APRIL 2022

Improving College Success for Students in Corequisite Reading

AUTHORS

Florence Xiaotao Ran
University of Delaware

Susan Bickerstaff
Community College Research Center

Nikki Edgecombe
Community College Research Center

STRONG START to FINISH

CCRC COMMUNITY COLLEGE RESEARCH CENTER
TEACHERS COLLEGE, COLUMBIA UNIVERSITY

Table of Contents

I. Introduction

Colleges and universities across the country assess — usually through standardized tests[1] — whether incoming students are academically ready for college-level coursework. Students who score below a college-ready threshold are referred to developmental education. According to nationally representative data of students entering college during 2011–12, around two-thirds of community college students and one-third of public four-year students took at least one developmental course within six years of enrollment.[1] Research has shown that the traditional approach to developmental education, which typically consists of one or a sequence of noncredit courses prior to entering college-level classes, has limited benefits or even detrimental effects on students' progression in college.[2] In addition, traditional developmental education may widen outcome differences in college success by demographic background, since Black, Hispanic and students from families with low incomes are disproportionately more likely to be required to take these courses.[3]

In response to these discouraging outcomes, corequisite approaches to serving students with developmental needs have gained popularity among community colleges: As of 2021, 24 states have adopted — or, in some cases, mandated — corequisite support for developmental education.[4] In a corequisite approach, students enroll directly in a college-level course paired concurrently with a support course designed to address students' learning needs in that subject. The corequisite approach grants students immediate access to college coursework upon enrollment, and concurrently offers a paired learning support course that can address academic needs in the selected content area. A growing body of research finds that corequisite support is effective in improving course outcomes in college-level mathematics and English.[5]

A less-studied area in the emerging research on corequisite support is how to support students with developmental needs in reading. A few reasons make it important to explore strategies to improve college success for students in developmental reading. Readiness for college-level reading has remained low in the last decade: Around 56 percent of high school students who took ACT tests in 2021 did not meet college-level thresholds, up from 53 percent in 2017.[6] Students of color are much more likely to face educational barriers that lead to differences in reading outcomes: The differences in college readiness for reading was 35 percentage points between Black and white students and 22 percentage points between Hispanic and white students.[7] Strategies to support students referred to developmental reading have the potential to reduce differences in college outcomes across racial groups.

Reading is an essential component of college readiness. Low literacy skills pose a particularly strong threat to college achievement and completion.[8] In a study of curricular alignment between developmental reading and introductory-level general education, Armstrong and colleagues found that most of the texts in introductory courses in humanities, social sciences and sciences required reading proficiency at the 12th grade level or higher.[9] Students with reading difficulties are prone to challenges across multiple subjects or areas of studies. The concurrent nature of corequisite support offers built-in opportunities for content alignment between college-level courses and learning support courses, but unlike developmental writing and math, developmental

reading does not have an obvious college-level pairing, as college-level reading courses typically do not exist.[10] Therefore, research may shed light on optimal course pairings.
In this report, we first examined early college outcomes for students placed into corequisite reading at the 13 community colleges in the Tennessee Board of Regents (TBR) system. In 2015, TBR required all community colleges within the system to replace standalone developmental courses with corequisite learning support, but each college could determine course pairings and course structures for their learning support sections. We next investigated promising strategies to improve college success for students in need of developmental education reading. More specifically, we examined which college-level course pairings among College Composition, College Success, humanities, arts and social sciences were associated with better outcomes for corequisite reading students. In addition, we analyzed how course structural components, including delivery format, contact hours, enrollment timing, and peer composition and class size influence student outcomes in corequisite reading and its college-level pairing courses. Results from this report provide important insights for *higher education administrators*, who are leading the design of institutional supports for developmental education reforms, and for *instructors*, who are teaching students who may need additional support to meet the literacy demands of college.

II. Background and Context

1. Corequisite reform nationwide

Rather than forcing students to dedicate one or more semesters to developmental education exclusively, the corequisite approach allows students placed into developmental education to take college-level courses with concurrent supports immediately upon college enrollment. It has emerged as one of the most popular developmental education reforms, with around two dozen states and systems adopting it. The earliest and most well-known corequisite model is the Accelerated Learning Program (ALP) in English, developed by the Community College of Baltimore County. This model specified a fixed enrollment size for the developmental education course section and a set ratio of college-level and developmental education students in the companion college-level course section. Under the original ALP model, the DE course section immediately follows its college-level companion, which are both taught by the same instructor. This program was associated with sizable improvement in gateway English completion.[11]

Since then, many colleges and states have implemented their own corequisite models in English, reading and mathematics. Boatman found that enrolling students into college-level math with learning assistance significantly improved enrollment persistence and college-level credit accumulation at a four-year university in Tennessee.[12] The efforts to scale up the corequisite model to serve all developmental students in Tennessee community colleges were also shown to have significant positive impacts on gateway completion rates for both English and math.[13] The University System of Georgia (USG) is another state that adopted a corequisite model systemwide. Since USG implemented the model in 2018 and 2019, the proportions of students who completed gateway math and English within one year both increased substantially.[14]

