



Developmental Summer Bridge Programs

Program Description¹

Developmental summer bridge programs are designed to reduce the need for developmental education in college by providing students with accelerated instruction in areas where additional knowledge and skills are needed to help them succeed in higher education. These programs occur in the summer “bridge” period between high school and college.² Summer bridge programs are based on theories and empirical evidence suggesting that the transition to college can be difficult for academically underprepared students. Thus, providing accelerated academic and college knowledge skills during this bridge period can presumably improve students’ college readiness.³ Developmental bridge programs most often incorporate two components: accelerated developmental instruction addressing identified academic deficiencies, typically in reading, writing, and/or math; and college preparation training designed to ease students’ emotional and psychological adjustment to the college environment. The college preparation training component of summer bridge programs often includes information on financial aid, study skills training, time management, computer literacy, and college culture.

Research⁴

The What Works Clearinghouse (WWC) identified one study of *developmental summer bridge programs* that both falls within the scope of the Interventions for Developmental Students in Postsecondary Education topic area and meets WWC group design standards. This study met WWC group design standards without reservations. The study included 1,318 undergraduate students across eight colleges in Texas.

The WWC considers the extent of evidence for *developmental summer bridge programs* to be small for three outcome domains—academic achievement, postsecondary enrollment, and credit accumulation. (See the Effectiveness Summary on p. 5 for more details of effectiveness by domain.)

Report Contents

Overview	p. 1
Program Information	p. 3
Research Summary	p. 4
Effectiveness Summary	p. 5
References	p. 8
Research Details for Each Study	p. 11
Outcome Measures for Each Domain	p. 13
Findings Included in the Rating for Each Outcome Domain	p. 14
Supplemental Findings for Each Outcome Domain	p. 16
Endnotes	p. 20
Rating Criteria	p. 21
Glossary of Terms	p. 22

Effectiveness

Developmental summer bridge programs were found to have no discernible effects on academic achievement, postsecondary enrollment, and credit accumulation for postsecondary students.

Table 1. Summary of findings⁵

Outcome domain	Rating of effectiveness	Improvement index (percentile points)		Number of studies	Number of students	Extent of evidence
		Average	Range			
Academic achievement	No discernible effects	+2	+1 to +3	1	1,318	Small
Postsecondary enrollment	No discernible effects	+1	na	1	1,318	Small
Credit accumulation	No discernible effects	-1	-2 to 0	1	1,318	Small

na = not applicable

Program Information

Background

There are many models of summer bridge programs, with content varying widely across the institutions that implement them and the student populations being served. Historically, summer bridge programs have targeted ethnic/racial minority, low-income, first-generation, or other student populations deemed at risk of dropping out of college. This intervention report, however, concentrates solely on *developmental summer bridge programs*—that is, programs with a core emphasis on providing developmental education for students who are identified as unprepared for college-level work in one or more classes. These *developmental summer bridge programs* explicitly target students whose scores on college placement tests indicate the need for remediation.

Developmental summer bridge programs offer the opportunity for students to complete required developmental coursework during the summer before the first year of college, so that they may enroll in college-level coursework in the fall of their first year of college. This is important given that student retention is negatively related to the amount of time students are required to spend in developmental education courses, for which they are typically required to pay tuition but do not earn credits toward their degree.⁶ *Developmental summer bridge programs* also aim to ease the transition to college by socializing students to institutional expectations of which they may be unaware or unequipped to master (e.g., study skills, time management skills, how to interact with faculty). These nonacademic college readiness components are designed to provide cultural and social capital to students and promote adjustment to college culture.

Program details

The *developmental summer bridge programs* that were implemented across the eight community colleges included in the one study reviewed in this intervention report were highly similar. They were all offered during summer 2009 and took place at two open-admissions 4-year institutions and six community colleges in Texas. The programs were delivered between 3–6 hours a day across the span of 4–5 weeks. All students received accelerated academic instruction designed to address deficiencies in math, reading, and/or writing. Students also received academic support services that typically involved tutoring, mentoring, and/or computer-based learning labs. Students also received training related to college preparation skills, which involved both academic (study and test-taking skills, time management, career assessment, financial aid) and social components (financial responsibility, motivation, behavioral expectations, stress management). Finally, students were given the opportunity to earn a stipend of up to \$400; typically, students received \$150 at the beginning of the program and \$250 after successful completion of the program.

Cost

Barnett, Bork, Mayer, Pretlow, Wathington, and Weiss (2012) report on implementation costs across the eight community colleges included in the one study reviewed in this intervention report. Implementation costs varied across the eight community colleges, ranging from a low of \$835 per student to a high of \$2,349 per student (expressed in 2009 dollars). The average cost across the eight colleges was \$1,319 per student (with a standard deviation of \$502). Approximately 32% of the implementation costs were attributed to staffing, and 27% were associated with stipend incentives offered to students (up to \$400 per student, with an average of \$354 per student). All of these costs were due solely to the supplemental nature of the program beyond practice as usual at the colleges. Barnett et al. (2012) also reported that there was no strong evidence of economies of scale related to the number of students enrolled, given that the student stipends were constant for each additional student served.

Barnett et al. (2012) also explored the cost effectiveness of the developmental bridge programs implemented in the study included in this intervention report, a discussion of which is beyond the scope of a WWC review.⁷

Research Summary

The WWC identified 22 studies that investigated the effects of *developmental summer bridge programs* on the enrollment and achievement of postsecondary students.

