

The Community College Reform Movement Has Failed Students: A Critical Review of the Literature

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Anonymous Evaluations: What People Are Saying About This Presentation

“Statistically significant?? More like sadistically significant!”



“Good but too wordy”



“We didn’t understand it, but we know it was the best presentation at the conference. Five stars! Love, Mom & Dad.”



The Original Goal of Reforms: To Increase Graduation Rates

Obama's 2009 Completion Agenda:
Experts originally promised that because
remediation was a barrier, reforming it would
increase graduation rates

2010 American Graduation Initiative Promise: Increase Public 2-Year Graduation Rates

Dr. Thomas R. Bailey, former head of the Community College Research Center (CCRC) at Columbia University, at the White House Summit on Community Colleges (Bailey & Cho, 2010)¹:

“The picture of past and current developmental education appears bleak. If students cannot get established in college with college-level courses, then they will certainly not be able to graduate. ... Finding better ways to address the needs of underprepared students is a necessity for meeting the Obama administration’s goal of increasing the number of community college graduates by 5 million by 2020” (p. 7).

The Three Most Common Reforms

- Multiple measures assessment
- Corequisites and other accelerated models
- Mathematics pathways

CCRC Litschwartz et al. (2023)₂

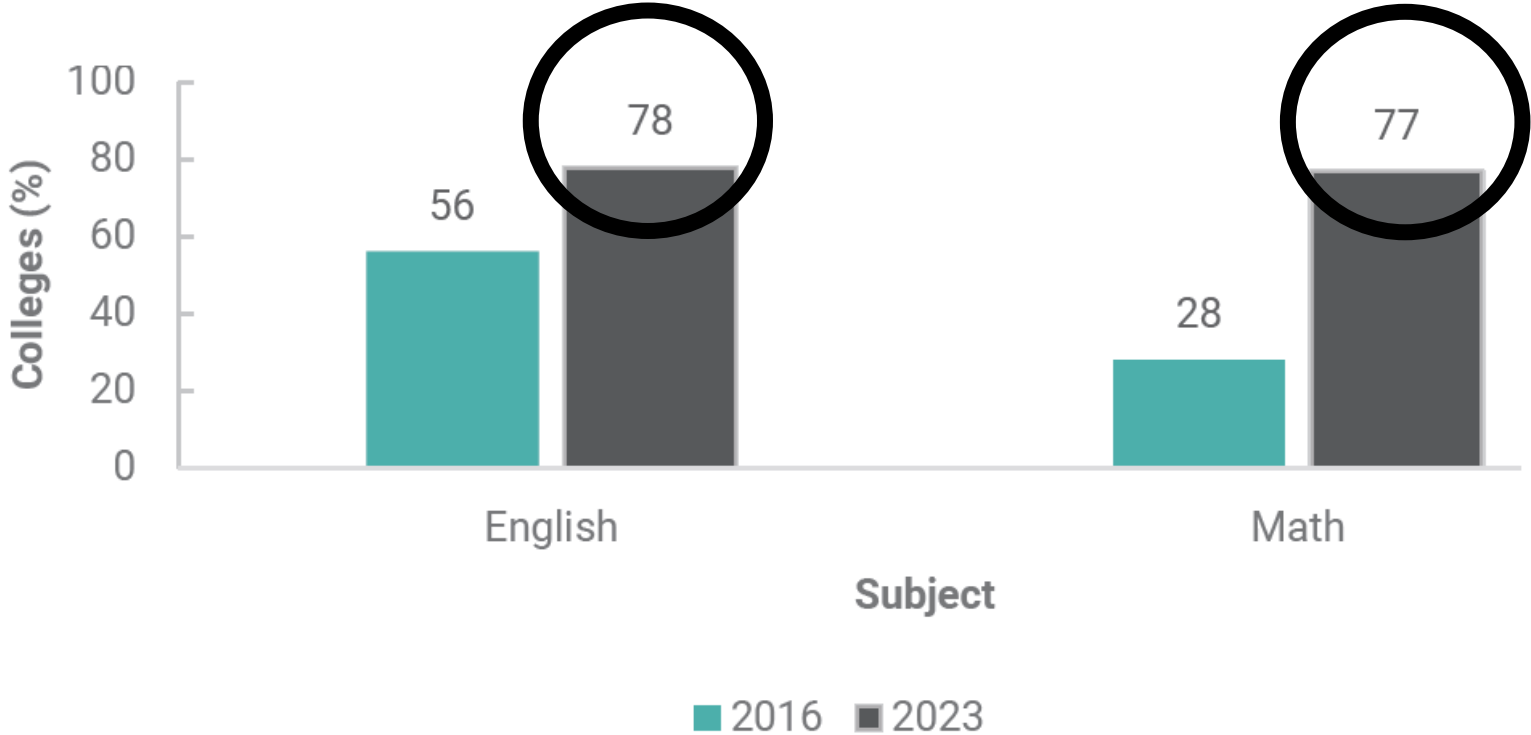
TABLE 1. Developmental Course Policies at U.S. Community Colleges, 2023

Measure	English (%)	Math (%)
Placement system uses indicators of high school performance	73	73
Only prerequisite developmental courses offered	18	21
Only corequisite developmental courses offered	14	12
Both prerequisite and corequisite developmental courses offered	64	65
Neither prerequisite nor corequisite developmental courses offered	4	2
Sample size = 99		

SOURCE: Data from 2023 and 2016 nationally representative surveys of two-year public colleges.

CCRC Litschwartz et al. (2023)₂

FIGURE 3. Two-Year Public Colleges Offering Corequisite Developmental Courses 2016 to 2023



SOURCE: Data from 2023 and 2016 nationally representative surveys of two-year public colleges. Data were collected and updated from February 2023 through October 2023

CAPR Dev
Ed Reforms
(Bickerstaff
et al.,
2022)₃

Report | October 2022

Five Principles for Reforming Developmental Education

A Review of the Evidence

*Susan Bickerstaff, Katie Beal, Julia Raufman, Erika B. Lewy,
and Austin Slaughter*



CAPR |
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POSTSECONDARY READINESS

CAPR Dev Ed Reforms (Bickerstaff et al., 2022)³

TABLE 1. Rigorous Studies of Developmental Education Interventions With Positive Impacts on Student Success