These results are consistent with the experimental evidence from the City University of New York (CUNY) and community colleges in Texas.[15] At three CUNY campuses, developmental

math students were randomly assigned to corequisite workshops in statistics or traditional algebra remediation; at five urban community colleges in Texas, developmental writing and reading students were randomly assigned to five different corequisite models in English. Miller et al. found that corequisite remediation in Texas increased the likelihood of completing gateway English within the first two years of enrollment, but it did not improve persistence in college.[16] Logue et al. showed that corequisite math had similar impacts on gateway course completion at CUNY, but their follow-up study found that students in corequisite statistics also had higher graduation rates than those assigned to take traditional algebra remediation.[17]

It is worth noting that adopters of corequisite developmental education have implemented the reforms with variations in a few key components. Both TBR and CUNY incorporated math curriculum reforms that aligned the content covered in corequisite sections with the college-level math courses relevant for students' program of study. Some colleges and systems have utilized technology to provide individualized or computer-adaptive modules tailored to students' academic needs when implementing corequisite remediation.[18] Other than delivery format, corequisite models also vary in other structural components, including peer composition (mixing of developmental and on-level students in the college-level courses), enrollment size, contact hours, etc. Recent evidence from USG suggests that having the same instructor for both a college-level course and corequisite section was associated with higher course passing rates.[19] It is worthwhile to explore how these structural components influence outcomes for students in corequisite learning support in other contexts.

2. Corequisite reform in Tennessee

Tennessee has long been a national leader in developmental education reform. TBR piloted a corequisite model in 2014 and scaled it up systemwide in fall 2015. Ran & Lin analyzed student transcript data from TBR and found that 11 of the 13 community colleges fully implemented a corequisite model as of fall 2015, with the remaining two colleges adopting the model by spring 2018; virtually no students took standalone developmental education courses after the scale-up of the corequisite model.[20] However, TBR did not require a standard format for corequisite courses, with each college having its own implementation plan approved by TBR. Currently, in most TBR colleges, the corequisite course is a semester-long learning support course that is linked with the college-level, credit-bearing course. Credits for the learning support courses range from one to three credit hours, although there are further variations in actual contact hours of the learning support sections for lecture courses versus lab courses. During our pre-pandemic analysis window, between 2015–16 and 2019–20, seven colleges offered corequisite learning support sections through traditional face-to-face instruction, three colleges offered them mostly through online instruction, while the remaining three colleges offered a combination of face-to-face, hybrid and online sections.

TBR community colleges use standardized test scores for corequisite placement, with ACT being the most common assessment.[21] The cut scores for placement into college-level courses are 18 for writing, and 19 for reading and math. At most TBR colleges, students must score above college-level for both writing and reading to be placed directly into a gateway English course (College Composition). But unlike corequisite learning support for writing, which is paired with College Composition in all colleges, each TBR community college offers its own set of paired, college-level courses to take with corequisite reading, as there are no college-level reading

courses.[22] These college-level pairings for corequisite reading can largely be put into five categories: 1) College Composition (same pairing for corequisite writing),[23] 2) College Success, 3) humanities (e.g., Fundamentals of Communication, United States History), 4) fine arts (e.g., Introduction to Art, Introduction to Music), and 5) social science (e.g., Introduction to Psychology, Introduction to Sociology). Figure 1a in the Appendix presents detailed college-level pairings for corequisite reading for all TBR community colleges over time. College Success is designed to support preparation for the transition from secondary to postsecondary education. While the course does not fulfill credential requirements on its own, credits earned through the course could provide elective credits. In a few TBR colleges, College Success is exclusively reserved for students placed into developmental reading.

III. Research Questions, Outcome Measures and Data

In this report, we examined the outcomes of students in developmental reading since the implementation of corequisite reform, and explored potential strategies to better support these students. Specifically, we addressed the following research questions:

1. How have early college outcomes changed for students referred to developmental reading since TBR adopted corequisite approaches in 2015?
2. What were the course outcomes of corequisite reading and its paired, college-level courses for students placed into corequisite reading?
3. Which college-level pairings for corequisite reading were associated with higher success rates for corequisite reading students?

We focused on the following set of early college outcomes in our analyses: 1) course pass rates for both corequisite reading and its college-level pairing, 2) first-year gateway English (College Composition) completion rates and 3) second-year enrollment persistence rates. Numerous studies have identified the importance of early academic momentum — the speed with which students initially progress in college — for college success.[24] For community college students, fulfilling developmental requirements, completing gateway math and English courses are important early momentum metrics that correlate with long-term degree completion.[25] Other than course performance, we also examined students' enrollment persistence to reveal whether they were on the right trajectory to complete a college credential or degree.