The WWC reviewed all 22 of those studies against group design standards. One study, reported in four different manuscripts (Barnett, Bork, Mayer, Pretlow, Wathington, & Weiss, 2012; Pretlow, 2011; Wathington, Barnette, Weissman, Teres, Pretlow, & Nakanishi, 2011; Wathington, Pretlow, & Mitchell, 2011) is a randomized controlled trial that meets WWC group design standards without reservations. That study is summarized in this report. Nine studies do not meet WWC group design standards. The remaining 12 studies do not meet WWC eligibility screens for review in this topic area. Citations for all 22 studies are included in the References section, which begins on p. 8.

Table 2. Scope of reviewed research

Grade	Postsecondary
Delivery method	Whole class
Program type	Practice

Summary of study meeting WWC group design standards without reservations

Barnett et al. (2012) conducted a randomized controlled trial with 1,322 students at eight colleges in Texas: El Paso Community College, Lone Star City College–CyFair, Lone Star College–Kingwood, Palo Alto College, San Antonio College, St. Philip’s College, South Texas College, and Texas A&M International University. The program group included 799 eligible students who were randomly assigned to participate in a *developmental summer bridge program* in the summer before their first semester of enrollment. Although the program content varied across the eight sites, all programs included accelerated instruction in math, reading, and/or writing; academic support (e.g., through tutoring, mentoring, and/or access to learning labs); college knowledge support and training; and the opportunity to earn a \$400 stipend. The comparison group included 533 students who were not invited to participate in the *developmental summer bridge programs* but who were free to pursue any other summer activities that the colleges provided. Follow-up data were collected on 1,318 students up to 2 years after randomization.

Summary of studies meeting WWC group design standards with reservations

No studies of *developmental summer bridge programs* met WWC group design standards with reservations.

Effectiveness Summary

The WWC review of *developmental summer bridge programs* for the Interventions for Developmental Students in Postsecondary Education topic area includes student outcomes in five domains: academic achievement, postsecondary enrollment, credit accumulation, degree attainment, and progress in developmental education. The one study of *developmental summer bridge programs* that meets WWC group design standards reported findings in three of the five domains: (a) academic achievement (b) postsecondary enrollment, and (c) credit accumulation. The findings below present the authors' estimates and WWC-calculated estimates of the size and statistical significance of the effects of *developmental summer bridge programs* on developmental students' outcomes in postsecondary education. For a more detailed description of the rating of effectiveness and extent of evidence criteria, see the WWC Rating Criteria on p. 22.

Summary of effectiveness for the academic achievement domain

One study that met WWC group design standards without reservations reported findings in the academic achievement domain.

Barnett et al. (2012) reported on whether students passed their first college-level math course, first college-level reading course, and first college-level writing course at the 2-year follow-up. The authors reported no statistically significant differences between the intervention and comparison groups in terms of the percentage of students who passed their first college-level math course (47% vs. 43%), first college-level reading course (73% vs. 72%), and first college-level writing course (72% vs. 68%). None of these differences were large enough to be considered substantively important. The WWC characterizes the mean effect across the three measures in this domain as an indeterminate effect.

The study authors also reported effects separately by gender and students' maternal educational attainment. The authors reported no statistically significant gender differences in program effects on the percentage of students who passed their first college-level math course (47% vs. 43% for women in the program and comparison groups; 46% vs. 43% for men in the program and comparison groups), first college-level reading course (73% for women in both groups; 73% vs. 70% for men in the program and comparison groups), and first college-level writing course (73% vs. 69% for women in the program and comparison groups; 71% vs. 68% for men in the program and comparison groups). The authors reported no statistically significant differences in program effects by maternal education in terms of the percentage of students who passed their first college-level math course (53% vs. 51% with maternal college attendance in the program and comparison groups; 43% vs. 37% for those with no maternal college attendance in the program and comparison groups), first college-level reading course (82% vs. 80% with maternal college attendance in the program and comparison groups; 68% for those with no maternal college attendance in both groups), and first college-level writing course (76% vs. 74% with maternal college attendance in the program and comparison groups; 69% vs. 65% for those with no maternal college attendance in the program and comparison groups). None of these differences were large enough to be considered substantively important.

Thus, for the academic achievement domain, the study that met WWC group design standards without reservations did not show either a statistically significant effect or an effect large enough to be considered substantively important. This results in a rating of no discernible effects, with a small extent of evidence.

Supplementary findings in the academic achievement domain, which were measured at interim follow-up periods, are reported in Appendix D.

Table 3. Rating of effectiveness and extent of evidence for the academic achievement domain

Rating of effectiveness	Criteria met
No discernible effects <i>None of the studies show statistically significant or substantively important effects, either positive or negative.</i>	In the one study that reported findings, the estimated impact of the intervention on outcomes in the <i>academic achievement</i> domain was neither statistically significant nor large enough to be substantively important.
Extent of evidence	Criteria met
Small	One study that included 1,318 students in eight colleges reported evidence of effectiveness in the <i>academic achievement</i> domain.

Summary of effectiveness for the postsecondary enrollment domain

One study that met WWC group design standards without reservations reported findings in the postsecondary enrollment domain.

Barnett et al. (2012) found no statistically significant differences in the percentage of intervention and comparison group students who were registered at any college at the first-semester follow-up (82% vs. 81%), and this effect was not large enough to be considered substantively important. The WWC characterizes this finding as an indeterminate effect.

Thus, for the postsecondary enrollment domain, the study that met WWC group design standards without reservations did not show either a statistically significant effect or an effect large enough to be considered substantively important. This results in a rating of no discernible effects, with a small extent of evidence.

