did not extend past that period, but the author noted that although the returns to high school CTE were substantial, in general the returns to postsecondary education were higher still.

College/university to related employment (Paths 8 and 9). College placement services represent the largest type of interventions to assist students in their transition from community college to related employment. One element of many programs that relates to this transition is an emphasis on work readiness or SCANS skills (Secretary's Commission on Achieving Necessary Skills, 1991). Skills such as working in a team, employing technology, and being punctual are commonly a part of transition programs aimed at helping graduating students find employment.

States need educated workforces in order to compete in the national and global economies. State governors are creating workforce development systems that engage businesses and provide seamless transitions across educational systems, as described here. The National Governors Association (2009b) has as its goal the development of state workforce development systems that (a) are flexible and responsive to changing state needs and (b) offer residents the opportunity for lifelong learning, entering and re-entering educational systems as their lives dictate. As an example, Prince and Jenkins (2005) showed the benefit of successfully crossing transition points: Attending college for at least one year and earning a credential provides a substantial boost in earnings for adults who begin with a high school diploma or less.

Community or technical college to 4-year college/university (Path 10). Intervention programs for this transition include community college "First Year Experience" programs that community colleges have implemented in order to increase student integration into the

postsecondary experience. These programs include preparatory as well as supportive elements. Learning communities are a common feature of these interventions, following the belief that a block schedule with the same students allows community college students to quickly find study partners and make new friendships (Bloom & Sommo, 2005; Tinto, 1997), thus promoting student integration and achievement.

Research Questions

We searched for empirical studies on the above-described transition paths in order to see what lessons can be learned from a synthesis of these studies. Specifically, we set out to conduct a systematic review and, if appropriate, a meta-analysis (or several meta-analyses) of studies that attempt to determine the effectiveness of transition programs. In the sections that follow, we detail (a) the methods of the systematic review, (b) the results of the one meta-analysis we were able to conduct, (c) the methods and results of studies that met our inclusion criteria but could not be included in the meta-analysis, (d) the limitations of the meta-analysis, and (e) suggestions for both policymakers and future research.

Methods

Inclusion Criteria

To be included in this review, a study had to meet several criteria. As described earlier, we examined federal legislation for labels that might be used to describe individuals who, from a public policy perspective, might be intended populations for targeted transition services. As such, our first criterion was that the sample had to be composed primarily of students who fit this broad definition of disadvantage (see Table 1 for the terms related to disadvantage that were used in the electronic literature searches).

Table 1
Literature Search Keywords for Postsecondary Transitions

Terms to suggest a transition	Terms to suggest an empirical study	Terms to suggest an intervention	Terms to suggest disadvantage
Transition* Career School to work College Employment Articulation Vocation*	Outcome Results Compar* Empirical Effect* Study Experiment* Longitudinal	Program* Intervention* Enrichment	At-risk <i>English Language Learners</i> ELL or English language learner English learner ESL or English as second language or English as a second language EFL or English as foreign language or English as a foreign language LEP or limited English proficient* Multilingual Immigrant Bilingual Foreign-born Second language acquisition or SLA Non-English speaker <i>Students with Disabilities</i> Disab* Individualized Education Plan or IEP Rehabilitat* Section 504 Chronic health Chronic disease <i>Children of Migrant or Seasonal Workers</i> Migrant Seasonal Migratory <i>Economically Disadvantaged Students</i> Disadvantage Homeless Low income

Terms to suggest a transition	Terms to suggest an empirical study	Terms to suggest an intervention	Terms to suggest disadvantage
			Public assistance Low socio-economic status or low SES Poor Welfare Poverty <i>Students in the Juvenile Justice System</i> Offender Delinquen* Correctional or corrections Probation Justice <i>Students Who Are Low Achieving</i> Basic skills Below grade level Low achiev* Underachieving Retained Fail Held back Remedial Dropout Underprepared

Notes. Terms were connected with OR within columns, and with AND between columns, so that to be identified through the electronic search, the database had to index at least one term from each column. Terms followed by an * are truncated; the search identified any term that includes the letters before the truncation symbol. For example, disab* identifies “disability,” “disabled,” and “disabilities,” as well as “disabuse.”

In addition, a study had to describe a formal program or intervention that addresses a transition from secondary education to college or university, or from a secondary education to related employment. As such, this review focuses on specific interventions (such as those designed to facilitate the transition to college), and larger transition programs (such as GEAR UP and career academies), but not transition policies (such as credit transfer policies). Further, by focusing on programs that help students transition from secondary education to college, through

college, or from secondary education to related employment, we excluded those programs that help with the transition from college to related employment, or from secondary education to the general work force (i.e., programs that teach soft employment skills but do not train participants for a career, cf. Figure 1).

We also required that included studies measure an outcome closely related to the goals of the transition intervention. For example, assuming it met other criteria, we would have included a GEAR UP evaluation that assessed student enrollment in postsecondary education or college readiness among high school students. We would have not included a GEAR UP evaluation that only measured the program's effects on academic achievement in middle school, as this outcome is too distal to interpret with a reasonable degree of confidence.

Finally, to be included in this review, a study needed to provide a quantitative evaluation of the effects of a transition program. Ideally, the evaluation would involve random assignment to conditions in the context of an experiment (e.g., of students to either a transition program or to a wait-list control), but we anticipated that these would be rare; as such, we required only that the study include a local comparison group. See *Quality assessment of included studies* for details of how we further assessed the quality of studies.

Literature Search

We used several strategies to find relevant literature, as recommended in the literature on systematic reviewing (see Rothstein, Turner, & Lavenberg, 2004). First, we conducted searches of the electronic databases PsycINFO and ERIC. The search terms we used are given in Table 1. The titles and abstracts from citations identified via the database search were examined by at least two individuals working independently. We obtained full copies of a study if, after discussion, both individuals agreed that it might meet our inclusion criteria.

In addition, we identified 124 documents that could, broadly speaking, be conceptualized as literature reviews of transition programs. For each of these reviews, we examined the reference sections for citations that appeared to meet our inclusion criteria and attempted to obtain copies of these studies if they did.

Finally, we conducted searches of the websites of foundations, research organizations, and governmental agencies; in all, over 70 were searched (see Table 2). Based on our sense that research on this topic often does not appear in peer-reviewed outlets, we believed that this was a critical step in locating relevant studies.