To address these research questions, we drew from detailed administrative data for students who entered any community colleges within the TBR system between academic year 2010–11 and 2019–20. We used data before and after academic year 2015–16 to track changes in student outcomes since the corequisite reform. Then, we focused on transcript data between fall 2015 and spring 2020 to examine how different college-level pairings and structural components of corequisite reading were associated with early college outcomes. Detailed student characteristics by developmental education placement results are presented in Table 1. Among entering cohorts of 2015–16 to 2019–20, around 31% of students were referred to developmental education in either reading or writing, 20 percentage points lower than the rate for math (51%). Consistent with national trends, Black and Hispanic students are disproportionately placed into developmental education. For example, while Black students only account for 15% of all

entering students at TBR community colleges, more than 30% of those referred to developmental reading were Black.

Another important takeaway from Table 1 is that, at TBR community colleges, students placed into developmental reading had lower high school GPAs and ACT scores than students who were only placed into developmental writing or math. This suggests that developmental reading students might be less academically prepared, especially compared to developmental math students. The vast majority of developmental reading students (87%) were also required to take developmental education courses across all three subjects, 11 percentage points and 34 percentage points higher than developmental writing and math students, respectively.

Table 1. Student characteristics by developmental education (Dev Ed) placements: cohorts 2015–2019

		Placed into developmental education		
	All Entrants	Reading	Writing	Math
Demographics				
Female	57%	57%	55%	61%
Race[1]				
Black	15%	31%	32%	24%
Hispanic	6%	8%	8%	7%
White	74%	55%	54%	64%
Other race	5%	6%	6%	5%
Age when first enrolled	19.08	19.56	19.85	19.94
First-time-in-college students	66%	82%	82%	78%
Fall entrants	81%	83%	83%	82%
Characteristics prior to college				
High school graduates	61%	83%	84%	77%
Enrolled at TBR within one year of high school graduation	44%	64%	64%	57%
High school GPA	2.83	2.42	2.46	2.57
ACT scores				
Reading	21.34	15.54	16.67	18.63
Writing	20.69	15.71	14.52	17.67
Math	19.51	16.53	16.30	16.15
Number of subjects among writing, reading & math placed into developmental education				
One	24%	-	17%	47%
Two	4%	13%	7%	-
Three	27%	87%	76%	53%
N	160,153	49,096	49,334	81,429

Note. Authors' calculation using TBR entering cohorts 2015–2019.

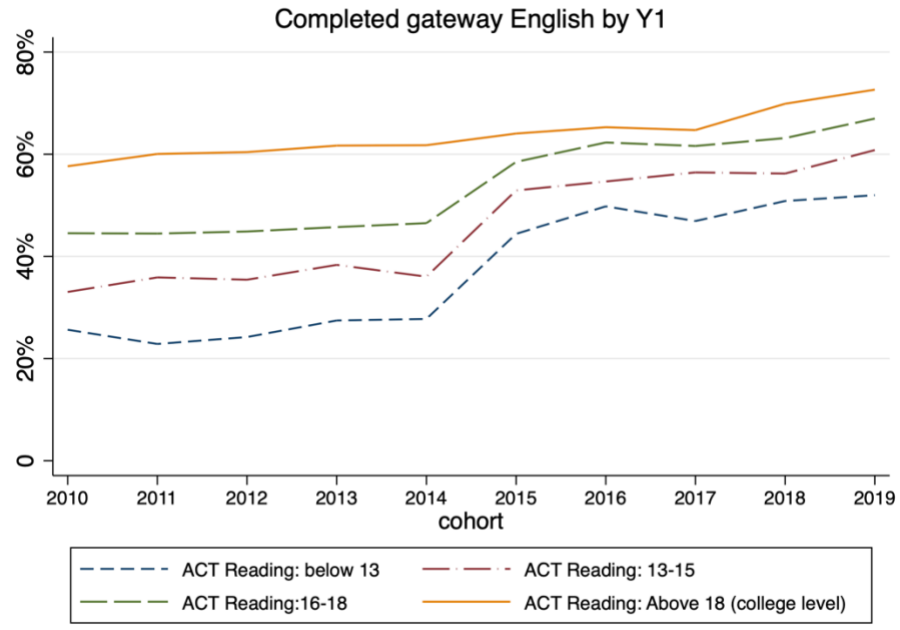
[1] Racial groups are in alphabetical order. Racial groups consisting of less than 5% of the student population are grouped together in the 'other race' category.

IV. Key Findings

1. Corequisite developmental education substantially reduced the differences in one-year gateway English completion rates by placement test scores and racial groups.