Table 4. Rating of effectiveness and extent of evidence for the postsecondary enrollment domain

Rating of effectiveness	Criteria met
No discernible effects <i>None of the studies show statistically significant or substantively important effects, either positive or negative.</i>	In the one study that reported findings, the estimated impact of the intervention on outcomes in the <i>postsecondary enrollment</i> domain was neither statistically significant nor large enough to be substantively important.
Extent of evidence	Criteria met
Small	One study that included 1,318 students in eight colleges reported evidence of effectiveness in the <i>postsecondary enrollment</i> domain.

Summary of effectiveness for the credit accumulation domain

One study that met WWC group design standards without reservations reported findings in the credit accumulation domain.

Barnett et al. (2012) reported on the percentage of students registered at any college, the number of semesters registered at any college, and the number of college-level credits earned at the 2-year follow-up. The authors reported no statistically significant differences between the intervention and comparison groups on the percentage of students registered at any college (64% vs. 66%), the number of semesters registered (3.3 vs. 3.4), or the number of college-level credits earned (15.9 in both groups). None of these differences were large enough to be considered substantively important. The WWC characterizes the mean effect across the three measures in this domain as an indeterminate effect.

The study authors also reported effects separately by gender and students' maternal educational attainment. The authors reported no statistically significant gender differences in program effects on number of semesters registered (3.3 for women in both groups; 3.3 vs. 3.5 for men in the program and comparison groups). The authors reported no statistically significant gender differences in program effects on number of college-level credits earned (15.7 vs. 15.2 for women in the program and comparison groups; 16.6 vs. 16.7 for men in the program and comparison groups). The authors reported no statistically significant differences in program effects by maternal education in terms of number of semesters registered (3.6 for those with maternal college attendance in both groups; 3.2 vs. 3.4 for those with no maternal college attendance in the program and comparison groups), and number of college-level credits earned (18.3 vs. 19.2 with maternal college attendance in the program and comparison groups; 14.4 vs. 14.5 for those with no maternal college attendance in the program and comparison groups). None of these differences were large enough to be considered substantively important.

Thus, for the credit accumulation domain, the study that met WWC group design standards without reservations did not show either a statistically significant effect or an effect large enough to be considered substantively important. This results in a rating of no discernible effects, with a small extent of evidence.

Supplemental findings in the credit accumulation domain, which were measured at interim follow-up periods, are reported in Appendix D.

Table 5. Rating of effectiveness and extent of evidence for the credit accumulation domain

Rating of effectiveness	Criteria met
<p>No discernible effects <i>None of the studies show statistically significant or substantively important effects, either positive or negative.</i></p>	<p>In the one study that reported findings, the estimated impact of the intervention on outcomes in the <i>credit accumulation</i> domain was neither statistically significant nor large enough to be substantively important.</p>
Extent of evidence	Criteria met
<p>Small</p>	<p>One study that included 1,318 students in eight colleges reported evidence of effectiveness in the <i>credit accumulation</i> domain.</p>

References

Study that meets WWC group design standards without reservations

Barnett, E. A., Bork, R. H., Mayer, A. K., Pretlow, J., Wathington, H. D., & Weiss, M. J. (2012). *Bridging the gap: An impact study of eight developmental summer bridge programs in Texas*. New York: National Center for Postsecondary Research. <http://files.eric.ed.gov/fulltext/ED539188.pdf>.

Additional sources:

Pretlow, J., III. (2011). *The impact of a Texas summer bridge program on developmental students* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3484625)

Wathington, H., Pretlow, J., & Mitchell, C. (2011, March). *The impact of developmental summer bridge programs on students' success*. Paper presented at the Society for Research on Educational Effectiveness, Washington, DC. <http://files.eric.ed.gov/fulltext/ED517925.pdf>.

Wathington, H. D., Barnett, E. A., Weissman, E., Teres, J., Pretlow, J., & Nakanishi, A. (2011). *Getting ready for college: An implementation and early impacts study of eight Texas developmental summer bridge programs*. New York: National Center for Postsecondary Research. <http://files.eric.ed.gov/fulltext/ED533919.pdf>.

Studies that meet WWC group design standards with reservations

None.

Studies that do not meet WWC group design standards

Gutierrez, T. E. (2007). *The value of pre-freshman support systems: The impact of a summer bridge program at UNM* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3273438)
The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups prior to the intervention was necessary and not demonstrated.

Hall, E. R. (2008). *Minority student retention program: Student achievement and success program at Anne Arundel Community College* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3342828)
The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups prior to the intervention was necessary and not demonstrated.

Hamilton, J. M. (1994). *First academic year progress of summer 1993 high-risk students in the Fresh Start program as compared to similar students who entered Gainesville College during the fall of 1990*. Gainesville, GA: Gainesville College, Office of Planning and Institutional Research. The study does not meet WWC group design standards because the measures of effectiveness could not be attributed solely to the intervention.

Herndon, L. G. (2007). *Evaluation of the summer bridges minority scholarship program at a community college* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3292594)
The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups prior to the intervention was necessary and not demonstrated.

Homel, S. M. (2013). *Act 101 summer bridge program: An assessment of student success following one-year participation* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3564815)
The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups prior to the intervention was necessary and not demonstrated.

Klein, B., & Wright, L. M. (2009). Making prealgebra meaningful: It starts with faculty inquiry. *New Directions for Community Colleges*, 145, 67–77. The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups prior to the intervention was necessary and not demonstrated.