Name of Intervention (Related Principles)	Study: Description of Study	Impacts on Student Success
AMP-UP: Accelerated Mathematics Sequence (1)	Douglas, McKay, & Edwards (2020): RCT at one New Jersey community college (Bergen) of a 7.5-week, intensive developmental math course followed by a 7.5-week, intensive college-level math course.	The accelerated course sequence increased completion of a college-level math course by 33 percentage points, college credit accumulation by 6.2 credits, and graduation rate by 9 percentage points.
Corequisite Remediation (1, 2)	Douglas, Edwards, & McKay (2020): RCT at one New Jersey community college (Union County). Students enroll in college-level math and participate in required weekly tutoring.	Corequisite math increased completion of a college-level math course by 11.4 percentage points. There was no impact on degree attainment after three years.
	Logue et al. (2019): RCT at three New York City community colleges of corequisite math. Students enroll in college-level statistics and receive weekly supplemental instruction.	Corequisite statistics increased completion of a college-level math course by 19.2 percentage points, credit accumulation by 4.4 credits, and graduation rate by 8.1 percentage points.
	Miller et al. (2022): RCT at five Texas community colleges of corequisite English.	Corequisite English increased completion of a college-level English course by 18.4 percentage points and credit accumulation by 1.5 credits. There was no impact on persistence.
CUNY Accelerated Developmental Writing Courses (1, 3)	Hodara & Jaggars (2014): Quasi-experimental study at three New York City community colleges of an accelerated developmental writing course that emphasizes group discussion.	The accelerated course increased completion of a college-level English course by 6.1 percentage points, credit accumulation by 2.1 credits, and graduation rate by 2.2 percentage points.
CUNY ASAP (2, 5)	Scrivener et al. (2015): RCT at three New York City community colleges of a three-year program that provides advising, tutoring, and financial support.	CUNY ASAP increased credit accumulation by 8.7 credits and graduation rate by 18.7 percentage points.
CUNY Start (2, 3, 4)	Weiss et al. (2021): RCT at four New York City community colleges of a pre-matriculation program that emphasizes student-centered teaching and provides support services.	CUNY Start increased completion of college-level math and English by 4 to 5 percentage points, college-level credit accumulation by 1.4 credits, and graduation rate by 3.1 percentage points.
Dana Center Mathematics Pathways (DCMP) (1, 3)	Biedzio & Sepanik (2022): RCT at four Texas community colleges of accelerated developmental math pathways in statistics and quantitative reasoning. DCMP emphasizes student-centered, contextualized instruction.	DCMP increased completion of a college-level math course by 6 percentage points. There was no impact on credits earned or degree attainment.
	Schudde & Keisler (2019): Quasi-experimental study of accelerated developmental math pathways in 20 Texas community colleges.	DCMP increased completion of a college-level math course by 36 percentage points and credit accumulation by 5.9 credits. There was no impact on degree attainment.
	Schudde & Meiselman (2019): Quasi-experimental study of accelerated developmental math pathways in 27 Texas community colleges.	DCMP increased completion of a college-level math course by 6 percentage points and college-level credit accumulation by 1.1 credits. There was no impact on degree attainment.
I-BEST (2, 3)	Martinson et al. (2021): RCT at three Washington State community colleges. I-BEST offers concurrent, contextualized instruction in workforce training and basic skills.	I-BEST increased total credits earned by 10.9 percentage points and receipt of any credential by 31 percentage points.
Multiple Measures Assessment* (1)	Barnett et al. (2020): RCT at seven New York community colleges of multiple measures assessment (MMA) systems.	MMA increased completion of a college-level course by 8 to 10 percentage points and credits earned by 3.9 credits.
	Cullinan & Biedzio (2021): RCT at five Midwestern community colleges of MMA systems.	MMA increased completion of a college-level course by 11 to 16 percentage points and college-level credits accumulation by 1.3 to 1.5 credits.

NOTE: Length of study follow-up period varies. See Appendix Table A1 for additional detail.

* Impacts reported are for students in the "bump-up zone," who were placed into college-level courses using multiple measures assessment but would have been placed into developmental courses using their placement test score alone.

**In this presentation,
I provide a critical review of the most
rigorous and recent literature on MMA,
corequisites and other accelerated
models, and pathways**

Multiple Measures Assessment (MMA)