Since TBR mandated corequisite approaches to serving students with developmental needs in 2015, students placed into developmental education experienced substantial improvements in gateway course outcomes. Notably, students from *all* reading placement score groups experienced improvements in gateway English completion, albeit to different extents. In Figure 1, we present the proportions of entering students completing gateway English (College Composition) by the end of the first year by ACT reading scores. For students with reading test scores right below college-level threshold, the differences in gateway English completion rates compared to college-level students reduced from 15 percentage points under the traditional developmental education model to 5 percentage points with corequisite approaches. For those with the lowest reading placement scores (with ACT reading below 13), their one-year gateway English completion rates used to be 35 percentage points lower than students identified as college-ready; post-reform the gap reduced to 19 percentage points. In other words, the differences in gateway English completion rates between students placed into college-level courses and those with the lowest ACT scores reduced in half, since the corequisite reform.

Figure 1. Proportion of entering students completing gateway English by Year One, by cohort & ACT reading score



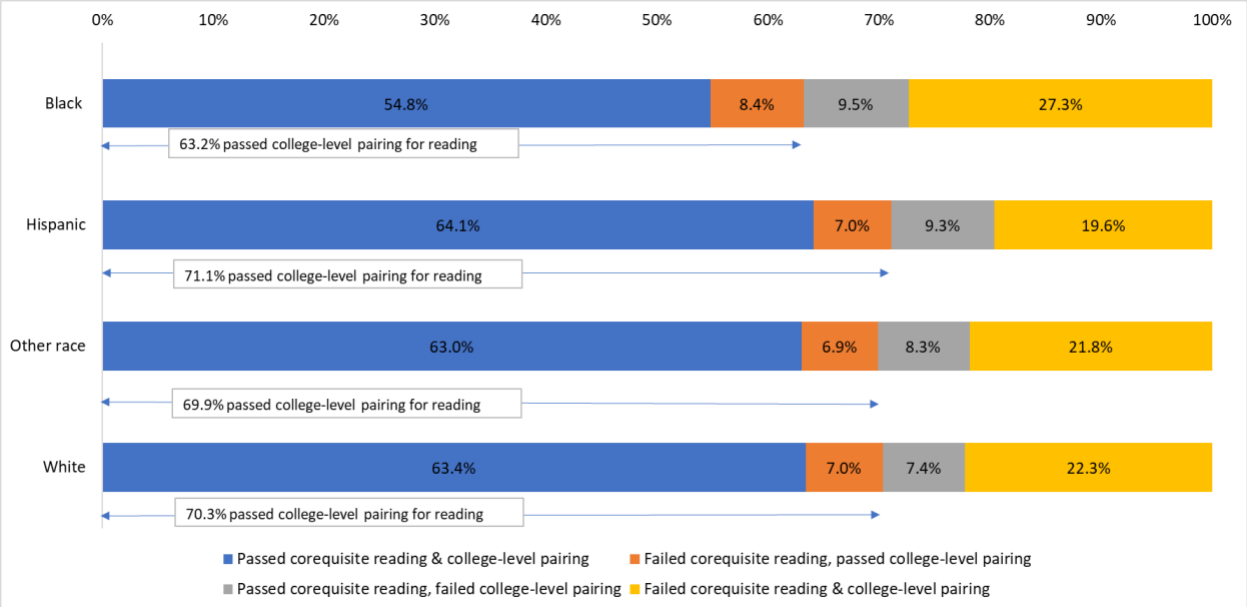
Note. Authors' calculation based on TBR entering cohorts 2010–11 to 2019–20.

In addition, outcomes differences by race in one-year gateway English completion rates also closed since the corequisite reform. As mentioned above, Black and Hispanic students were more likely to be referred to developmental education. Since the corequisite reform, first-year gateway English completion rates improved by 17 percentage points for Black students and by 14 percentage points for Hispanic students. These improvements were higher than the overall increase in first-year gateway English completion rates for all incoming students over the same time period (10 percentage points).

2. Students who did not pass corequisite reading and its college-level pairing also failed almost all other courses they enrolled in that term; the majority of these students dropped out from college by the end of year one.

Unfortunately, not all students enjoyed success under the corequisite model. Among those placed into corequisite reading, around one quarter (24%) did not pass either the learning support section or its paired college-level course. Importantly, a higher percentage of Black students did not pass corequisite reading or its paired college-level course compared to students of other racial groups, as shown in Figure 2. This result does not conflict with our earlier findings that show racial differences in early college success measures were reduced since corequisite reform. While corequisite developmental education appears to narrow differences in outcomes by race, additional institutional and classroom strategies are needed to improve course pass rates for Black students. This study cannot definitively identify the reasons for these persistent inequities, but disparities in educational resources in K-12 systems mean that some Black students arrive in college with lower high school GPAs, a predictor of college success. As will be discussed later in this report, Black students were much more likely to take corequisite courses online than students from other racial groups. Such difference in access to in-person learning support was likely another factor that contributed to the disparities in corequisite reading course outcomes. Likewise, in TBR colleges, Black students are also more likely to attend part-time and qualify for Pell Grants or other need-based financial aid, compared with the system average. This finding points to the need for community colleges to take race-conscious approaches to providing academic, financial and non-academic supports to reduce barriers faced by Black students.