- Martinez, M. C. G. (2000). *The effect of the College Exploration Early Intervention summer program on performance and retention of Hispanic disadvantaged first-year students in higher education* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 9987240) The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups prior to the intervention was necessary and not demonstrated.
- McEvoy, S. (2012). *The study of an intervention summer bridge program learning community: Remediation, retention, and graduation* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3503243) The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups prior to the intervention was necessary and not demonstrated.
- Vinson, T. L. (2008). *The relationship that summer bridge and nonsummer bridge participation, demographics, and high school academic performance have on first-year college students: Effects of grade point average and retention* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3838048) The study does not meet WWC group design standards because equivalence of the analytic intervention and comparison groups prior to the intervention was necessary and not demonstrated.

Studies that are ineligible for review using the Interventions for Developmental Students in Postsecondary Education Evidence Review Protocol

- Allen, D. F., & Bir, B. (2011/2012). Academic confidence and summer bridge learning communities: Path analytic linkages to student persistence. *Journal of College Student Retention: Research, Theory & Practice*, 13(4), 519–548. The study is ineligible for review because the study did not use a sample aligned with the protocol.
- Appenzeller, E. A. (1998). *Transition to college: An assessment of the adjustment process for at-risk college students* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 9821495) The study is ineligible for review because the study did not use a sample aligned with the protocol.
- Castleman, B. L., Arnold, K., & Wartman, K. L. (2012). Stemming the tide of summer melt: An experimental study of the effects of post-high school summer intervention on low-income students' college enrollment. *Journal of Research on Educational Effectiveness*, 5(1), 1–17. The study is ineligible for review because the study did not use a sample aligned with the protocol.
- Haugen, D. E. (2012). *College transition programs for community college students* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3511972) The study is ineligible for review because the study did not use a sample aligned with the protocol.
- Kolb, M. M. (2005). *The relationship between state appropriations and student retention at public, four-year institutions of higher education* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3159880) The study is ineligible for review because the study did not use a sample aligned with the protocol.
- Maples, S. C. (2002). *Academic achievement and retention rate of students who did and did not participate in a university summer bridge program* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3060379) The study is ineligible for review because the study did not use a sample aligned with the protocol.
- McMinn, H. M. (2005). *Assessment of the college preparatory program: A prediction model and retention study* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3151305) The study is ineligible for review because the study did not use a sample aligned with the protocol.
- Outlaw, J. S. (2008). *Academic outcomes of academic success programs* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3319077) The study is ineligible for review because the study did not use a sample aligned with the protocol.

- Waller, T. O. (2009). *A mixed method approach for assessing the adjustment of incoming first-year engineering students in a summer bridge program* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. DP19548) The study is ineligible for review because the study did not use a sample aligned with the protocol.
- Walpole, M., Simmerman, H., Mack, C., Mills, J. T., Scales, M., & Albano, D. (2008). Bridge to success: Insight into summer bridge program students' college transition. *Journal of The First-Year Experience & Students in Transition*, 20(1), 11–30. The study is ineligible for review because the study did not use a sample aligned with the protocol.
- Wertheimer, J. C. (1999). *Summer transition entry program: A program for high-risk freshmen in higher education* (Master's thesis). Available from ProQuest Dissertations and Theses database. (UMI No. 1399072) The study is ineligible for review because the study did not use a sample aligned with the protocol.
- Wheatland, J. A., Jr. (2000). *The relationship between attendance at a summer bridge program and academic performance and retention status of first-time freshman science, engineering, and mathematics students at Morgan State University, an historically black university* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 9997415) The study is ineligible for review because the study did not use a sample aligned with the protocol.

Appendix A: Research details for Barnett et al. (2012)

Barnett, E. A., Bork, R. H., Mayer, A. K., Pretlow, J., Wathington, H. D., & Weiss, M. J. (2012). *Bridging the gap: An impact study of eight developmental summer bridge programs in Texas*. New York: National Center for Postsecondary Research. <http://files.eric.ed.gov/fulltext/ED539188.pdf>.

Table A. Summary of findings **Meets WWC group design standards without reservations**

Outcome domain	Sample size	Study findings	
		Average improvement index (percentile points)	Statistically significant
Academic achievement	1,318 students	+2	No
Postsecondary enrollment	1,318 students	+1	No
Credit accumulation	1,318 students	-1	No

Setting The study took place at eight colleges in Texas: El Paso Community College, Lone Star City College–CyFair, Lone Star College–Kingwood, Palo Alto College, San Antonio College, St. Philip’s College, South Texas College, and Texas A&M International University.

Study sample The *developmental summer bridge programs* targeted students whose scores on a college placement test indicated the need for remediation in at least one academic subject addressed in the college’s summer bridge program (math, reading, and/or writing). The study enrolled students who applied for admission into a *developmental summer bridge program* and consented to participate in the study. Randomization was conducted at the student level at each of the eight colleges. Across all sites, a total of 1,332 students were recruited, and 1,318 students were included in the final analytic sample. More than half of the students (n=799) were randomly assigned to the intervention group, and the rest (n=533) were randomly assigned to the comparison group. Demographically, more than half (62%) of the entire sample of study participants were female. The majority of participants (84%) were Hispanic, 9% were non-Hispanic White, and 7% were non-Hispanic African American. Most participants (85%) were 18 or younger at the start of the study. Further, 29% indicated receiving some form of public assistance, and 41% reported being the first in their family to attend college.⁸

Intervention group The *developmental summer bridge programs* were implemented in the summer before postsecondary enrollment and delivered daily over the course of 4–5 weeks. The daily sessions lasted 3–6 hours. Across all sites, the hours of instruction varied from 35 to 100 hours, with most institutions providing more than 52 hours of total instruction. Although the specific content of the *developmental summer bridge programs* varied across sites, all of them involved accelerated academic instruction in at least one area of academic need (math, reading, writing), academic support services, guidance about academic expectations and knowledge needed to navigate college, and the opportunity to receive a stipend of \$400 (with \$150 delivered at the beginning of the program and \$250 delivered on successful completion of the program). Four of the colleges implemented a course-based program that involved standard developmental college courses condensed to fit within the summer time frame, where students received developmental education credits upon successful completion of the program. The other four colleges used a freestanding program, which did not follow an established developmental college course structure, such that students were not required to enroll in developmental courses during the summer and therefore did not receive developmental education credits for participation in the summer bridge program.