Multiple Measures
(Kopko et al., 2023)⁴

Figure 4.4

Change in Placement Among Program Group Students

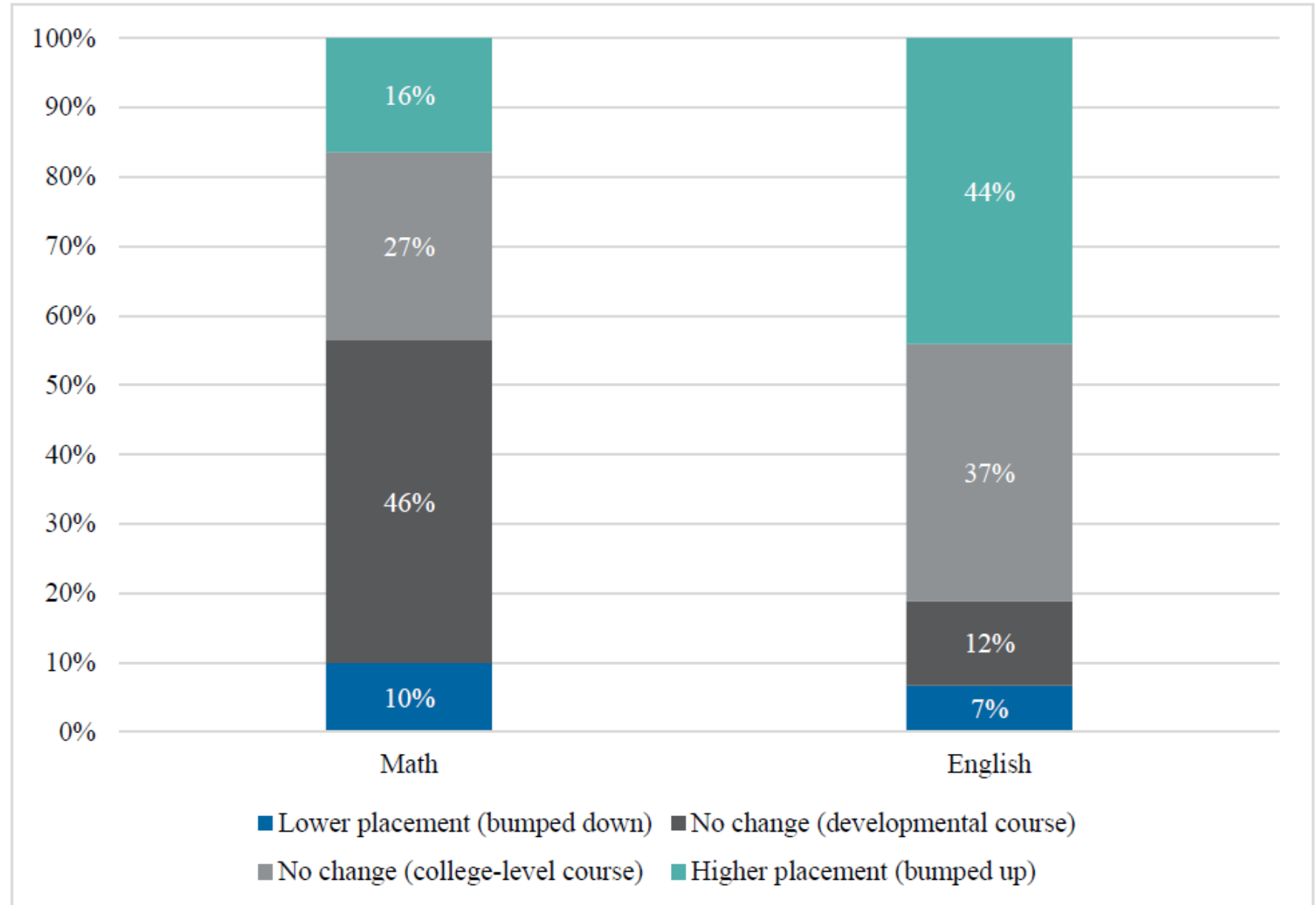
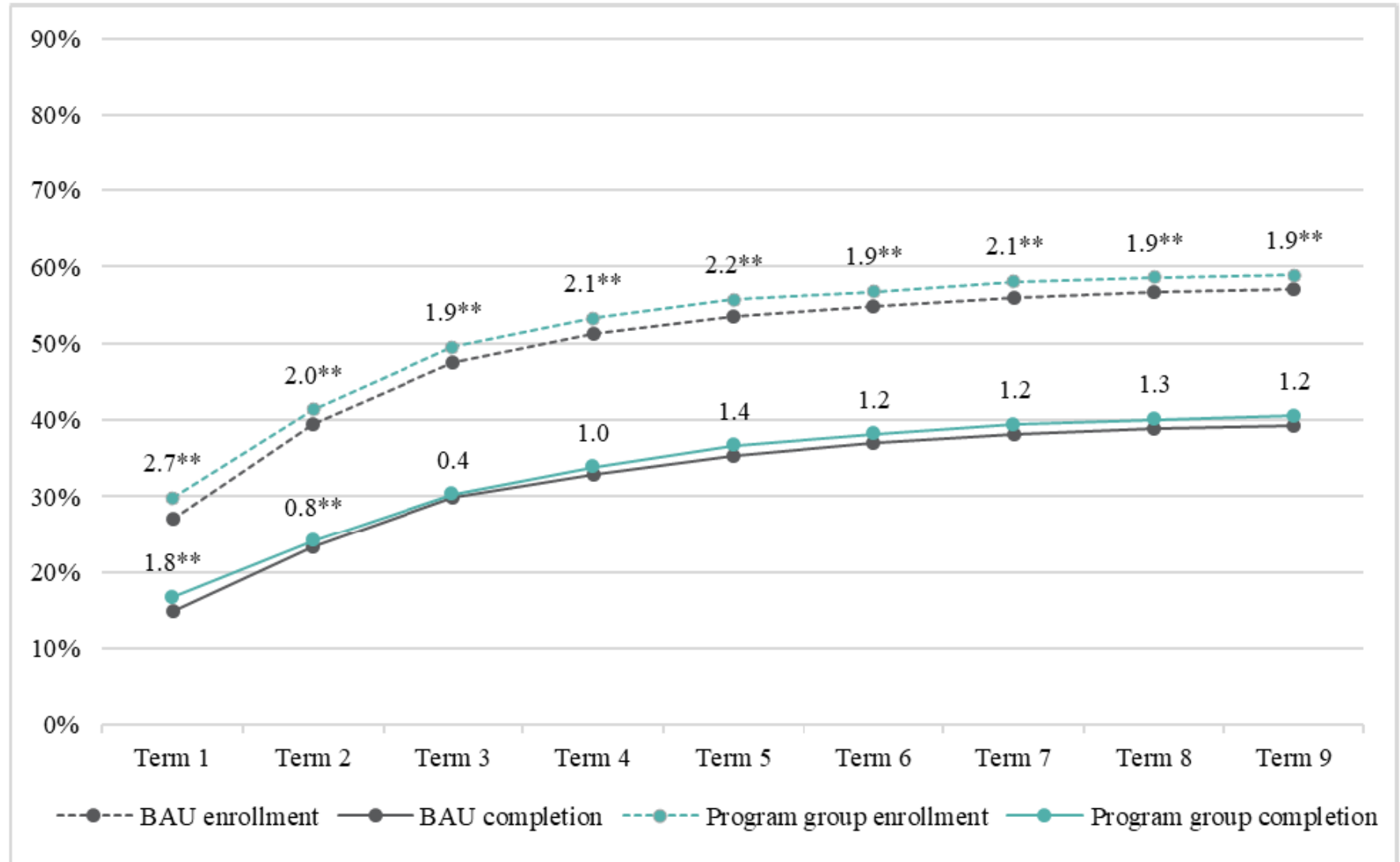


Figure 4.1

College-Level Math Course Outcomes (Among Students in Math Subsample)