Table 2
Websites Searched for Possibly Relevant Studies

Organization	Internet address
Academic Pathways to Access Student Success	www.apass.uiuc.edu
Academy for Educational Development	www.aed.org
Achieve, Inc.	www.achieve.org
Association for Career and Technical Education Research	www.agri.wsu.edu/acter/
American Association for Community Colleges	www.aacc.nche.edu
American Institutes for Research	www.air.org
American Youth Policy Forum	www.aypf.org
Annie E. Casey Foundation	www.aecf.org
Association for Supervision and Curriculum Development	www.ascd.org
Association for Career and Technical Education	www.acteonline.org
Association of American Colleges and Universities	www.aacu.org
Berea College	www.berea.edu
Broad Foundation	www.broadfoundation.org
Carnegie Foundation	www.carnegiefoundation.org
Career Education Corporation	www.careered.com
The Center for Community College Policy	www.communitycollegepolicy.org
The Center for Educational Policy Research	www.s4s.org
Center for Occupational Research and Development	www.cord.org
The Center for Research on Developmental Education and Urban Literacy	www.cehd.umn.edu/crdeul/about.html
Center on Education and Work	www.cew.wisc.edu/

Organization	Internet address
College of the Ozarks	www.cofo.edu
Community College Resource Center	www.crcr.tc.columbia.edu/
Council for Exceptional Children	www.cec.sped.org//AM/Template.cfm?section=Home
ED Publications (U.S. Department of Education)	www.ed.gov/about/pubs/intro/index.html?src=gu
Education Commission of the States	www.ecs.org
Educational Policy Institute	www.educationalpolicy.org
The Education Trust	www2.edtrust.org/edtrust/
Ford Foundation	www.fordfound.org
Bill and Melinda Gates Foundation	www.gatesfoundation.org/Pages/home.aspx
The Institute on Education and the Economy	www.tc.columbia.edu/centers/iee/
Jobs for the Future	www.jff.org
W.K. Kellogg Foundation	www.wkkf.org
Latin America Research and Service Agency	www.larasa.org
League for Innovation in the community College	www.league.org/index.cfm
League of United Latin American Citizens	www.lulac.org
Lilly Foundation	www.lilly.com/products/access/foundation.html
Lumina Foundation	www.luminafoundation.org
Ronald E. McNair Postbaccalaureate Achievement Program (TRIO)	www.ed.gov/programs/triomcnair/index.html
MDRC (Manpower Demonstration Research Corporation)	www.mdrc.org
Mathematica Policy Research, Inc.	www.mathematica-mpr.com/
MELMAC Education Foundation	www.melmacfoundation.org
Charles Stewart Mott Foundation	www.mott.org
MPR Associates	www.mprinc.com
National Association for the Advancement of Colored People	www.naacp.org/home/index.htm
National Career Pathways Network	www.cord.org/ncpn-index.cfm
National Center for the First-Year Experience and Students in Transition	www.sc.edu/fye/
National Center for Public Policy and Higher Education	www.highereducation.org/index.shtml
National Council for Workforce Education	www.ncwe.org
National Governors Association	www.nga.org
National Research Center for Career and Technical Education	www.nrccte.org
National Center for Research in Vocational Education	vocserve.berkeley.edu
Nellie Mae Education Foundation	www.nmefdn.org
National Science Foundation	www.nsf.gov
Office of Community College Research and Leadership	occr.ed.uiuc.edu/
Office of Special Education Programs	www.ed.gov/about/offices/list/osers/osep/index.html
Office of Vocational and Adult Education	www.ed.gov/about/offices/list/ovae/index.html

Organization	Internet address
Frederick D. Patterson Institute	http://www.patterson-uncf.org/index.htm
Pew Charitable Trust	www.pewtrusts.org
Postsecondary Education Opportunity	www.postsecondary.org
Rockefeller Foundation	www.rockfound.org
United Negro College Fund	www.uncf.org
Upjohn Institute for Employment Research	www.upjohninst.org
Washington Center for Improving the Quality of Undergrad Education	www.evergreen.edu/washcenter/project.asp?pid=73
Washington State Board for Community and Tech Colleges	www.sbctc.ctc.edu
WestEd	www.wested.org/cs/we/print/docs/we/home.htm
Women Employed	www.womenemployed.org
Workforce Strategy	www.workforcestrategy.org/

After obtaining electronic or physical copies of the studies that passed through our initial screen, we utilized a secondary screening process to determine if studies actually met our inclusion criteria. As such, studies that looked promising based on a reading of their titles and abstracts were evaluated for inclusion using the full study text, as is often recommended (see Cooper, 1998). See Table 1 in the Appendix for the instrument we used to guide this process.

Coding Studies

After the second screening, all studies that seemed to meet our inclusion criteria were fully coded. As can be seen in Table 2 of the Appendix, we coded background study characteristics (e.g., authors, year of publication), characteristics of the intervention (e.g., the type of transition addressed, the duration of the intervention), characteristics of the sample (e.g., age, source of disadvantage), and outcomes (e.g., construct measured, effect size). All studies were then coded using the protocol given in Table 3 in the Appendix as a guide.

Quality assessment of included studies. We attempted to assess, as part of the coding, the likely internal, external, construct, and statistical validity of the inferences arising from all studies. We approached this aspect of the review using the framework provided by Valentine and Cooper (2008). This approach attempts to overcome many of the shortcomings of existing

quality scales. Among these are the reliance on single scores to represent the multidimensional construct of study quality and the use of items that require a great deal of inference on the part of the study coders. Specifically, we coded questions that addressed the internal validity (e.g., how participants were assigned to conditions, overall attrition rate), external validity (e.g., degree to which the sample appeared to be representative of the target population), construct validity (e.g., reliability of scores), and statistical validity (e.g., the extent to which data met assumptions underlying the general linear model). As will be shown later, however, due to poor reporting in the primary studies, we were unable to assess studies on most quality dimensions.

Data Analysis

To analyze data, we conducted a meta-analysis treating each independent sample within the studies as the unit of analysis (most studies provided only one independent sample). We weighted effect sizes by the amount of information they provided about the population mean (i.e., we used the typical inverse variance weight) and calculated 95% confidence intervals for all effects. In addition, this data analysis strategy required us to make several decisions about how we would address certain complexities in the data. Each of these is described below.

Effect size metric. We employed effect sizes that reflect mean differences between groups for continuous outcomes. In addition, because we anticipated that most studies would choose to operationalize their constructs in different ways, we standardized these effect sizes to provide an interpretable comparison across studies. The standardized mean difference effect size is computed as:

$$d = \frac{\bar{Y}_T - \bar{Y}_C}{s_p},$$

where \bar{Y}_T is the treatment group mean, \bar{Y}_C is the comparison group mean, and s_p is the pooled

standard deviation. This formulation of the standardized mean difference effect size has a known bias in small samples, so we applied the usual correction for this (Hedges, 1981). Standardized mean difference effect sizes were computed so that values greater than zero indicated positive program effects (e.g., better grades for the intervention group relative to the comparison group).