Comparison group

Students assigned to the comparison group were allowed to pursue any other summer activities that the college provided, including enrollment in developmental or college-level summer courses. Of the students assigned to the comparison group, 32% reported that they expected to take summer classes (at any institution), and 16% did in fact enroll in summer courses at the institution to which they applied for admission to the summer bridge program. Therefore, the comparison group received standard services in the summer before enrollment.

Outcomes and measurement

Researchers reported outcomes at five points in time: the fall semester after the program (fall 2009), the spring semester after the program (spring 2010), the summer semester after the program (summer 2010), the second fall semester after the program (fall 2010), and the second spring semester after the program (spring 2011, 2 years after random assignment).

As specified in the Interventions for Developmental Students in Postsecondary Education review protocol, for outcomes measured at multiple follow-up periods, the longest follow-up period was selected as the primary outcome of interest, with findings from earlier time points included in supplemental tables (Appendix D). However, as specified in the protocol, the first measure of enrollment was selected as the primary outcome of interest in the postsecondary enrollment outcome domain. Measures of enrollment occurring after the first semester of college were categorized under the credit accumulation domain, and the longest follow-up period was selected as the primary outcome within that outcome domain. For a more detailed description of the outcome measures, see Appendix B.

Support for implementation

The Texas Higher Education Coordinating Board provided funding to the eight colleges to establish and implement the *developmental summer bridge programs*. The program evaluator, the National Center for Postsecondary Research, provided the funds to cover the cost of students' stipends. All eight programs were reported to be implemented with reasonable fidelity to the program model. Programs ranged in size from 52 to 165 students, who attended the program 3–6 hours a day, 4–5 days per week, for 4–5 weeks.

Appendix B: Outcome measures for each domain

Academic achievement	
<i>Passed college-level math</i>	Taken from Texas Higher Education Coordinating Board records, this outcome assesses whether students passed the first college-level (i.e., non-developmental) math course taken.
<i>Passed college-level reading</i>	Taken from Texas Higher Education Coordinating Board records, this outcome assesses whether students passed the first college-level (i.e., non-developmental) reading course taken.
<i>Passed college-level writing</i>	Taken from Texas Higher Education Coordinating Board records, this outcome assesses whether students passed the first college-level (i.e., non-developmental) writing/English course taken.
Postsecondary enrollment	
<i>First-semester registration at any college</i>	Taken from school administrative and Texas Higher Education Coordinating Board records, this outcome assesses whether students were registered at any college in Texas the first semester after the bridge program was offered.
Credit accumulation	
<i>Registered at any college</i>	Taken from school administrative and Texas Higher Education Coordinating Board records, this outcome assesses whether students were registered at any college in Texas subsequent to their first semester after the bridge program was offered.
<i>Semesters registered at any college</i>	Taken from school administrative and Texas Higher Education Coordinating Board records, this outcome assesses the number of semesters students were registered at any college in Texas.
<i>College-level credits earned</i>	Taken from school administrative records, this outcome assesses the total number of college-level (i.e., non-developmental) credits students earned.

Appendix C.1: Findings included in the rating for the academic achievement domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			p-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Barnett et al., 2012^a								
<i>Passed college-level math</i>	College students	1,318	47%	43%	4%	0.07	3	.19
<i>Passed college-level reading</i>	College students	1,318	73%	72%	1%	0.02	1	.68
<i>Passed college-level writing</i>	College students	1,318	72%	68%	4%	0.07	3	.18
Domain average for academic achievement (Barnett et al., 2012)						0.06	2	Not statistically significant

Table Notes: For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on individual outcomes, representing the average change expected for all individuals who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average individual's percentile rank that can be expected if the individual is given the intervention. The WWC-computed average effect size is a simple average rounded to two decimal places; the average improvement index is calculated from the average effect size. The statistical significance of the study's domain average was determined by the WWC.

^a For Barnett et al. (2012), no corrections for clustering or multiple comparisons and no difference-in-differences adjustments were needed. The p-values presented here were reported in the original study. Proportions presented for the outcomes are the posttest percentages for each group passing college-level courses (provided by the study authors). Effect sizes are computed as a Cox's index: logged-odds ratio transformation divided by 1.65. Please see the WWC Standards and Procedures Handbook (version 3.0) for the computation of effect sizes for binary outcomes. This study is characterized as having indeterminate effects because the reported effect size was neither statistically significant nor large enough to be substantively important. For more information, please refer to the WWC Standards and Procedures Handbook (version 3.0), p. 26.

Appendix C.2: Findings included in the rating for the postsecondary enrollment domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			p-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Barnett et al., 2012^a								
<i>First-semester registration at any college</i>	College students	1,318	82%	81%	1%	0.02	1	.67
Domain average for postsecondary enrollment (Barnett et al., 2012)						0.02	1	na

Table Notes: For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on individual outcomes, representing the average change expected for all individuals who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average individual's percentile rank that can be expected if the individual is given the intervention. na = not applicable.