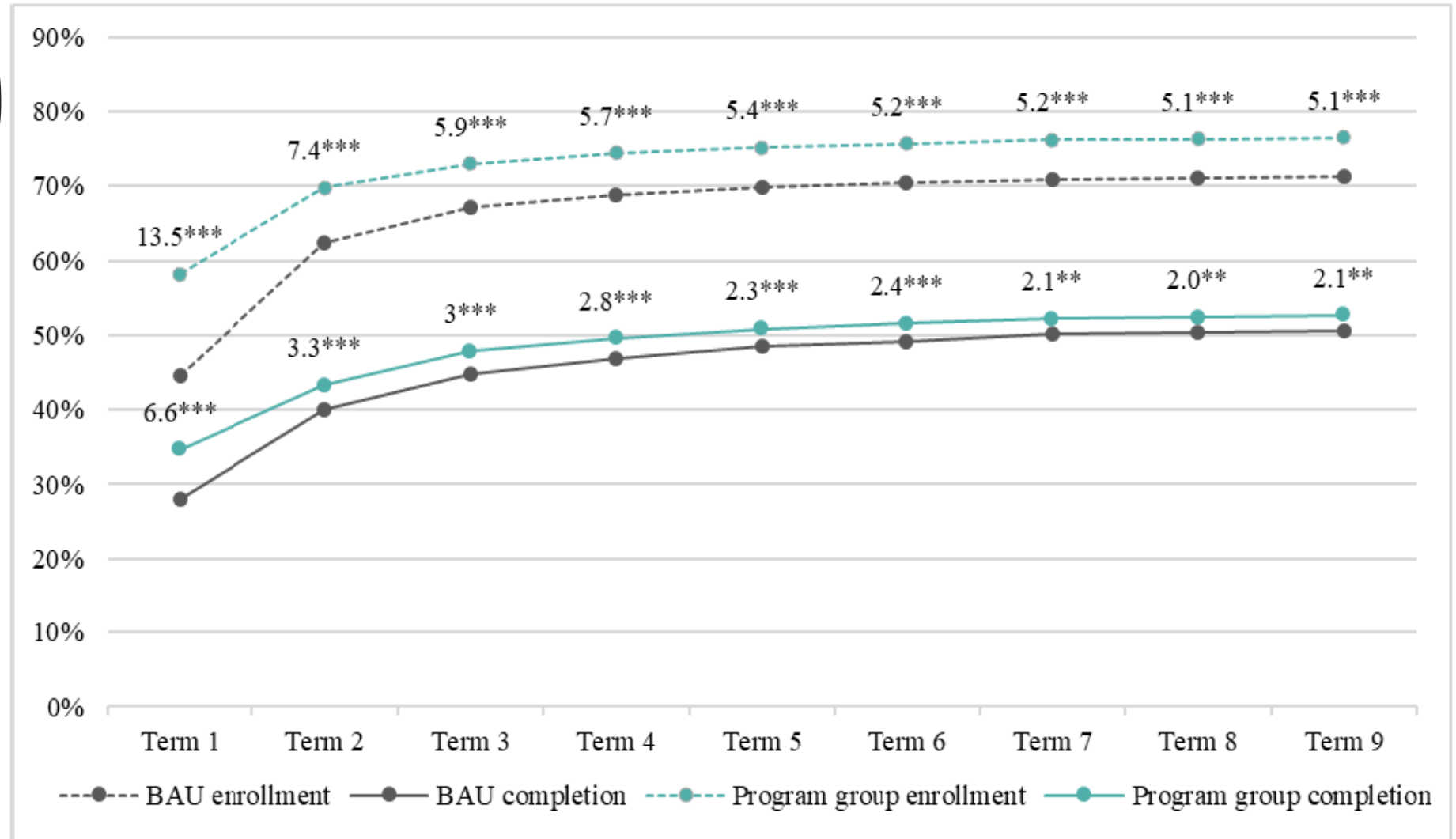
NOTE: Data labels represent impact estimates, or the percentage-point difference between the mean outcomes for business-as-usual and program group students.

*** $p < .01$, ** $p < .05$, * $p < .10$.

Multiple Measures (Kopko et al., 2023)⁴

Figure 4.2

College-Level English Course Outcomes (Among Students in English Subsample)



NOTE: Data labels represent impact estimates, or the percentage-point difference between the mean outcomes for business-as-usual and program group students.

*** $p < .01$, ** $p < .05$, * $p < .10$.

Multiple Measures (Kopko et al., 2023)⁴

Multiple
Measures
(Kopko et
al., 2023)⁴

“MMA did not have a statistically significant impact on non-subject-specific outcomes including persistence and credential attainment or transfer overall” (pp. 17–18).

“We also do not find any evidence that MMA affected credential-specific outcomes, including certificate attainment, associate degree attainment, and bachelor’s degree attainment, among the whole sample. That said, as shown in Figure 4.3, program group students attempted more college-level credits than their business-as-usual peers, and by term 9, program group students attempted approximately one more college-level credit. We do not observe a statistically significant difference between study groups in the number of college-level credits earned” (p. 18).

Corequisites and Other Accelerated Models

Corequisites
(Douglas et
al., 2022)⁷

One of the most cited studies on corequisites is Logue et al. (2016, 2019)^{5,6}. The 7-year follow-up came out in 2022 (Douglas et al., 2022)⁷. The abstract misleads readers into thinking the 7-year results showed large effects on graduation:

“The current study examined the 7-year results of a randomized controlled trial of corequisite remediation with college-level statistics. *Students assigned to the corequisite group were 50 percent more likely to complete associate’s degrees within 3 years, and 100 percent more likely to complete bachelor’s degrees within 5 years [emphasis added].* Corequisite students also earned, on average, \$3,000–\$4,500 more in years 5 to 7” (abstract).