Figure 2. Student course outcomes in corequisite reading and college-level pairing, by race: cohort 2015–2019



Note. Authors' calculations based on TBR entering students who were referred to corequisite reading for cohorts 2015–16 to 2019–20.

Importantly, difficulties in corequisite reading posed strong threats to students' performance across other subject areas. Students who failed both corequisite reading and the paired college-level course also failed more than 90% of all courses they were enrolled in during the first term; only 17% of them continued to enroll in the next academic year. As shown in Table 2, for students who failed corequisite reading, course pass rates were consistently low across all subject areas, more so in academic- or transfer-oriented subjects, such as humanities, STEM and social sciences, than for occupational-oriented areas. Failing corequisite reading and its paired college-level course was a stronger predictor of failing other courses than failing corequisite writing or math. Students who failed corequisite and gateway math courses were able to pass two-fifths of the courses they enrolled in and 40% of them persisted into the second academic year. (It is worth noting that overall pass rates were slightly higher in corequisite and college-level pairing for reading than for writing or math. Compared to the 60% pass rates of corequisite and college-level pairing courses for reading, the pass rates were 57% and 49% for writing and math respectively.) Course performance in corequisite reading and enrollment persistence are likely affected by a variety of factors, including non-academic needs. But the stronger correlation between outcomes in corequisite reading and courses in other subject areas suggests that proficiency in reading is an integral component of college readiness. Improving literacy skills for academically vulnerable students should be a priority for colleges to ensure that students have the foundational skills needed for college-level study.

Table 2. Descriptive student outcomes by results in corequisite (CR) & paired college-level (CL) courses: students took corequisite reading

	Corequisite reading students who:			
	Passed both (60.4%)	Passed CR & failed CL (8.2%)	Failed CR & passed CL (7.5%)	Failed both (23.9%)
Course pass rates during first term				
Any courses	86.6%	53.6%	51.9%	8.8%
College-level courses	85.9%	36.1%	70.4%	9.8%
By subject area				
Art, Humanities & English	89.0%	25.7%	75.0%	6.6%
Math & Science (STEM)	63.6%	34.8%	29.5%	6.9%
Social Science	84.3%	39.3%	62.0%	9.6%
Health & Nursing	83.7%	62.4%	51.3%	19.4%
Business	85.7%	51.2%	68.8%	13.2%
Career Technical Education (CTE)	87.3%	55.7%	70.9%	14.3%
Downstream outcomes				
Persist to 2nd year (exclude cohort 2019)	68.9%	42.3%	41.1%	16.7%

Earned a certificate by 3rd year (exclude cohorts 2018 & 2019)	3.6%	0.9%	0.7%	0.2%
Earned an AA by 3rd year (exclude cohorts 2018 & 2019)	6.9%	0.6%	0.8%	0.0%

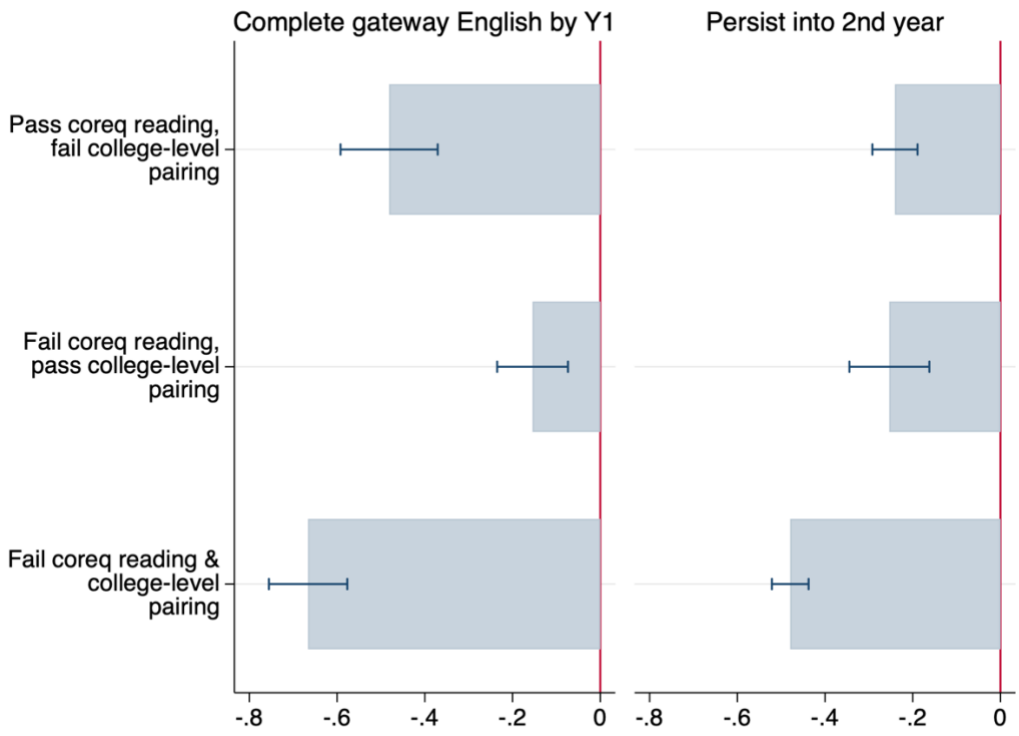
Note. Samples include students who entered TBR between fall 2015 and spring 2020 and enrolled in corequisite learning support for reading (N = 32,580). Among these students, 60.4% passed both corequisite reading and paired college-level course, 8.2% passed corequisite reading but failed the college-level pairing; 7.5% failed corequisite reading but passed the college-level pairing; and 23.9% failed both courses.