^a For Barnett et al. (2012), no corrections for clustering or multiple comparisons and no difference-in-differences adjustments were needed. The p-value presented here was reported in the original study. Proportions presented for *first-semester registration* are the posttest percentages for each group (provided by the study authors). Effect size is computed as a Cox's index: logged-odds ratio transformation divided by 1.65. Please see the WWC Standards and Procedures Handbook (version 3.0) for the computation of effect sizes for binary outcomes. This study is characterized as having indeterminate effects because the reported effect size was neither statistically significant nor large enough to be substantively important. For more information, please refer to the WWC Standards and Procedures Handbook (version 3.0), p. 26.

Appendix C.3: Findings included in the rating for the credit accumulation domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			p-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Barnett et al., 2012^a								
<i>Registered at any college</i>	College students	1,318	64%	66%	-2%	-0.04	-2	.49
<i>Semesters registered at any college</i>	College students	1,318	3.3 (nr)	3.4 (nr)	-0.10	-0.06	-2	.37
<i>College-level credits earned</i>	College students	1,318	15.9 (nr)	15.9 (nr)	0	0	0	.97
Domain average for credit accumulation (Barnett et al., 2012)						-0.03	-1	Not statistically significant

Table Notes: For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on individual outcomes, representing the average change expected for all individuals who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average individual's percentile rank that can be expected if the individual is given the intervention. The WWC-computed average effect size is a simple average rounded to two decimal places; the average improvement index is calculated from the average effect size. The statistical significance of the study's domain average was determined by the WWC. nr = not reported.

^a For Barnett et al. (2012), no corrections for clustering or multiple comparisons and no difference-in-differences adjustments were needed. The p-values presented here were reported in the original study. Proportions presented for *registered at any college* are the posttest percentages for each group (provided by the study authors). Effect size for *registered at any college* is computed as a Cox's index: logged-odds ratio transformation divided by 1.65. Please see the WWC Standards and Procedures Handbook (version 3.0) for the computation of effect sizes for binary outcomes. This study is characterized as having indeterminate effects because the reported effect size was neither statistically significant nor large enough to be substantively important. For more information, please refer to the WWC Standards and Procedures Handbook (version 3.0), p. 26.

Appendix D.1: Description of supplemental findings for the academic achievement domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			p-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Barnett et al., 2012^a								
<i>Passed college-level math</i>	Women	810	47%	43%	4%	0.08	3	.28
<i>Passed college-level math</i>	Men	489	46%	43%	3%	0.07	3	.46
<i>Passed college-level reading</i>	Women	810	73%	73%	0%	-0.01	0	.86
<i>Passed college-level reading</i>	Men	489	73%	70%	3%	0.07	3	.43
<i>Passed college-level writing</i>	Women	810	73%	69%	3%	0.07	3	.32
<i>Passed college-level writing</i>	Men	489	71%	68%	3%	0.08	3	.41
<i>Passed college-level math</i>	Mother with some college	426	53%	51%	2%	0.04	2	.67
<i>Passed college-level math</i>	Mother with no college	755	43%	37%	6%	0.13	5	.09
<i>Passed college-level reading</i>	Mother with some college	426	82%	80%	2%	0.06	2	.57
<i>Passed college-level reading</i>	Mother with no college	755	68%	68%	0%	-0.02	-1	.83
<i>Passed college-level writing</i>	Mother with some college	426	76%	74%	3%	0.06	2	.52
<i>Passed college-level writing</i>	Mother with no college	755	69%	65%	4%	0.08	3	.28
<i>Passed college-level math</i>	First semester follow-up	1,318	11%	5%	6%	0.22	9	.00
<i>Passed college-level reading</i>	First semester follow-up	1,318	32%	29%	3%	0.08	3	.17
<i>Passed college-level writing</i>	First semester follow-up	1,318	33%	29%	4%	0.09	4	.10
<i>Passed college-level math</i>	Second semester follow-up	1,318	32%	23%	9%	0.22	9	.00
<i>Passed college-level reading</i>	Second semester follow-up	1,318	63%	58%	5%	0.11	4	.06
<i>Passed college-level writing</i>	Second semester follow-up	1,318	63%	58%	5%	0.11	4	.06
<i>Passed college-level math</i>	1-year follow-up	1,318	36%	28%	8%	0.17	7	.00
<i>Passed college-level reading</i>	1-year follow-up	1,318	65%	61%	4%	0.08	3	.14
<i>Passed college-level writing</i>	1-year follow-up	1,318	65%	60%	5%	0.11	5	.04

<i>Passed college-level math</i>	Third semester follow-up	1,318	43%	37%	6%	0.12	5	.03
<i>Passed college-level reading</i>	Third semester follow-up	1,318	70%	67%	3%	0.08	3	.14
<i>Passed college-level writing</i>	Third semester follow-up	1,318	69%	65%	6%	0.10	4	.08

Table Notes: The supplemental findings presented in this table are additional findings from studies in this report that do not factor into the determination of the intervention rating. For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on individual outcomes, representing the average change expected for all individuals who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average individual's percentile rank that can be expected if the individual is given the intervention.