Corequisites
(Douglas et al., 2022)⁷

**Remedial:
41%**

**Coreq Grad Rate
After 7yrs: 44%**

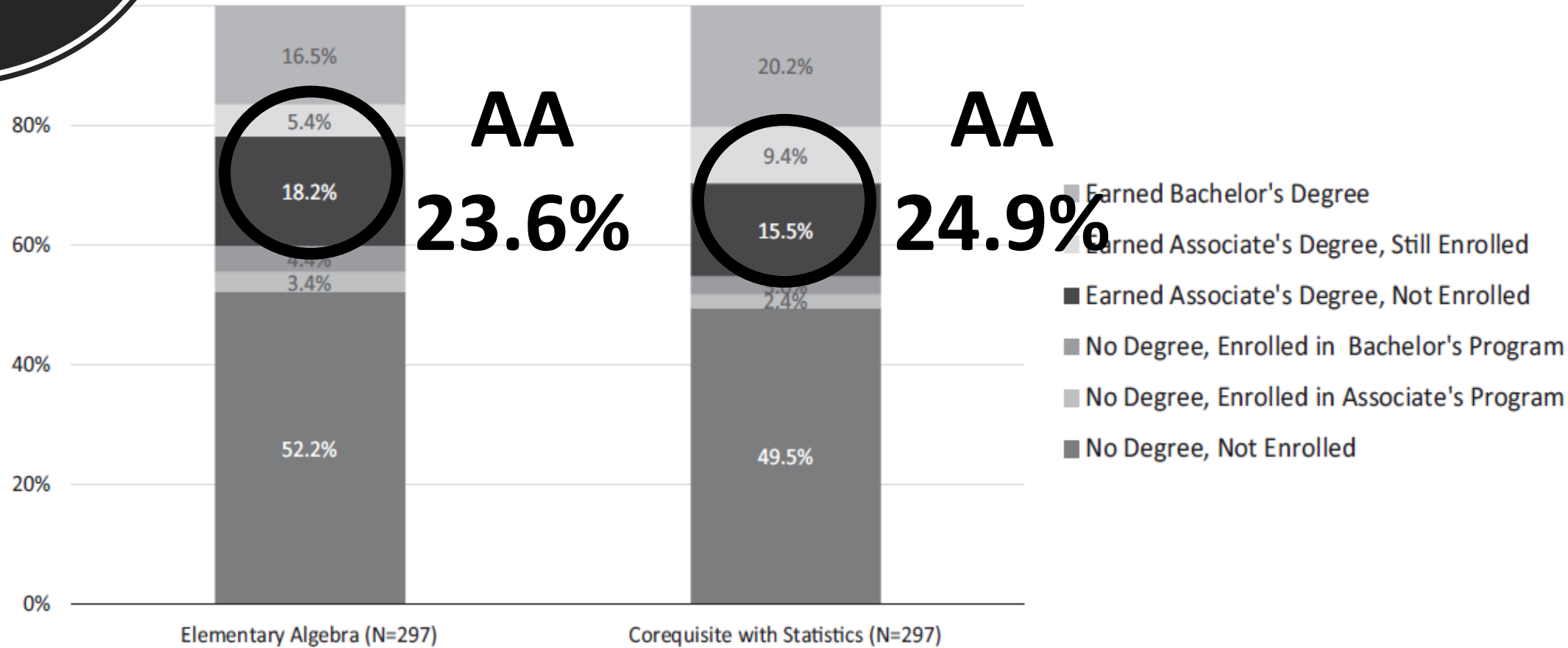


FIGURE 1. *Student disposition in fall 2020 by treatment status.*

Corequisites (Douglas et al., 2022)⁷

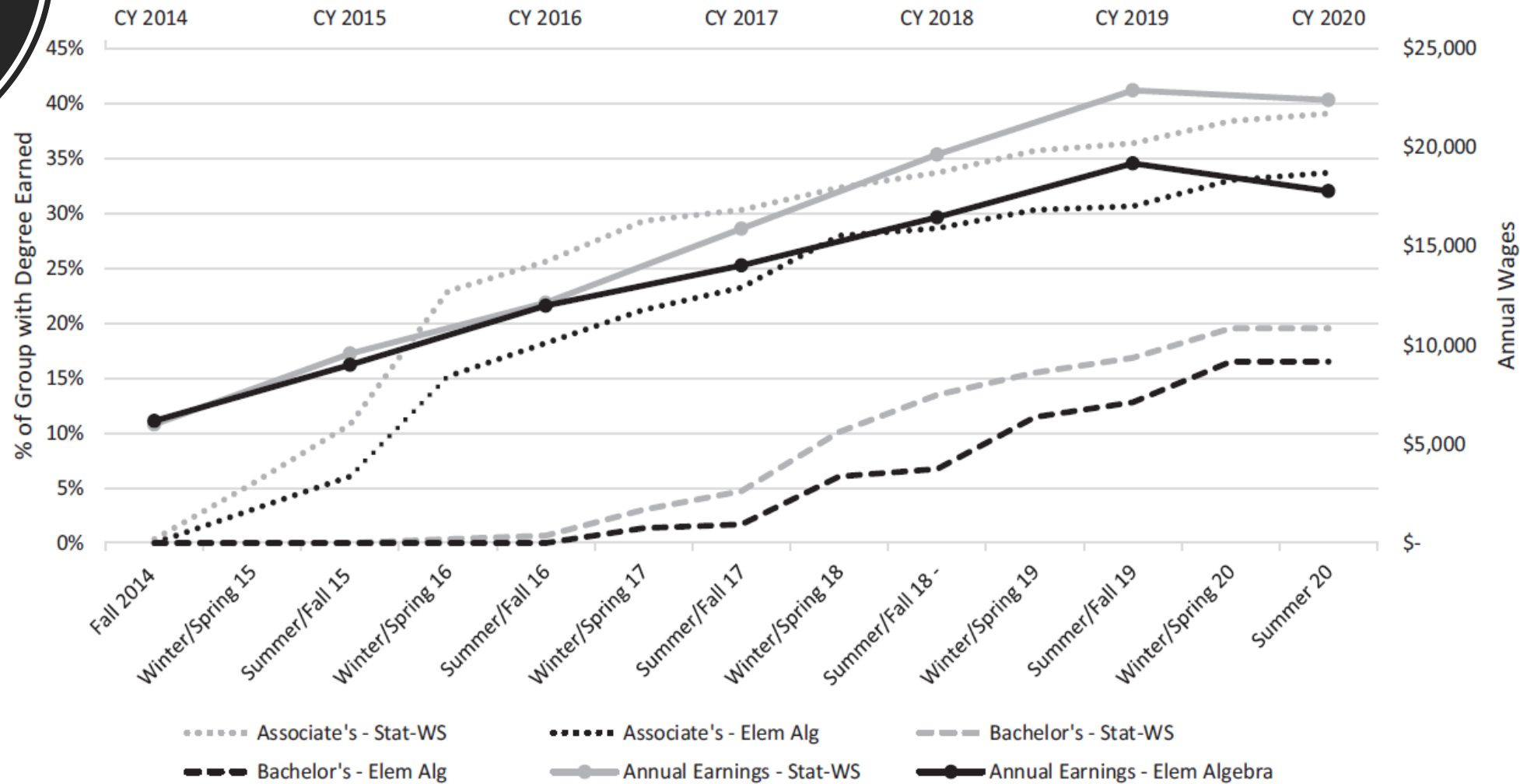


FIGURE 2. Seven-Year associate's and bachelor's degree completion, and average annual wages by treatment status.

Corequisites (Miller et al., 2022)⁸

Miller et al. (2022) compared similar students randomly assigned to a corequisite English course model with students assigned to the highest level stand-alone integrated reading and writing developmental education course.

The corequisite group had an 18.4 percentage point increase in passing the gateway college-level English course (college composition I) after 2 years compared to the remedial group. However, when the analysis was extended to college composition II, a course that most students require, that advantage was reduced to just over 6 percentage points, a finding only significant at the $p < 0.05$ level.

No increase in graduation rates (effect not studied).