3. Performance in corequisite reading and its college-level pairing are predictive of other early college success outcomes.

The academic backgrounds of students played important roles in success in these courses. Up to 12% of the variations in the early college success measures we explored could be explained by high school GPA, demographic characteristics and enrollment patterns. Indeed, characteristics with the strongest predictive power for success in corequisite reading and its college-level pairing was students' high school GPA. One standard deviation increase in high school GPA (0.63) was associated with a 13 percentage point increased likelihood of passing corequisite reading and its college-level pairing. In comparison, one standard deviation increase in ACT reading score led to an improvement of the same outcomes by 3 percentage points. This provides additional evidence to show that high school GPA is a much better predictor of college success than standardized tests.[26]

However, even after adjusting for students' demographic and academic characteristics, passing both corequisite reading and its college-level pairing course were still associated with significantly better outcomes in terms of gateway completion and enrollment persistence. As shown in Figure 3, students who passed both courses were more likely to persist to the second academic year by 48 percentage points, compared to those who attended the same college in the same entering cohort, shared similar individual characteristics, but failed the two courses. More detailed regression estimates are reported in Appendix Table 1a. These results highlight the importance of developmental reading for enrollment persistence. Although this model may still be unable to account for some unobservable student characteristics, such large differences in subsequent outcomes suggest that colleges should devote more effort and resources in helping students pass these courses. Next, we turn to potential strategies to do so.

Figure 3. Gateway English and persistence outcomes by results in corequisite reading and college-level pairing, compared to outcomes of students who passed both courses



Note. This figure is based on regression results reported in Appendix Table 1a. Bars represent regression point estimates and error bars present 99% confidence intervals.

4. Students who took College Success courses as the college-level pairing with corequisite reading had the highest course passing rates, compared with those who took it with other types of pairings.

As mentioned in Section II, TBR colleges offer five types of courses as college-level pairings for students to take concurrently with corequisite reading. Until spring 2020, approximately 45% of all students who enrolled in corequisite reading took it with College Composition (gateway English),[27] 26% took it with College Success, 12% with a humanities course, 12% with a social science course, and 5% with a course in fine arts. Table 3 presents student outcomes in these courses by types of pairings. Descriptively, students who took corequisite reading with College Success had the highest success rates in these courses, while students who took College Composition had the lowest passing rates. Within the humanities, social science and fine arts, we also identified a few specific college-level courses that were associated with high success rates, including Computer Applications, Introduction to Theatre, Music Appreciation and Fundamentals of Speech.

As College Success stood out as the college-level course with the highest passing rates for students enrolled in learning support in reading, we examined this pairing more closely. At TBR community colleges, College Success courses were designed to help students transition from high school to postsecondary education.[28] Higher success rates in this course pairing could be driven by different reasons. It is possible that grading in College Success is not as stringent as in other college-level pairings, making it an easier course for students. It is also possible that this course became a space where instructors provide targeted advising and support for students with similar needs. As Perin argued, College Success courses could be used as a major approach to improving academic preparedness for students with reading difficulties and low academic skills, when focusing on study skills, college resources, interpersonal skills and self-regulated learning.[29]

Table 3. Descriptive outcomes for corequisite reading (CR) and college-level (CL) pairing