For dichotomous outcomes (e.g., persisted vs. did not persist), we employed the odds ratio, which is defined as

$$OR = \frac{\frac{a}{b}}{\frac{c}{d}} = ad \div bc$$

where a is defined as the number of successes in the intervention group, b is the number of non-successes in the intervention group, c is the number of successes in the comparison group, and d is the number of non-successes in the comparison group. Meta-analysis was performed on logged odds ratios, because this metric has better statistical properties (Lipsey & Wilson, 2001). We then transformed the logged odds ratios to odds ratios for presentation. The odds ratios were set up so that values greater than one indicated positive program effects (e.g., greater persistence rates among intervention group members relative to comparison group members).

Dependencies among effect sizes. Independence of observations is a fundamental assumption underlying the general linear model, but in a systematic review, effect sizes (observations) can be dependent for several different reasons. For example, researchers may assess an outcome at the end of a program and at a subsequent follow-up. Or, researchers might collect multiple measures of the same construct (e.g., scores on a standardized test and class grades as a measure of academic achievement). Because these effects are based on the same sample, they are not independent and treating them as such has undesirable effects. Chief among these are that studies will not be weighted properly in a meta-analysis, and statistics that estimate

variability (or are based on estimates of variability) will be biased.

To address the problem of dependence, researchers have choices. One is to randomly select one measure to represent the study. This has the virtue of dealing with the dependence problem but the drawback of discarding information. Another strategy is to select the outcome that maximizes similarity with other studies. Often this strategy is better than randomly selecting one effect size, but it still results in a loss of information. A final strategy is often referred to as the shifting unit of analysis approach (Cooper, 1998); this is the approach we adopted for this paper. The shifting unit of analysis approach involves averaging effects when appropriate (e.g., averaging posttest and follow-up effects when testing the overall effect size for the intervention), then splitting the effects when testing the dimension on which they differ. In this example, when asking whether program effects appear to persist over time, a study with both a posttest effect size and a follow-up effect size would contribute to both levels of that moderator.

Error model. Finally, reviewers need to consider whether to employ a fixed effects or a random effects analytic model. Using the fixed effects model, study effects can be thought of as being randomly sampled from a single population of studies, and therefore any differences in effect sizes across studies are treated as solely due to random sampling and identifiable covariates. Using the random effects model, reviewers assume that studies do not in fact share a single population value, and any differences in between-study effect sizes are due to random sampling error, any identifiable covariates, and other random factors that cannot be identified.

The choice between fixed and random effects models can be an important one, because the confidence intervals arising from a random effects analysis will never be smaller and are often larger than their fixed effects counterparts; this has implications for both the statistical significance tests and interpreting the likely range of an intervention's effect. In practice,

choosing between the models is done empirically or conceptually. Empirically, reviewers often allow a statistical test of homogeneity to dictate their choice. The formula for this test is

$$Q = \frac{w_i(d_i - \bar{d})^2}{k - 1},$$

where d_i is each individual effect size, w_i is the inverse variance weight for effect size i , and \bar{d} is the weighted average effect size. Formally, the homogeneity test is a test of the between-studies variance component, and a significant value of Q indicates that the variation among studies is significantly different from zero, and often leads reviewers to employ a random effects model.

Generally, however, the choice between models is best made conceptually (Hedges & Vevea, 1998; Valentine, Pigott, & Rothstein, in press). Reviewers might, for example, consider the diversity of research designs, programs, outcomes, and samples in their review and use a fixed effects model if these seem to be very similar. Or, they may have an explicit interest in the extent to which different studies yield different answers. In addition, reviewers could consider their desired universe of generalization as a basis for choosing between the models. The fixed effects model allows for generalization to studies that are highly like the ones in the review, whereas the random effects model allows for inferences that are not so tightly conditioned on the observed studies (hence, the inferences are more broadly generalizable). In this review, the programs meta-analyzed were not highly similar; in addition, we were interested in the extent to which the studies seemed to yield different effects, and we also wanted to take advantage of the broader range of generalization. As such, we adopted the random effects data analytic model.

Results

Literature Search

Because we cast a very wide net with our electronic search, we identified over 8,000 possible citations. The vast majority of these were not relevant to the purposes of our study (e.g.,

were opinion pieces, literature reviews, or simple descriptions of transition programs), and only 109 were selected for further evaluation. Of these, 33 were selected for full coding as possibly meeting inclusion criteria; on further examination, some of these turned out not to meet our inclusion criteria. The search of the literature reviews yielded an additional 149 potential studies, and the website search yielded an additional 30. As with the electronic literature search, most of these could not be included in this review.

By far, most of the eligible studies were of programs designed to help with the transition to college during the first two years of the undergraduate experience (Paths 3 and 4 in Figure 1). In fact, of the 9 transition paths identified as priorities for this review as outlined in Figure 1, these were the only transitions that have been sufficiently studied to perform a meta-analysis. A total of 19 unique studies were identified that studied interventions aimed at helping students remain in college. Both community college and four-year institutions were represented, but the latter by far represented the largest category. In the analyses below, we combined these different institutions because the approaches used were similar. Eighteen of these studies also contained enough information to compute an effect size that described the impact the intervention had on program participants.

Description of Interventions

As anticipated, the interventions included in this review varied in interesting ways. Because the interventions were designed to help college students stay in school (i.e., are college transition programs), they all included students who were either at increased risk for college failure (e.g., were identified as high-risk admits) or were on academic probation. Due to their common purpose, the studies were similar in that they included students with a variety of background characteristics (e.g., ethnicity) and included both men and women. However, the

specific approaches taken in these studies varied quite a bit. These ranged from relatively comprehensive interventions (e.g., a seminar designed to facilitate college adjustment, coupled with limitations on the number of credit hours students could enroll in, smaller classes, and tutoring; Hecker, 1995) to those that were much smaller in scale, such as adding a journaling component to an English composition class (Cohen Goodman, 1998). Most interventions fell between these two poles, with a freshman orientation/adjustment seminar being the strategy most often adopted (either alone or in conjunction with other activities such as tutoring).

Description of Research Designs and Study Implementation

Unfortunately, only two of the 19 studies included in this review used a random mechanism to assign students to groups. As such, selection (i.e., differences in participants who receive the intervention relative to those who do not) is a pervasive threat to the validity of these studies. Notably, one additional study (Moss & Yeaton, 2006) employed a regression-discontinuity design to study the effects of a developmental English program for college students. This study was not included in the meta-analysis due to the difficulties of converting the statistical results of the regression-discontinuity design to a metric compatible with the rest of the studies in this review, but it will be discussed below.

Potential selection effects were addressed to varying degrees in the studies included in the meta-analysis. Most studies compared the students receiving the intervention to students who appeared to be comparable (e.g., met study inclusion criteria) but did not receive the intervention. The best of these studies attempted to adjust for baseline differences between groups or allowed us to accomplish the same goal. For example, some studies computed means that were adjusted for scores on college entrance exams, whereas others allowed us to compute a pretest effect size that was subtracted from the reported posttest effect size. However, some

studies compared program students to students who were clearly not comparable (e.g., Cone, 1991). We explore the consequences of these design choices below.