Mathematics Pathways

DCMP
Math
Pathways
(Sepanik,
2023)⁹

“The program diversified the developmental and college-level math course content, separating it into three distinct pathways. DCMP included a statistics pathway, for students majoring in social and health sciences; a quantitative reasoning pathway, for students majoring in the humanities; and a path to calculus for students majoring in science, technology, engineering, and mathematics (STEM). (Students entering the STEM pathway were not included in this study.) All three pathways began with a one-semester Foundations of Mathematical Reasoning course that covered algebra (the content of standard developmental math courses) but also emphasized statistics and quantitative literacy. Upon successful completion of the Foundations course, students in DCMP took a one-semester college-level statistics or quantitative reasoning course or began a two-semester path to calculus” (p. 2).

DCMP
Math
Pathways
(Sepanik,
2023)⁹

“While the early version of DCMP did help a significant number of students complete their first college-level math course, it was not as successful in supporting students’ completion of a second college-level math course and it did not have a discernible impact on students’ average accumulation of math credits by the end of the five-year study” (p. 4).

“While more students who were offered DCMP passed their first college-level math course, the early version of the DCMP model had no discernible effect on students’ total college-level credits earned during any year of the study” (p. 5).

DCMP
Math
Pathways
(Sepanik,
2023)⁹

“This early version of the DCMP model did not have a statistically significant impact on students’ credential completion or current enrollment at a four-year college during any of the five study years. There were also no impacts on ever earned a certificate, associate’s degree, or bachelor’s degree after five years when measured separately” (p. 6).

DCMP
Math
Pathways
(Schudde &
Keisler,
2019)¹⁰

“Enrolling in and passing non-algebra college math coursework explained the majority of the increase in college math completion” (p. 16).

“Participating in DCMP has a small negative relationship with taking and passing college algebra, lowering the probability of each by about 1 percentage point” (p. 16).

“The observed increase in college-level math course enrollment and completion among DCMP students may partially stem from students taking non-algebra college-level math, a key component of the DCMP model” (p. 11).

Why do researchers place importance on increasing gateway pass rates?

**An assumption in the theory of
*early momentum***

The CCRC Moved the Goal Line From Graduation to Pass Rates to Continue Reforms

- Momentum is a term used to describe continuous progress toward a degree for college students
- *Early momentum* refers to a theory that if there is an increase in gateway pass rates or credits earned in the first year (i.e., early momentum), then that will lead to increased graduation rates later (Wang, 2017)¹¹
- CCRC adopted early momentum metrics (EMM) in 2017 as an argument to keep implementing reforms targeting first-year gateway pass rates (Jenkins & Bailey, 2017)¹²

**There is no evidence
that reforms promoting early
momentum actually lead to increased
graduation rates**

***In fact, we now know some reforms
are lowering graduation rates***

Corequisites
in TN
(Ran & Lee,
2024)¹³

In a groundbreaking study on the 10-year results from the full implementation of corequisites in Tennessee, Ran and Lee (2024) analyzed student outcomes at all levels, as opposed to students just beneath the cutoff in Ran and Lin (2019), the initial study on TN corequisites.

The authors' findings are extremely important because it is the first study on the effects of a statewide full-scale implementation of corequisites and mathematics pathways.

Corequisites
in TN
(Ran & Lee,
2024)¹³

“The proportion of students earning degrees at the associate level or higher did not change significantly before and after the corequisite reform” (p. 24).

“After the corequisite reform, remedial students accumulated similar amounts of college-level credits while enrolling in fewer courses overall, making the allocation of time and financial aid resources more efficient. However, these positive effects on early college-level credit accumulation did not lead to improved downstream outcomes. We found that remedial students, particularly those with lower placement scores, were more likely to drop out and were less likely to earn short-term certificates” (p. 29).

Corequisites
in TN
(Ran & Lee,
2024)¹³

“The fact that college-level course pass rates and average grades became lower for corequisite cohorts than for prerequisite cohorts indicates that the concurrent academic learning support was still not enough for some remedial students to succeed in college-level courses. In addition, with both on-level and remedial students, college-level classrooms have become more heterogeneous learning environments. These changes present new challenges for faculty to accommodate students with a wider range of academic needs” (p. 29).

Corequisites
in TN
(Ran & Lee,
2024)¹³

“Interventions that showed positive effects on attainment outcomes incorporated components of curriculum reforms (Logue et al., 2019) or a holistic set of academic and financial support (Scrivener et al., 2015). Students may need ongoing academic and nonacademic support to translate the momentum gained from additional college-level coursetaking into improved persistence and completion outcomes” (p. 30).

“Together with similar results from the initiative to move remediation to high school (Kane et al., 2021), the literature in this area provided emerging evidence that the problems with traditional remediation models were *not* the primary drivers of low college completion rates” (pp. 29–30).

**Research
Not Highlighted
By CCRC**

For decades, numerous studies showing positive results for remediation have been published in top journals (e.g., *Research in Higher Education*, *The Review of Higher Education*, *The Journal of Higher Education*) but have not been widely cited or shared

Data Showing Positive Results for Remediation

Cabrera et al. (2005)¹⁴: “Those taking math remediation courses were 4% more likely to transfer than those who did not.... However, among Lowest-SES students, the effect of taking remedial reading is particularly noteworthy. For this group taking remedial reading actually increases their likelihood of transferring by 24%” (p. 174).

Data Showing Positive Results for Remediation

Lesik (2006)¹⁵: “Using the regression-discontinuity design and an instrumental variables strategy to model selection bias, I concluded that participating in a developmental mathematics program significantly increases the odds of successfully completing a college-level mathematics course on the first try” (p. 17). (*The Review of Higher Ed*)

Fike and Fike (2008)¹⁶: “Students who did not enroll in developmental mathematics had lower odds of retention than those who enrolled in developmental mathematics but did not successfully complete the course. This finding suggests the significant role that developmental mathematics plays in student retention” (p. 78).

Data Showing Positive Results for Remediation

Moss and Yeaton (2013)¹⁷: “For the term-by-term RDDs, using parametric estimates, we found a consistent pattern whereby DE students benefited from completing developmental English. During each of the five terms, DE students experienced higher achievement at the cut score when compared to NDE students” (p. 393).