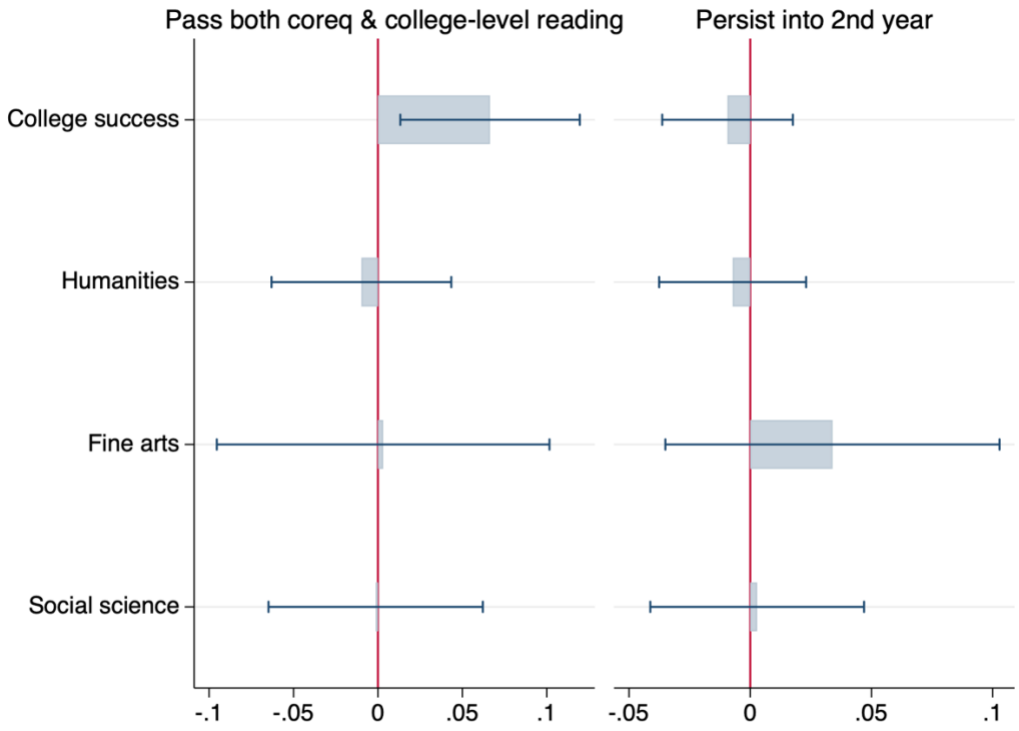
	Composition (45%)	College Success (26%)	Humanities (12%)	Arts (5%)	Social Science (12%)
Passed both CR & CL	56.1%	65.4%	64.1%	61.1%	62.5%
Passed CR, failed CL	11.3%	3.5%	7.7%	7.8%	6.9%
Failed CR, passed CL	6.5%	8.8%	6.8%	9.0%	8.3%
Failed both CR & CL	26.0%	22.3%	21.5%	22.1%	22.2%

Note. Sample includes students who entered TBR between fall 2015 and spring 2020 and enrolled in corequisite learning support for reading (N = 32,580).

To explore whether taking College Success influenced course success and students' progression in college, we performed regression analyses, adjusting for a set of student characteristics and variations across cohorts and colleges. Detailed results adjusted for differences in individual demographic and academic characteristics are reported in Appendix Table 2a. As shown in Column 1 of this table, taking College Success with corequisite reading was associated with a 9-percentage-point higher pass rate compared to students who took the College Composition pairing but were otherwise similar in terms of individual characteristics. In addition, some colleges changed college-level course pairings for corequisite reading over time. For example, at Cleveland State Community College, the pairing for corequisite reading switched from College Success or Fundamentals of Speech Communications to College Composition in 2016. We further leveraged such within-college changes with a college fixed-effects model. This analysis eliminated any systemic differences across colleges and only drew comparison between students who took different course pairings within the same college due to the change of pairing offerings over time. We found that the positive effects of College Success pairing were still significant, but the magnitude reduced to 6.6 percentage points. The left column of Figure 4 visually presents the significant, positive association between taking College Success and passing both corequisite and college-level pairing for reading.

However, we did not find any positive outcomes associated with taking College Success pairing beyond higher course passing rates. As reflected in the zero-inclusive error bars in the right column of Figure 4, taking College Success with corequisite reading did not lead to higher enrollment persistence rates, compared with taking corequisite reading with other types of college-level courses (It did not hurt the outcome either.). Among other downstream outcomes we explored, such as subsequent enrollment or performance in other college-level courses and credential completion, it did not appear that taking College Success influenced these outcomes. In general, our findings are consistent with systemic reviews of previous research on a College Success course, which concluded that these first-year experience courses provided statistically significant positive effects on college credit accumulation, while the impacts on persistence or credential attainment were limited or small.[30] Since some TBR colleges reserved College Success exclusively for corequisite reading students, it is possible that these courses could be further enhanced to bring additional benefits to students with reading difficulties by incorporating academic content and skill-building exercises into the course, or developing noncognitive skills, effective learning skills and academic planning.[31] In this way, the College Success course can become an intentional space to address the multifaceted needs for students who currently face great challenges in both corequisite reading and courses in other subject areas.

Figure 4. Course and persistence outcomes by corequisite reading pairings, compared to outcomes of students who took corequisite reading with college composition



Note. This figure is based on regression results reported in Column 2 and 4 of Appendix Table 2a. Bars represent regression point estimates and error bars present 99% confidence intervels.