A pervasive threat to the statistical conclusions reached in the individual studies, and relevant to the confidence intervals we generated through meta-analyses of them, is that many of the included studies likely violated the statistical assumption of independence of observations. For example, many studies involved comparing students in sections of a course to students in other sections of a course. Because students were not randomly assigned to sections, they may share characteristics that increase the similarity of observations within sections relative to the similarity of observations across sections. Further, students in the same section share other influences, such as the instructor, that likely also tend to increase their relative similarity. Most important for the purposes of this review, violation of the assumption of independence can lead to standard errors that are spuriously small—and hence, confidence intervals that are too narrow, and statistical tests that are too likely to reject the null hypothesis. Unfortunately, the studies in this review usually did not give us enough information about the nature and extent of potential data clustering, and none allowed us to estimate a likely value that could be used to arrive at potentially better standard errors.

Almost without exception, the studies gave little indication about other potential threats to their validity. For example, most studies did not give an indication of attrition (either overall or differential), data exclusions (such as systematically missing data), or intervention fidelity. The absence of good reporting about these issues means that we do not know how serious these threats are to the validity of the conclusions we draw below.

Outcomes Measured

Most studies measured academic achievement (usually via grade point average [GPA]) or

persistence (i.e., re-enrollment). The majority of studies measured these outcomes either immediately after the program (e.g., for a Fall 2000 course, re-enrollment for the Spring 2001 semester), or one semester later. Only two studies (Clark & Halpern, 1993; Stovall, 1999) can be considered to have measured outcomes over the long term (i.e., more than one year post-program).

Data Dependencies

Abadie (1999) reported outcomes for two cohorts of students. We collapsed these into one group for analysis purposes. Abadie (1999) and Stovall (1999) also reported outcomes for multiple points in time (Abadie, immediately following the end of the intervention and one semester later; Stovall, at the end of the first and second semesters, the end of the second year, and the end of the third year). We also collapsed these for analysis. We would have employed Cooper's (1998) shifting unit approach here if more studies had measured outcomes at similar follow-up periods, but the lack of the feature across studies made such an analysis impossible. McGregor (2001) administered two measures related to academic achievement, and these were averaged for analysis. Finally, two studies (Fry, 2007; Hecker, 1995) used two comparison groups (one comparison group that was made up of regularly admitted students, and a second group that was made up of students who were more like the students receiving the intervention). Here, we did employ Cooper's shifting unit of analysis approach and averaged these groups for the overall analysis, but allowed them to contribute to both levels of analysis when we examined the nature of the comparison group and its effects on effect size estimation.

Data Analysis

Academic achievement. Eighteen studies measured the impact of an intervention on academic achievement (most often, GPA; see Table 4 in the Appendix). The random effects

estimate was positive, indicating that program participants fared better on achievement related outcomes, but not statistically significant, $d = 0.08 \pm .17$, $p = .30$. The distribution of effect sizes was heterogeneous, $Q(17) = 68.7$, $I^2 = 75\%$, $p < .001$.

Persistence. Eleven studies measured the impact of an intervention on student persistence (see Table 5 in the Appendix). The random effects estimate for this outcome was positive, indicating that program participants were more likely to re-enroll, but not statistically significant, with an odds ratio of 1.46 (the 95% confidence interval ranged from .85 to 2.51), $p = .17$. Once again, the distribution of effect sizes was heterogeneous, $Q(10) = 84.7$, $I^2 = 88\%$, $p < .001$.

Publication bias. Publication bias—the tendency for studies lacking statistically significant outcomes to go unpublished—is a concern in every review, even those that, like ours, include a vigorous search for unpublished literature. For the academic achievement outcomes, we conducted a statistical analysis to help assess whether our set of studies appeared to be affected by publication bias. It should be noted that there are no very good solutions to the problems posed by publication bias, and current statistical approaches are at best informed guesses about the nature and severity of potential publication bias. We used the trim and fill approach, which is based on the assumption that the observed studies (i.e., those in the meta-analysis) are a random sample from a normally distributed population of studies.

Our analysis suggests that, in fact, some degree of publication bias might exist in our set of achievement outcomes. Specifically, the trim and fill analysis identified that an additional two studies would need to be added to the distribution of effect sizes in the achievement meta-analysis for that distribution to be essentially normal. However, adding these studies does not substantively alter the interpretation of the overall meta-analysis on achievement outcomes. Specifically, the new estimated effect size is still small and not statistically significant, $d = 0.01$,

$p = .98$, and is neither statistically significantly or practically significantly different from our overall estimate. As such, the hints of publication bias that exist do not seem to suggest a great deal of concern about the integrity of our meta-analytic dataset.

Comparison quality as a moderator of study effects. For both grades and persistence, the distributions of effect sizes were heterogeneous. Heterogeneity is one justification for the search for moderating influences, as these might explain some or potentially all of the “excess” observed heterogeneity. We noted that studies varied in terms of the quality of the comparison group against whom the relative effects of the intervention were judged. We therefore investigated whether the quality of the comparison group moderated the effect sizes we observed. This was very much the case. The five comparisons of the academic achievement of program students to clearly non-comparable students yielded strong, negative, statistically significant program effects ($d = -.45 \pm .17, p < .001$), whereas the 15 comparisons of program students to relatively more comparable students yielded a statistically significant positive effect ($d = .25 \pm .11, p < .001$). A fixed effects moderator test for the difference between these two groups of effect sizes was statistically significant, $Q(1) = 68.1, p < .001$. Notably, studies within each level of comparability appeared to be relatively homogeneous (both p 's greater than .16)

For persistence outcomes, the nature of the comparison group again moderated the observed effect sizes. The four studies that compared the persistence of program students to clearly non-comparable students yielded negative effects (the weighted average odds ratio was .69, with a 95% confidence interval ranging from .34 to 1.40), whereas the 10 comparisons of program students to relatively more comparable students yielded positive effects (the weighted average odds ratio was 1.21, with a 95% confidence interval ranging from 1.001 to 1.46). The fixed effects moderator test for the difference between these two groups of effect sizes was

statistically significant, $Q(1) = 24.4, p < .001$. Studies within each level of comparability again appeared to be relatively homogeneous (both p 's greater than .29).