Turk (2019)¹⁸: “When two groups of statistically similar students were compared, developmental education generally improved the chances of earning an associate degree” (p. 1090). (*Research in Higher Education*)

Data Showing Positive Results for Remediation

Saw (2019)¹⁹: “For 2-year college students, remediation enrollment in both mathematics and English improved the likelihood of transferring to a 4-year college and earning a bachelor’s degree” (p. 298). (*Journal of Higher Education*)

Sanabria et al. (2020)²⁰: “Taking remediation is associated with a nearly nine percentage-point increase in bachelor’s degree completion for 2-year college students after accounting for demographic, familial, and academic background characteristics” (p. 474). (*Research in Higher Education*)

CCRC Knew Early On That Reforms Would Not Increase Graduation Rates

Top CCRC researchers' conclusions on most common reforms to remediation (Jaggars & Bickerstaff, 2018)²¹:

“Research suggests that the most popular reform models (including multiple measures assessment and placement, math pathways, and the co-requisite approach) will indeed improve students' rate of success in college-level math and English, but they are unlikely to substantially improve graduation rates” (p. 496).

Tens of Millions of Taxpayer Dollars Have Been Used to Create a False Narrative

- CCRC/NCPR/CAPSEE/CAPR (all basically one organization formerly headed by Dr. Thomas R. Bailey) have received well over \$35 million in taxpayer dollars since 2006 (IES, n.d.)²² to conduct this research, during which they created a biased narrative
- Tens of millions of dollars have also been donated to interest groups such as Complete College America, who still want to eliminate remediation, from such philanthropies as the Gates Foundation, Lumina, etc.

**In spite of all this widely available data,
reformers are still working hard to
eliminate stand-alone prerequisite
remediation**

FutureEd
Report
(Kim,
2024)²⁶

New Report on Dev Ed (Kim, 2024): *Incomplete: The Unfinished Revolution in College Remedial Education*

If every state in the country were to replicate Tennessee's results in dev-ed reform, 226,618 additional students would finish gateway math and English every year. Of this group, more than 100,000, or nearly half, would be Latino or Black.

Corequisites
in TN
(Ran & Lee,
2024)¹³

Ran and Lee (2024)

“We found that students placed into corequisite remediation were up to 20.4 percentage points (or 77%) more likely to pass gateway math and 22.8 percentage points (or 42%) more likely to pass gateway English within one year of enrollment compared with otherwise similar students placed into prerequisite remedial courses” (p. 4).

“Since the corequisite reform, students placed below the college-readiness threshold were 4.3 percentage points (or 8.1%) less likely to continue enrolling in the state’s public college system and 3.0 percentage points (or 28.8%) less likely to earn a credential (mostly certificates) within three years of the initial enrollment” (p. 4).

“Our sample covers a higher proportion of underrepresented minorities, which represents approximately 55% of the lowest scoring group” (p. 5).

Comprehensive Developmental Education Reform is Best

- The most effective reform, the City University of New York's Accelerated Study in Associate Programs (CUNY ASAP), does not eliminate remediation (Miller & Weiss, 2021)²³
- Original model more than doubled graduation rates (21% vs. 48% for developmental students) and was an RCT comprised of 90% students of color (Scrivener & Weiss, 2013)²⁴
- Miller et al. (2020)²⁵ studied a replication of ASAP in Ohio and found that this model of true holistic *developmental education* caused a 3-year graduation rate increase of 12 percentage points (49 vs. 37%) (p. 48) at a cost of \$1,840 per student per year (p. ES-7)
- These models included required developmental coursework first

Anecdotes are powerful:
***What do students say about
remediation and developmental
education?***

Student Quotes on Remediation


Jason, who was a nontraditional student at a community college in the Midwest, took a remedial English course (the lower of two levels). Here is what he said:

“Remedial English is not just a refresher. It is a lifeline for older students returning to education after many years, providing the essential skills they need to navigate the academic world with confidence.”

Student Quotes on Remediation

Stephon Boncek was a remedial mathematics student in Florida. Here is what he said:

“Taking the prerequisite math courses provided me with the essential skills and knowledge that I needed to excel in my college math classes. Without them, I'm sure I would have been lost and frustrated.”



Student Quotes on Remediation

Tracey Stallworth took remediation in Florida. He said this:

“I believe that prerequisite developmental/remedial courses were necessary for my success in college. Without them, I would have struggled in a lot of my courses. Having barely passed my GED, I am thankful for those developmental classes. They offered the education I needed to chart my path forward. In addition, these courses provided the knowledge that I would need to excel in my classes while pursuing my AA. Moreover, strong relationships were made by the instructors which still exist by those who encouraged me to reach my full potential.”

Student
Quotes on
Remediation



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Stand-Alone Prerequisite Remediation and Developmental Education Should Be Options

- Based on DCMP findings, Ran and Lee (2024), and other recent rigorous research, stand-alone prerequisite remediation should be offered as options for students
- We need to keep supporting underserved students like Jason, Stephon, and Tracey
- Please ask students you may know who have benefited from remediation and developmental education to contribute a quote if they are open to that. There are many more success stories to share!

Thank you!

Please take these data to your institutions and argue to keep stand-alone remediation and developmental education as an option for at-risk students!
I'm happy to assist you.

References below and more reading available:

communitycollegedata.com

alexmgoudas (at) gmail (dot) com

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(See below for references with links)