^a For Barnett et al. (2012), no corrections for clustering or multiple comparisons and no difference-in-differences adjustments were needed. The *p*-values presented here were reported in the original study. Proportions presented for the outcomes are the posttest percentages for each group passing college-level courses (provided by the study authors). Effect sizes are computed as a Cox's index: logged-odds ratio transformation divided by 1.65. Please see the WWC Standards and Procedures Handbook (version 3.0) for the computation of effect sizes for binary outcomes. This study is characterized as having indeterminate effects because the reported effect size was neither statistically significant nor large enough to be substantively important. For more information, please refer to the WWC Standards and Procedures Handbook (version 3.0), p. 26.

Appendix D.2: Description of supplemental findings for the credit accumulation domain

Outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			p-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Barnett et al., 2012^a								
<i>Semesters registered at any college</i>	Women	810	3.3 (nr)	3.3 (nr)	0	0	0	.96
<i>Semesters registered at any college</i>	Men	489	3.3 (nr)	3.5 (nr)	-0.20	-0.18	-7	.18
<i>College-level credits earned</i>	Women	810	15.7 (nr)	15.2 (nr)	0.50	0.03	1	.67
<i>College-level credits earned</i>	Men	489	16.6 (nr)	16.7 (nr)	-0.10	-0.01	0	.92
<i>Semesters registered at any college</i>	Mother with some college	426	3.6 (nr)	3.6 (nr)	0	0	0	.93
<i>Semesters registered at any college</i>	Mother with no college	755	3.2 (nr)	3.4 (nr)	-0.20	-0.15	-6	.11
<i>College-level credits earned</i>	Mother with some college	426	18.3 (nr)	19.2 (nr)	-0.90	-0.06	-2	.55
<i>College-level credits earned</i>	Mother with no college	755	14.4 (nr)	14.5 (nr)	-0.10	-0.01	0	.98
<i>Semesters registered at any college</i>	First semester follow-up	1,318	0.8 (nr)	0.8 (nr)	0	0	0	.67
<i>College-level credits earned</i>	First semester follow-up	1,318	4.0 (nr)	4.0 (nr)	0	0	0	.74
<i>Registered at any college</i>	Second semester follow-up	1,318	79%	80%	-1%	-0.01	0	.86
<i>Semesters registered at any college</i>	Second semester follow-up	1,318	1.6 (nr)	1.6 (nr)	0	0	0	.89
<i>College-level credits earned</i>	Second semester follow-up	1,318	8.0 (nr)	7.8 (nr)	0.20	0.02	1	.66
<i>Registered at any college</i>	1 year follow-up	1,318	40%	46%	-6%	-0.12	-5	.03
<i>Semesters registered at any college</i>	1 year follow-up	1,318	2.0 (nr)	2.1 (nr)	-0.10	-0.06	-2	.33
<i>College-level credits earned</i>	1 year follow-up	1,318	9.0 (nr)	9.2 (nr)	-0.20	-0.02	-1	.81

<i>Registered at any college</i>	Third semester follow-up	1,318	67%	68%	-1%	-0.02	-1	.74
<i>Semesters registered at any college</i>	Third semester follow-up	1,318	2.7 (nr)	2.7 (nr)	0	0	0	.39
<i>College-level credits earned</i>	Third semester follow-up	1,318	12.7 (nr)	12.5 (nr)	0.20	0.02	1	.81

Table Notes: The supplemental findings presented in this table are additional findings from studies in this report that do not factor into the determination of the intervention rating. For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on individual outcomes, representing the average change expected for all individuals who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average individual's percentile rank that can be expected if the individual is given the intervention. nr = not reported.

a For Barnett et al. (2012), no corrections for clustering or multiple comparisons and no difference-in-differences adjustments were needed. The *p*-values presented here were reported in the original study. Proportions presented for *registered at any college* are the posttest percentages for each group (provided by the study authors). Effect sizes for *registered at any college* are computed as a Cox's index: logged-odds ratio transformation divided by 1.65. Please see the WWC Standards and Procedures Handbook (version 3.0) for the computation of effect sizes for binary outcomes. This study is characterized as having indeterminate effects because the reported effect size was neither statistically significant nor large enough to be substantively important. For more information, please refer to the WWC Standards and Procedures Handbook (version 3.0), p. 26.

Endnotes

¹ The descriptive information for this program was obtained from Barnett et al. (2012), Kezar (2000), Sablan (2014), and Wathington et al. (2011). The WWC requests that distributors review the program description sections for accuracy from their perspective. Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review.

² Kezar, A. (2000). *Summer bridge programs: Supporting all students*. ERIC Digest. Washington, DC: ERIC Clearinghouse on Higher Education. <http://files.eric.ed.gov/fulltext/ED442421.pdf>; Sablan, J. R. (2014). The challenge of summer bridge programs. *American Behavioral Scientist*, 58, 1035–1050.

³ Conley, D. T. (2008). Rethinking college readiness. *New Directions for Higher Education*, 144, 3–13; Deil-Amen, R., & Rosenbaum, J. E. (2003). The social prerequisites of success: Can college structure reduce the need for social know-how? *The Annals of the American Academy of Political and Social Science*, 586, 120–143; Venezia, A., & Hughes, K. L. (2013). Acceleration Strategies in the new developmental education landscape. *New Directions for Community Colleges*, 164, 37–45.

⁴ The literature search reflects documents publicly available by May 2014. The studies in this report were reviewed using the Standards from the WWC Procedures and Standards Handbook (version 3.0), along with those described in the Interventions for Developmental Students in Postsecondary Education review protocol (version 3.0). The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.

⁵ The one study that met group design standards and is summarized in this intervention report did not report outcomes in the degree attainment domain, which is covered in the Interventions for Developmental Students in Postsecondary Education topic area protocol. The study did report results in the progress in developmental education domain (measured as number of developmental credits earned); however, outcomes in this domain were not included in the intervention report because the direction of expected effects would vary across the eight intervention sites depending on whether students earned developmental credits during the intervention period.