“Best practice” studies relative to other studies. A final comparison of interest involves those studies that, compared to the other studies in our review, can be considered “best practice.” That is, these studies used both a relatively intensive intervention and a relatively better comparison group. As expected, the nine comparisons with these characteristics yielded positive and statistically significant effect sizes for academic achievement ($d = .29 \pm .15, p < .001$), whereas the 11 comparisons that lacked either an intensive intervention, a relatively good comparison, or both yielded negative effect sizes in the random effects model ($d = -.17 \pm .21, p = .12$). The fixed effects moderator test for the difference between these two groups of effect sizes was statistically significant, $Q(1) = 44.5, p < .001$. Studies within the “best practice” category appeared to be relatively homogeneous ($p = .24, I^2 = 23\%$), whereas studies within the lower quality category were still heterogeneous ($p < .001, I^2 = 70\%$). There was not enough variation on the quality dimension to do a similar analysis for studies that measured persistence, although an examination of Table 5 in the Appendix suggests that the pattern is similar.

Interpreting the program effects. If we assume that the best estimate of the effects of transition programs on student achievement comes from the “best practice” studies, this suggests that these programs have a population effect of about $\delta = .29$ on student grades. To put this in context, assume that students are expected to have a GPA of 2.0 if they do not receive the intervention. A population effect of $\delta = .29$ implies that students receiving the intervention should be three-tenths of a standard deviation higher in GPA than those not receiving the intervention. A typical standard deviation for GPA in the lower portion of the distribution is about .75, so the typical student receiving the intervention should have a GPA of about 2.22 [i.e.,

$2.0 + (.75 \times .29)$]. For every five program students taking 12 credit hours, this would be approximately equivalent to four of them earning three C's and one B, with the fifth earning four C's, whereas the five students in the comparison condition would earn all C grades.

One problem with the interpretation of the program effects for grades is that some interventions required students to attend a seminar or course, and it was not always clear if or how these seminars were graded. It was also not always clear how many credit hours students would have enrolled for, if these were formal courses. If the seminars were graded and this grade was included in the computation of the GPA, and if students enrolled for three credit hours, then the program effect could largely or entirely be due to the influence of the program course on grades. Clearly this is an issue that merits specific attention in future studies.

To interpret the persistence outcomes, assume that the “true” intervention effect is given by the odds ratio for the studies that used a relatively better comparison group (i.e., the odds ratio for persistence is 1.62). If we assume—optimistically—that about 50% of students would re-enroll the next semester in the absence of the intervention, then the odds ratio suggests that for about every 10 students who receive the intervention, one additional student would persist the next semester. Of course, due to the fact that the studies included in this review tended not to measure outcomes beyond two semesters after the intervention, we know very little about how program effects behave over time.

A study employing the regression-discontinuity design. Moss and Yeaton (2006) used regression-discontinuity to study the effectiveness of a developmental English program in a large community college. The regression-discontinuity design involves assigning a cut-off point, below (or above) which participants receive the intervention. For example, a pretest might be administered, and all potential participants falling below a certain threshold score might be given

the intervention. This design generally has very strong inferential properties, as, like studies using random assignment, the selection mechanism is entirely known.

In the Moss and Yeaton (2006) study, the college administered a placement exam in English. Students falling below a certain threshold score were required to take a developmental English course before they could take college-level English. This was the only intervention component that was investigated in the present study. The outcome variable was the grade that the students earned in their college-level English course. Results suggested that the developmental English course was associated with better grades in the college-level course, although this effect appears to have been concentrated in the students who scored the lowest on the placement test. In other words, students in the developmental course who performed relatively well on the placement exam (i.e., those right below the cut-point requiring the course) received grades similar to students who fell just on the other side of the cut-point. However, students who scored very low on the placement exam received grades in their college-level course that were similar to their peers who scored higher on the placement exam. Follow-up analyses suggested that neither differential maturation nor differential attrition, both potential rival hypotheses in this particular study, appear to have influenced study results.

Other Studies Meeting Review Criteria

We mentioned that we also uncovered studies that met the inclusion criteria but fit into other transition paths besides 3 and 4 (i.e., facilitating the transition through college among students already in college). We discuss the methods and findings for these in turn.

Brewer and Landers (2005). Brewer and Landers (2005) investigated the effects of a talent search (TS) program on postsecondary enrollment (Paths 1 and 2 in Figure 1). These programs identify students who demonstrate potential for college study, and this identification

usually occurs fairly early (most commonly in middle school). This study, conducted at the University of Tennessee-Knoxville, offered academic and career advising to program participants. TS programs often include additional educational opportunities (e.g., enrichment programs). This study notably involved students who were also low-income and would be the first in their families to graduate from college.

To study the effects of the TS programs, the authors formed a comparison group of students who were eligible to participate in the TS program but for some reason did not. Data were collected between one and nine years after program participation. Results suggested that TS program participants were 2.3 times more likely to have enrolled in postsecondary education.

However, one important limitation of this study is that the comparison group was comprised of students who chose not to attend the TS program. One potential rival explanation for the finding that TS students were more likely to attend college is that these students differed systematically from program participants in a way that might have biased the study findings. In fact, TS program participants were 2.6 times more likely than non-participants to have a parent who attended at least some college. This suggests that, in fact, the comparison group was structured in a way that biased the study results. As such, it is not at all clear whether participants in this program were more likely to attend college because of the Talent Search program, background factors that made attendance more likely, or a combination of both.

Kemple (2008). In a long-term randomized experiment, Kemple (2008) investigated the effects of career academies in eight school districts across the United States (Paths 1, 2, and 7 in Figure 1). The school districts were selected in part due to the fact that they had relatively mature career academy programs at the start of the study, were implementing these academies in a way that conformed with a few critical “best practices” (i.e., utilized relatively smaller learning

communities, had an academic curriculum with career-themed courses, and established employer partnerships), and made special efforts to recruit students who were perceived to be at high risk of dropping out of school.

Eight years after scheduled graduation, high-risk students who were randomly assigned to attend a career academy (a) were somewhat more likely to have earned a high school diploma or GED than students who did not attend the academy and (b) were slightly more likely to have graduated from high school (odds ratio = 1.07), although this finding was not statistically significant. The rates of college attendance between students attending a career academy and those not attending a career academy were virtually identical (38.4% vs. 38.6%). The report did outline potentially beneficial employment outcomes for career academy students (e.g., somewhat higher rates of employment and somewhat greater earnings).

Maxwell (2001). In a related study, Maxwell (2001) investigated the effects of career academies on college achievement and graduation rates (Paths 1 and 2 in Figure 1). Because her interest was in investigating the overall effects of career academies in one particular district, Maxwell examined students who enrolled at a university in California from that school district and did not provide much detail about the nature of the career academies themselves. She did report that the district operated career academies in six different high schools, and it seems reasonable to expect differences in the programs across the schools. Maxwell compared career academy students to non-academy students by statistically controlling some important background variables. Her results suggest that students in career academies need less remediation in English than similar non-career academy students and graduate at a slightly higher (but still relatively low) rate compared to similar non-academy students; these effects appeared to be small.