References

1. Bailey, T. R., & Cho, S. W. (2010). *Issue Brief: Developmental education in community colleges*. Prepared for: The White House Summit on Community College. Community College Research Center, Teachers College, Columbia University. <https://ccrc.tc.columbia.edu/media/k2/attachments/developmental-education-community-colleges.pdf>
2. Litschwartz, S., Cullinan, D., & Plancarte, V. (2023). *Multiple measures assessment and corequisite courses: Alternate ways to place and prepare new college students* [CAPR research brief]. Center for the Analysis of Postsecondary Readiness, Community College Research Center, Teachers College, Columbia University. <https://postsecondaryreadiness.org/multiple-measures-assessment-corequisite-alternate-place/>
3. Bickerstaff, S., Beal, K., Raufman, J., Lewy, E. B., & Slaughter, A. (2022). *Five principles for reforming developmental education: A review of the evidence*. Center for the Analysis of Postsecondary Readiness and Community College Research Center, Teachers College, Columbia University, and MDRC. <https://ccrc.tc.columbia.edu/media/k2/attachments/capr-synthesis-report-exec-sum-final.pdf>
4. Kopko, E., Daniels, H., & Cullinan, D. (2023). *The long-term effectiveness of multiple measures assessment: Evidence from a randomized controlled trial* [CAPR working paper]. MDRC and Community College Research Center, Teachers College, Columbia University. https://www.mdrc.org/sites/default/files/long-term-effectiveness-multiple-measures-assessment_0.pdf
5. Logue, A. W., Watanabe-Rose, M., & Douglas, D. (2016). Should students assessed as needing remedial mathematics take college-level quantitative courses instead? A randomized controlled trial. *Educational Evaluation and Policy Analysis*, 38(3), 578–598. <http://journals.sagepub.com/doi/pdf/10.3102/0162373716649056>
6. Jaggars, S. S., & Stacey, G. W. (2014). *What we know about developmental education outcomes* [Research overview]. Community College Research Center, Teachers College, Columbia University. <http://ccrc.tc.columbia.edu/media/k2/attachments/what-we-know-about-developmental-education-outcomes.pdf>
7. Logue A. W., Douglas, D., & Watanabe-Rose, M. (2019). Corequisite mathematics remediation: Results over time and in different contexts. *Educational Evaluation and Policy Analysis*, 41(3), 294–315. <https://doi.org/10.3102/0162373719848777>
8. Douglas, D., Logue, A. W., & Watanabe-Rose, M. (2022). The long-term impacts of corequisite mathematics remediation with statistics: Degree completion and wage outcomes. *Educational Researcher*, 52(1), 7–15. <https://doi.org/10.3102/0013189x221138848>
9. Miller, T., Daugherty, L., Martorell, P., & Gerber, R. (2022). Assessing the effect of corequisite English instruction using a randomized controlled trial. *Journal of Research on Educational Effectiveness*, 15(1), 78–102. <https://doi.org/10.1080/19345747.2021.1932000>
10. Sepanik, S. (2023). *Impact findings from the Dana Center Mathematics Pathways long-term follow-up study* [CAPR research brief]. Center for the Analysis of Postsecondary Readiness, Community College Research Center, Teachers College, Columbia University. <https://postsecondaryreadiness.org/impact-findings-dana-center-mathematics-pathways/>
11. Schudde, L., & Keisler, K. (2019). The relationship between accelerated dev-ed coursework and early college milestones: Examining college momentum in a reformed mathematics pathway. *AERA Open*, 5(1), 1–22. <https://doi.org/10.1177%2F2332858419829435>
12. Wang, X. (2017). Toward a holistic theoretical model of momentum for community college student success. In M. B. Paulsen (Ed.), *Higher education: Handbook of theory and research* (pp. 259–308). New York, NY: Springer. https://link.springer.com/chapter/10.1007/978-3-319-48983-4_6

12. Jenkins, D., & Bailey, T. (2017). *Early momentum metrics: Why they matter for college improvement* (CCRC Brief No. 65). Community College Research Center, Teachers College, Columbia University. <https://ccrc.tc.columbia.edu/media/k2/attachments/early-momentum-metrics-college-improvement.pdf>
13. Ran, F. X., & Lee, H. (2024). *Does corequisite remediation work for everyone? An exploration of heterogeneous effects and mechanisms* (EdWorkingPaper: 24-928). Annenberg Institute at Brown University. <https://doi.org/10.26300/h26j-2484>
14. Cabrera, A. F., Burkum, K. R., & La Nasa, S. M. (2005). Pathways to a four-year degree: Determinants of transfer and degree completion. In A. Seidman (Ed.), *College student retention: A formula for success* (pp. 155–214). ACE/Praeger Series on Higher Education. https://www.researchgate.net/publication/261699379_Pathways_to_a_four_year_degree_Determinants_of_transfer_and_degree_completion
15. Lesik, S. A. (2006). Applying the regression-discontinuity design to infer causality with non-random assignment. *The Review of Higher Education*, 30(1), 1–19. <https://muse.jhu.edu/article/203468/pdf>
16. Fike, D. S., & Fike, R. (2008). Predictors of first-year student retention in the community college. *Community College Review*, 36(2), 68–88. <https://journals.sagepub.com/doi/abs/10.1177/0091552108320222>
17. Moss, B. G., & Yeaton, W. H. (2013). Evaluating effects of developmental education for college students using a regression discontinuity design. *Evaluation Review*, 37(5), 370–404. <https://doi.org/10.1177/0193841X14523620>
18. Turk, J. M. (2019). Estimating the impact of developmental education on associate degree completion: A dose–response approach. *Research in Higher Education*, 60, 1090–1112. <https://doi.org/10.1007/s11162-019-09549-9>
19. Saw, G. K. (2019). Remedial enrollment during the 1st year of college, institutional transfer, and degree attainment. *Journal of Higher Education*, 90(2), 298–321. <https://www.tandfonline.com/doi/full/10.1080/00221546.2018.1493668>
20. Sanabria, T., Penner, A. & Domina, T. (2020). Failing at remediation? College remedial coursetaking, failure and long-term student outcomes. *Research in Higher Education*, 61, 459–484. <https://doi.org/10.1007/s11162-020-09590-z>
21. Jaggars, S. S., & Bickerstaff, S. (2018). Developmental education: The evolution of research and reform. In M. B. Paulsen (Ed.), *Higher education: Handbook of theory and research* (pp. 469–503). Springer International Publishing. https://doi.org/10.1007/978-3-319-72490-4_10
22. Institute of Education Sciences. (n.d.). Community College Research Center and related organizations’ IES grant monies search results. <https://ies.ed.gov/funding/grantsearch/index.asp?mode=2&sort=1&order=1&all=1&search=PrincipalAffiliationName&slctAffiliation=304&GrantsPageNum=1>
23. Miller, C., & Weiss, M. (2021). *Increasing community college graduation rates: A synthesis of findings on the ASAP model from six colleges across two states*. MDRC. <https://files.eric.ed.gov/fulltext/ED611732.pdf>
24. Scrivener, S., & Weiss, M. J. (2013). *More graduates: Two-year results from an evaluation of Accelerated Study in Associate Programs (ASAP) for developmental education students* (MDRC Policy Brief). MDRC. http://www.mdrc.org/sites/default/files/More_Graduates.pdf
25. Miller, C., Headlam, C., Manno, M., & Cullinan, D. (2020). *Increasing community college graduation rates with a proven model: Three-year results from the Accelerated Study in Associate Programs (ASAP) Ohio demonstration*. MDRC. https://www.mdrc.org/sites/default/files/ASAP_OH_3yr_Impact_Report_1.pdf
26. Kim, A. (2024). *Incomplete: The unfinished revolution in college remedial education*. FutureEd. <https://www.future-ed.org/wp-content/uploads/2024/06/FutureEd-Dev-Ed-Reform-Report.pdf>