⁶ Attewell, P., Lavin, D., Domina, T., & Levey, T. (2006). New evidence on college remediation. *Journal of Higher Education*, 77, 886–924.

⁷ Interested readers are referred to Barnett et al. (2012), pp. 40–42.

⁸ Pretlow (2011).

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WWC Rating Criteria

Criteria used to determine the rating of a study

Study rating	Criteria
Meets WWC group design standards without reservations	A study that provides strong evidence for an intervention's effectiveness, such as a well-implemented RCT.
Meets WWC group design standards with reservations	A study that provides weaker evidence for an intervention's effectiveness, such as a QED or an RCT with high attrition that has established equivalence of the analytic samples.

Criteria used to determine the rating of effectiveness for an intervention

Rating of effectiveness	Criteria
Positive effects	Two or more studies show statistically significant positive effects, at least one of which met WWC evidence standards for a strong design, AND No studies show statistically significant or substantively important negative effects.
Potentially positive effects	At least one study shows a statistically significant or substantively important positive effect, AND No studies show a statistically significant or substantively important negative effect AND fewer or the same number of studies show indeterminate effects than show statistically significant or substantively important positive effects.
Mixed effects	At least one study shows a statistically significant or substantively important positive effect AND at least one study shows a statistically significant or substantively important negative effect, but no more such studies than the number showing a statistically significant or substantively important positive effect, OR At least one study shows a statistically significant or substantively important effect AND more studies show an indeterminate effect than show a statistically significant or substantively important effect.
Potentially negative effects	One study shows a statistically significant or substantively important negative effect and no studies show a statistically significant or substantively important positive effect, OR Two or more studies show statistically significant or substantively important negative effects, at least one study shows a statistically significant or substantively important positive effect, and more studies show statistically significant or substantively important negative effects than show statistically significant or substantively important positive effects.
Negative effects	Two or more studies show statistically significant negative effects, at least one of which met WWC evidence standards for a strong design, AND No studies show statistically significant or substantively important positive effects.
No discernible effects	None of the studies shows a statistically significant or substantively important effect, either positive or negative.

Criteria used to determine the extent of evidence for an intervention

Extent of evidence	Criteria
Medium to large	The domain includes more than one study, AND The domain includes more than one school, AND The domain findings are based on a total sample size of at least 350 students, OR, assuming 25 students in a class, a total of at least 14 classrooms across studies.
Small	The domain includes only one study, OR The domain includes only one school, OR The domain findings are based on a total sample size of fewer than 350 students, AND, assuming 25 students in a class, a total of fewer than 14 classrooms across studies.

Glossary of Terms

Attrition	Attrition occurs when an outcome variable is not available for all participants initially assigned to the intervention and comparison groups. The WWC considers the total attrition rate and the difference in attrition rates across groups within a study.
Clustering adjustment	If intervention assignment is made at a cluster level and the analysis is conducted at the student level, the WWC will adjust the statistical significance to account for this mismatch, if necessary.
Confounding factor	A confounding factor is a component of a study that is completely aligned with one of the study conditions, making it impossible to separate how much of the observed effect was due to the intervention and how much was due to the factor.
Design	The design of a study is the method by which intervention and comparison groups were assigned.
Domain	A domain is a group of closely related outcomes.
Effect size	The effect size is a measure of the magnitude of an effect. The WWC uses a standardized measure to facilitate comparisons across studies and outcomes.
Eligibility	A study is eligible for review and inclusion in this report if it falls within the scope of the review protocol and uses either an experimental or matched comparison group design.
Equivalence	A demonstration that the analysis sample groups are similar on observed characteristics defined in the review area protocol.
Extent of evidence	An indication of how much evidence supports the findings. The criteria for the extent of evidence levels are given in the WWC Rating Criteria on p. 21
Improvement index	Along a percentile distribution of individuals, the improvement index represents the gain or loss of the average individual due to the intervention. As the average individual starts at the 50th percentile, the measure ranges from -50 to +50.
Multiple comparison adjustment	When a study includes multiple outcomes or comparison groups, the WWC will adjust the statistical significance to account for the multiple comparisons, if necessary.
Quasi-experimental design (QED)	A quasi-experimental design (QED) is a research design in which study participants are assigned to intervention and comparison groups through a process that is not random.
Randomized controlled trial (RCT)	A randomized controlled trial (RCT) is an experiment in which eligible study participants are randomly assigned to intervention and comparison groups.
Rating of effectiveness	The WWC rates the effects of an intervention in each domain based on the quality of the research design and the magnitude, statistical significance, and consistency in findings. The criteria for the ratings of effectiveness are given in the WWC Rating Criteria on p. 21
Single-case design	A research approach in which an outcome variable is measured repeatedly within and across different conditions that are defined by the presence or absence of an intervention.
Standard deviation	The standard deviation of a measure shows how much variation exists across observations in the sample. A low standard deviation indicates that the observations in the sample tend to be very close to the mean; a high standard deviation indicates that the observations in the sample tend to be spread out over a large range of values.
Statistical significance	Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups. The WWC labels a finding statistically significant if the likelihood that the difference is due to chance is less than 5% ($p < .05$).
Substantively important	A substantively important finding is one that has an effect size of 0.25 or greater, regardless of statistical significance.

Please see the [WWC Procedures and Standards Handbook \(version 3.0\)](#) for additional details.