Brancard et al. (2006). Brancard, Baker, and Jensen (2006) evaluated the effects of a community college program aimed at students for whom English is a second language (Path 3 in Figure 1). The program compared ESL students involved in a learning community to those who were not. Typically these programs are constructed to provide students with social support and a shared sense of group norms that endorse learning goals. In this study, the learning community model integrated language skills (i.e., grammar and composition), featured collaboration among faculty, and provided educational case management for students. Brancard et al. used a quasi-experimental design with matching to investigate program effects. Results showed that students in the intervention group were about 17% more likely to re-enroll the second semester than were students in the comparison group. Further, the intervention group had higher (but not statistically significant) course completion rates and GPAs, but it is unclear from the report how large these effects were.

Richburg-Hayes et al. (2009). Richburg-Hayes et al. (2009) evaluated the effects of a scholarship program aimed at individuals who had graduated from high school (or earned their GED), had a child under age 19, and whose income was less than 200% of the Federal poverty level (Paths 1 and 5). Using a random assignment design, over the course of two semesters, participants were given supplemental financial aid of \$1,000 a semester for (a) enrolling at least half time and (b) maintaining at least a C GPA; students also received an enhanced version of the counseling services available to all students. Results suggested that while the intervention was in effect, students in the scholarship group were more likely to enroll in courses relative to members of the control group (82% to 77%), were more likely to take a full-time course load (60% to 54%), and were more likely to maintain at least a C average (55% to 42%). The findings were even more impressive for the second semester: The scholarship group members were more

likely to enroll in courses relative to members of the control group (64% to 49%), were more likely to take a full-time course load (46% to 32%), and were more likely to maintain at least a C average (38% to 27%). In addition, longer term follow-up results suggested that the relative advantage experienced by the scholarship group persisted over time.

Discussion

Perhaps the most striking finding from this systematic review is that many interventions supporting transition that are of interest to policymakers lack even one experimental evaluation and most existing non-experimental evaluations are of undetermined inferential strength. We targeted 10 such transitional paths for this review, and only two (Paths 1 and 2 in Figure 1) had at least three studies that involved an external comparison group of any kind. In part, this finding is a result of our focus on individuals who, from a public policy perspective, could be considered disadvantaged. There are some transition programs without this specific focus that have been evaluated (e.g., Tech Prep; Bragg, Loeb, Zamani, & Yoo, 2001). But even within this larger group of non-targeted interventions, a high-quality literature base capable of carefully informing public policy does not yet exist.

In addition, the studies we did uncover provide a weak basis for public policy, because their designs tend not to be strong; further, they lack reporting on details that would allow us to assess the conditions under which and characteristics of students for whom the interventions might be effective. As an example, due to poor reporting, we were unable to critically examine the quality of the included studies in a rigorous manner. For example, few of the included studies discussed implementation fidelity in much depth, and as such have little information about the degree to which observed effects might be attenuated due to low fidelity. Also, most studies employed an evaluation design in which students were allowed to choose whether they received

the intervention or a comparison condition (e.g., a voluntary course; an analysis of a database that tracked student experiences). Although the researchers often took steps to attempt to make the intervention and comparison groups more comparable, these designs still carry with them an added element of ambiguity. This concern partly exists because we can never know how well our attempts to make groups more comparable have worked. As a result of these concerns, we were unable to shed additional light on important questions such as the mechanisms by which these interventions exert influence (i.e., how they work, assuming they do), which program implementation characteristics are associated with better outcomes, and whether transition programs seem to be especially effective for students with certain characteristics. Future studies using this type of design and analysis strategy should attend more explicitly to the concerns raised by non-experimental designs. In addition, a systematic and rigorous program of evaluations that are targeted at transition interventions would help clarify whether these are effective.

With respect to interventions that are targeted at college students at risk for dropout, we noted that the evidence base we uncovered is not deep, and that the interventions we studied varied along a number of critical dimensions. Because of these characteristics, we were unable to examine how or why programs might be effective. Even though the data seem to suggest that, among our stronger studies, there is evidence that the comprehensive interventions might positively affect short-term grades and persistence, we have little information about which elements in the comprehensive interventions might be relatively more effective. Future evaluations should provide information on the specific elements that were part of the intervention strategy and report details about resource utilization. For example, several interventions included in our review had a tutoring component, but no studies provided detailed

information about the training of tutors or the number of tutoring sessions attended.

In addition, most studies contained little information that would help individuals make decisions about how best to support students in particular areas, such as those in career and technical education or those in community college settings, and most provided virtually no information about program costs. Taken together, these concerns suggest potentially serious gaps in our understanding of the effectiveness of specific program elements to support transitions. Our hope is that this review spurs rigorous and theoretically rich studies of funded interventions that aim to support students as they transition to new roles.

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APPENDIX

Table 1
Postsecondary Transitions Study Screening Guide

1. First Author (Last, Initial)	
2. Year of Publication	
3. Journal	
4. Pages	
Inclusion Criteria	
5. Does this report describe an intervention? If No then STOP	0. No 1. Yes 99. Can't tell, guess =
6. Is the sample "at-risk" as defined in the relevant legislation? Note: This is defined broadly, but does not include individuals who might be deemed at-risk simply due to their race or ethnicity. Common categories that do meet the definition are: low SES, under prepared or underachieving, disabled. If No then STOP	0. No 1. Yes 99. Can't tell, guess =
7. Does the intervention address a transition from one educational system to another or from an educational system to a related career? If No then STOP	0. No 1. Yes, one educational system to another 2. Yes, an educational system to a related career 99. Can't tell, guess =

Table 2
Postsecondary Transitions Study Categorization Guide

<p>What is the first author's last name and first initial?</p>	
<p>What was the year of appearance of the report or publication?</p> <p>What was the type of publication?</p> <p>1 = journal article 2 = book chapter 3 = book 4 = dissertation 5 = MA thesis 6 = private report 7 = government report (state or federal) 8 = school or district report 9 = other (specify _____)</p>	
<p>What kind of transition does the intervention address?</p> <p>NOTE: If 0 then STOP</p>	<p>0. No transition 1. From one educational system to another 2. From an educational system to related employment</p>
<p>If the transition is to related employment, briefly describe that employment</p>	
<p>Is the intervention aimed at at-risk students?</p> <p>Note: Mark "yes" if the intervention is aimed at students who are not at risk but <i>this study</i> focuses on at-risk students.</p> <p>NOTE: If NO then STOP</p>	<p>0. No 1. Yes</p>
<p>Briefly describe the source of the "at-risk" designation</p>	

<p>Note: For example, “Underachieving”</p>	
<p>What is the age range of students in the study?</p> <p>Note: Select the “best” answer</p>	<ol style="list-style-type: none"> 1. High school students 2. College students 3. Multiple age ranges 4. Can’t tell 5. Other _____
<p>What kind of study is this?</p>	<ol style="list-style-type: none"> 0. Program description only 1. Mainly a program description but with some data 2. Qualitative study 3. One group pretest-posttest 4. Comparison group study (i.e., a comparison of at least two groups, regardless of the kind of comparison)

Table 3

Postsecondary Transitions Study Coding Final Guide (College Persistence Programs)

What is the first author's last name and first initial?	
What is the research design?	<ul style="list-style-type: none"> 0. Non-equivalent groups quasi-experiment 1. Randomized experiment 2. Other
Are pretest data available for the outcome or a closely related proxy?	<ul style="list-style-type: none"> 0. No 1. Yes
Did any participants get to choose their condition?	<ul style="list-style-type: none"> 0. Yes, all students were volunteers 1. Comparison group made up of students eligible for program but chose not to attend 2. No, all students were assigned to their conditions (e.g., random assignment study) 3. Can't tell
Does the study appear to have experienced attrition?	<ul style="list-style-type: none"> 0. No 1. Yes 2. Can't tell
If yes, list attrition rates if available.	<p style="text-align: center;">_____ Overall</p> <p style="text-align: center;">_____ Differential</p>
Do any study participants appear to have switched groups during the study? (e.g., moved from treatment to control?)	<ul style="list-style-type: none"> 0. No 1. Yes 2. Can't tell
Outcomes	This is outcome ___ of ___
What construct is this outcome tapping?	<ul style="list-style-type: none"> 1. Academic achievement 2. Persistence 3. Other
What is the source for the data?	<ul style="list-style-type: none"> 0. Self-report 1. Teacher report 2. Archival records (includes grades) 3. Other
What is the timing of the outcome assessment?	<ul style="list-style-type: none"> 0. Immediately at the end of the intervention 1. At the end of the semester in which the intervention was delivered 2. One full semester after the intervention was delivered 3. More than one full semester after the intervention was delivered

What intervention components were included? (list all)	<ul style="list-style-type: none"> 0. Study skills course/seminar 1. Adjusting to college life course/seminar 2. Tutoring 3. Mentoring 4. Differential policies (e.g., limitations on the number of courses) 5. Other
If the intervention included a course or seminar, how long was it?	_____ weeks
Did the report give an indication of resource utilization? (Example: average number of tutoring sessions attended.)	<ul style="list-style-type: none"> 0. No 1. Yes
Average sample age	_____ years
Range of sample age	_____ to _____ years
Ethnicities represented in sample (circle all that apply)	<ul style="list-style-type: none"> 0. White 1. African-American 2. Latino 3. Asian-American 4. American Indian 5. Other 6. Not specified
SES represented in sample	<ul style="list-style-type: none"> 0. Low SES 1. Lower-middle SES 2. Middle SES 3. Middle-upper SES 4. Mixed 5. Not specified
Were students in a community college or in a four-year institution?	<ul style="list-style-type: none"> 0. College/University 1. Community college 2. Can't tell
Effect Size Data	
To whom were program students compared?	<ul style="list-style-type: none"> 0. Students not meeting inclusion criteria (e.g., typical college students) 1. Students meeting inclusion criteria 2. Can't tell
Were adjusted means available in the report?	<ul style="list-style-type: none"> 0. No 1. Yes
If yes, for what variables were the means adjusted?	<ul style="list-style-type: none"> 0. n/a, no adjusted means 1. Prior achievement (e.g., high school gpa) 2. Standardized achievement test (e.g., SAT)

	score) 3. SES 4. Other 5. Can't tell
Was a pretest effect size available for a pretest of the outcome, or a close proxy?	0. No 1. Yes
Program group pretest data	_____ mean _____ <i>SD</i> _____ <i>N</i>
Program group posttest data	_____ mean _____ <i>SD</i> _____ <i>N</i>
Comparison group posttest data	_____ mean _____ <i>SD</i> _____ <i>N</i>
Comparison group posttest data	_____ mean _____ <i>SD</i> _____ <i>N</i>

Four-fold table

	Persist	Drop out
Program		
Comparison		

Table 4
Studies Measuring Academic Achievement Outcomes

First Author (Year)	Intervention Description	Target Population/ Setting	Duration of Intervention	Comparison Group	Outcome	Outcome Assessment Timing	Effect Size ^a
Abadie (1999)	Administrative limitations on extracurricular activities, smaller class sizes, required body of general education courses	Incoming 4-year college students not meeting regular admit criteria	One academic year	Students admitted via usual admission process	GPA	After first semester of intervention	-0.13
						After second semester of intervention	-0.56
Alderman (1998)	One credit college orientation class, tutoring, remedial coursework	Community college students identified as needing remedial instruction	One semester	Historical controls who met inclusion criteria (i.e., students before program existed)	GPA	Semester following the end of the intervention	+0.18
Clark (1993)	Remedial coursework, small classes, academic and career advising	Incoming 4-year students scoring in the lowest quartile of a placement test	One academic year	Historical controls who met inclusion criteria (i.e., students before program existed)	GPA	Three and a half years after the end of the intervention	+0.93
Cohen Goodman (1998)	Added a journal writing component to an English composition class	Students in a 4 year university scoring low on a placement test	One semester	Randomly group of students not assigned to intervention condition	Reading comprehension	Immediately after intervention	+0.07
Cone (1991)	Study skills and adjustment course	Students in a 4 year university with first semester gpa < 2.0	One semester	Unclear, but comparison students do not appear to have met inclusion criteria for intervention	GPA	Immediately after intervention	-0.61
Cox (2002)	Study skills curriculum integrated into usual math instruction	Students in a community college scoring below cutoff on a placement test	One semester	Historical controls who met inclusion criteria (i.e., students before program existed)	Grade in one math class	Immediately after the intervention	+0.32
Dees (1991)	Cooperative learning in a remedial math class	Students in a 4 year university needing	One semester	Randomly assigned group of students in	Various math tests	Immediately after the intervention	+0.37

First Author (Year)	Intervention Description	Target Population/ Setting	Duration of Intervention	Comparison Group	Outcome	Outcome Assessment Timing	Effect Size ^a
		remediation		a traditional lab			
Esterbrook (2006)	Behavior modification	Students in a community college subjectively deemed to be "at-risk"	Unclear, but appears to be one semester	Assigned to receive traditional remedial instruction	GPA	Immediately after the intervention	-0.30
Fry (2007)	Course aimed at fostering time management and problem solving skills, as well as increased awareness of university resources	Conditionally admitted students in a 4 year university	One semester	Conditionally admitted students not taking the seminar Unconditionally admitted students not taking the seminar	GPA	Unclear, but appears to be for the semester during which the seminar took place	+0.21 -0.54
Hecker (1995)	Administrative limitations on maximum credit hours, courses available, class sizes; seminar to teach academic skills	Students conditionally admitted to a 4 year university through an alternate process	Probably one academic year	Regularly admitted students deemed to be "high risk" Regular admits	GPA	Immediately following the end of the intervention (i.e., Fall semester of the Sophomore year)	+0.15 -0.58
Loiacano (2000)	Specific curriculum added to an existing freshman orientation course	First year students in a 4 year university with a history of academic struggles	One academic semester	Similar students not receiving the added curriculum	Cognitive development	Immediately after the end of the intervention	+0.11
McGee (2004)	Statewide program providing financial, academic, and social assistance	Disadvantaged students attending community college	Unclear, but presumably 2 years	Students not participating in the program	GPA	Unclear	-0.22
McGregor (2001)	Added component to an existing college preparation course	Entering freshmen not meeting usual admission criteria to a 4 year university	5 weeks	Similar students not receiving the added component	Vocabulary Critical thinking	Immediately after the end of the intervention Immediately after the end of the intervention	+0.16 +0.16
Milligan (2007)	Study skills seminar	Students on academic probation in a 4 year university	8 weeks	Similar students who chose not to participate in the seminar	GPA	Immediately after the end of the intervention	+0.22
Salinitri (2005)	Mentoring	Students with entrance scores near	Unclear, but probably one	Similar students not chosen to receive	GPA	Unclear, but probably refers to the semester immediately	+0.60

First Author (Year)	Intervention Description	Target Population/ Setting	Duration of Intervention	Comparison Group	Outcome	Outcome Assessment Timing	Effect Size ^a
		the institution's lower limit	semester	mentoring		following the intervention	
Sanders (2000)	Peer tutoring	Academically underprepared freshmen in a 4 year institution	One academic year	Unclear, but seems to be similar students who did not receive the intervention	GPA	Immediately after the end of the intervention	+0.61
Scrivner (2008)	Learning communities of about 25 students; each community took a set of three courses together; curricula across the courses were linked. Tutoring was also offered.	Freshmen at a community college (sample in the meta-analysis had failed both English placement tests given by the college)	One semester	Students randomly assigned to receive college's usual menu of courses and support	Whether students had passed an English course ^b	First full semester after the end of the intervention	+0.22
Stovall (1999) ^c	Student success course focusing on transitioning to college, career development, and life management.	Students in a community college	One semester	Students who scored below college level on two placement tests (reading and English)	GPA	Immediately after the end of the intervention ^d	+0.21

Note. ^a All effect sizes for academic achievement are expressed as standardized mean differences. A standardized mean difference > 0 indicates that the students receiving the intervention performed better than students in the comparison condition

^b In Scrivner et al. (2008), this outcome was expressed in terms of percentages of students who had passed an English course vs. those who had not. We computed a logged odds ratio for this outcome, then transformed that logged odds ratio to a standardized mean difference effect size.

^c Stovall (1999) did not analyze students who took but did not pass the student success course. This choice may positively bias the effect size estimate somewhat.

^d Stovall (1999) also measured GPA at the end of the second term, second academic year, and third academic year. She found no differences between program participants and non-participants and did not separately compare at-risk program participants to at-risk non-participants. For meta-analysis, we conservatively imputed 0 for these effects.

Table 5
Studies Measuring Persistence Outcomes

First Author (Year)	Intervention Description	Target Population/ Setting	Duration of Intervention	Comparison Group	Outcome	Outcome Assessment Timing	Effect Size^a
Abadie (1999)	Administrative limitations on extracurricular activities, smaller class sizes, required body of general education courses	Incoming 4-year college students not meeting regular admit criteria	One academic year	Regular admits	Retention	First semester after intervention end	.36
						Second semester after intervention end	.42
Alderman (1998)	One credit college orientation class, tutoring, remedial coursework	Community college students identified as needing remedial instruction	One semester	Historical controls who met inclusion criteria (i.e., students before program existed)	Retention	First semester after intervention end	1.32
Clark (1993)	Remedial coursework, small classes, academic and career advising	Incoming 4-year students scoring in the lowest quartile of a placement test	One academic year	Historical controls who met inclusion criteria (i.e., students before program existed)	Retention	Three and a half years after the end of the intervention	1.21
				Regular admits			.86
Cone (1991)	Study skills and adjustment course	Students in a 4 year university with first semester gpa < 2.0	One semester	Historical controls who met inclusion criteria (i.e., students before program existed)	Retention	Semester following the intervention	14.48
Fry (2007)	Course aimed at fostering time management and problem solving skills, as well as increased awareness of university resources	Conditionally admitted students in a 4 year university	One semester	Conditionally admitted students not taking the seminar	Retention	Semester following the intervention	1.12
				Unconditionally admitted students not taking the		Two semesters following the intervention	.88
						Semester following the intervention	.76

First Author (Year)	Intervention Description	Target Population/ Setting	Duration of Intervention	Comparison Group	Outcome	Outcome Assessment Timing	Effect Size ^a
				seminar		Two semesters following the intervention	.64
Hecker (1995)	Administrative limitations on maximum credit hours, courses available, class sizes; seminar to teach academic skills	Students conditionally admitted to a 4 year university through an alternate process	Probably one academic year	Regularly admitted students deemed to be “high risk”	Retention	Immediately following the end of the intervention (i.e., Fall semester of the Sophomore year)	.77
				Regular admits	Retention		.49
House (1991)	Tutoring	Academically under prepared freshmen admitted through a special process to a 4 year university	Probably one academic year	Students eligible to receive tutoring but who did not	Retention	Appears to be the next semester after the end of the intervention (i.e., Fall semester of the Sophomore year)	1.52
Milligan (2007)	Study skills seminar	Students on academic probation in a 4 year university	8 weeks	Similar students who chose not to participate in the seminar	Retention	Immediately after the end of the intervention	1.15
Salinitri (2005)	Mentoring	Students with entrance scores near the institution’s lower limit	Unclear, but probably one semester	Similar students not chosen to receive mentoring	Retention	Unclear, but probably refers to the semester immediately following the intervention	14.60
Sanders (2000)	Peer tutoring	Academically underprepared freshmen in a 4 year institution	One academic year	Unclear, but seems to be similar students who did not receive the intervention	Retention	Immediately after the end of the intervention	.83
Stovall (1999) ^b	Student success course focusing on transitioning to college, career development, and life management.	Students in a community college	One semester	Students who scored below college level on two placement tests (reading and English)	Retention	Immediately after the end of the intervention	23.69
						End of the second academic year	1.94
						End of the third academic year	1.39

Note. ^a All retention effect sizes are expressed as odds ratios. An odds ratio > 1 indicates that the intervention was associated with increased retention.

^b Stovall (1999) did not analyze students who took but did not pass the student success course. This choice may positively bias the effect size estimate somewhat.



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