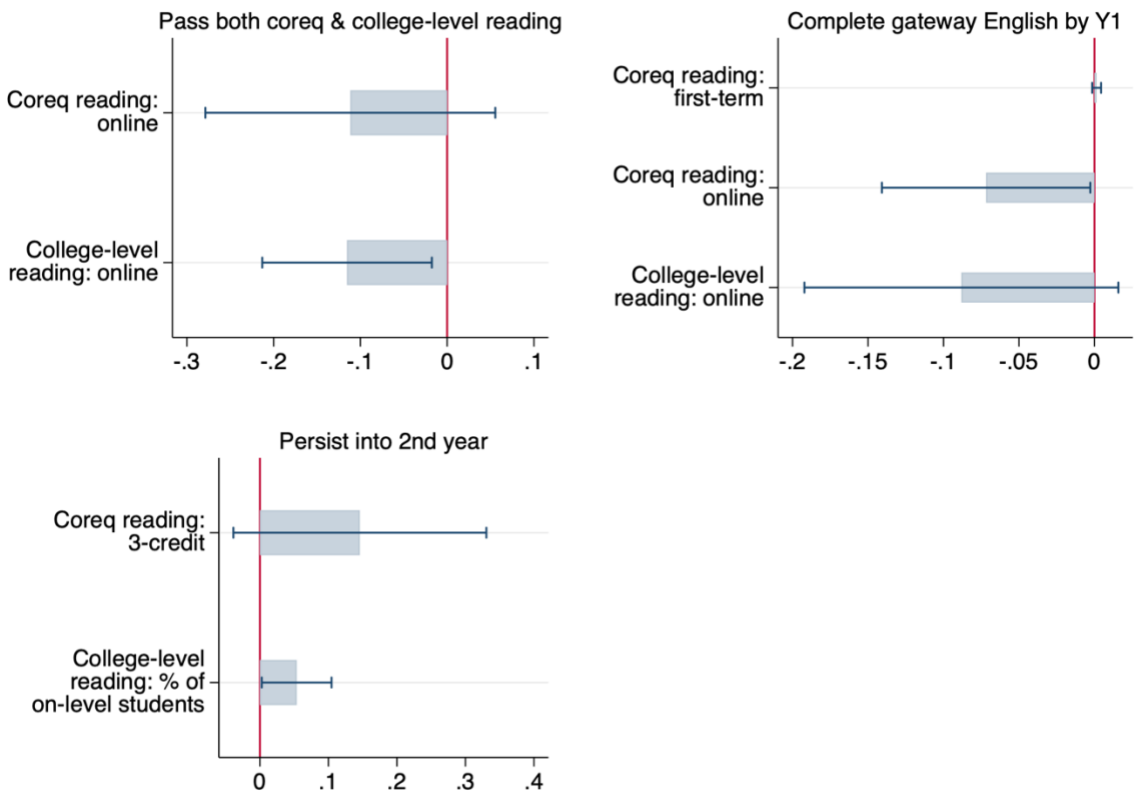
5. Taking corequisite reading and a college-level pairing online is associated with significantly lower success rates.

Since TBR did not mandate a single format for offering corequisite learning support, it was possible to explore under which conditions corequisite developmental education produced better student outcomes. Among the different course structural components that colleges were able to moderate, we explored the following features: 1) delivery format, i.e., whether corequisite section and college-level pairing were offered through face-to-face, hybrid or online modalities; 2) timing, i.e., whether students took the corequisite model during the first term of enrollment; 3) intensity of learning support, i.e., credit hours of the learning support section; 4) enrollment size, i.e., number of students enrolled in the corequisite section and college-level pairing course; and 5) peer composition, i.e., proportion of college-level students in the college-level course section.

Figure 5 presents the associations between selected structural components of corequisite and college-level reading courses with gateway and persistence outcomes. More detailed results are reported in Appendix Table 3a. Among all the course structural components we explored, course delivery format had the most consistent negative effects on early college outcomes. Taking corequisite reading and its college-level pairing course online significantly reduced the likelihood of passing these courses and students' chances of completing gateway English by the end of their first year. Specifically, taking the corequisite section online reduced the pass rates by 12 percentage points, and taking the college-level section online reduced the likelihood of passing by 10 percentage points (Note, again, that these results reflect pre-pandemic practices and outcomes.). Considering the overall passing rates of these courses were around 60%, these are equivalent to 20% and 17% decreases, respectively.

Other structural components also appeared to influence early college success measures. Taking corequisite reading during the first term of enrollment significantly increased one year gateway English completion rates by 15 percentage points. Taking the college-level pairing course for reading with more on-level students, i.e., students placed above the college-level threshold, benefited developmental reading students' enrollment persistence. In addition, taking three-credit-hour corequisite sections, rather than sections with one or two credit hours, appears to be associated with higher second year persistence rates. Some of the results were admittedly more noisy (i.e., patterns in these results were more likely due to sampling errors, rather than actual associations between corequisite course features and student outcomes), reflected by the wider confidence intervals.

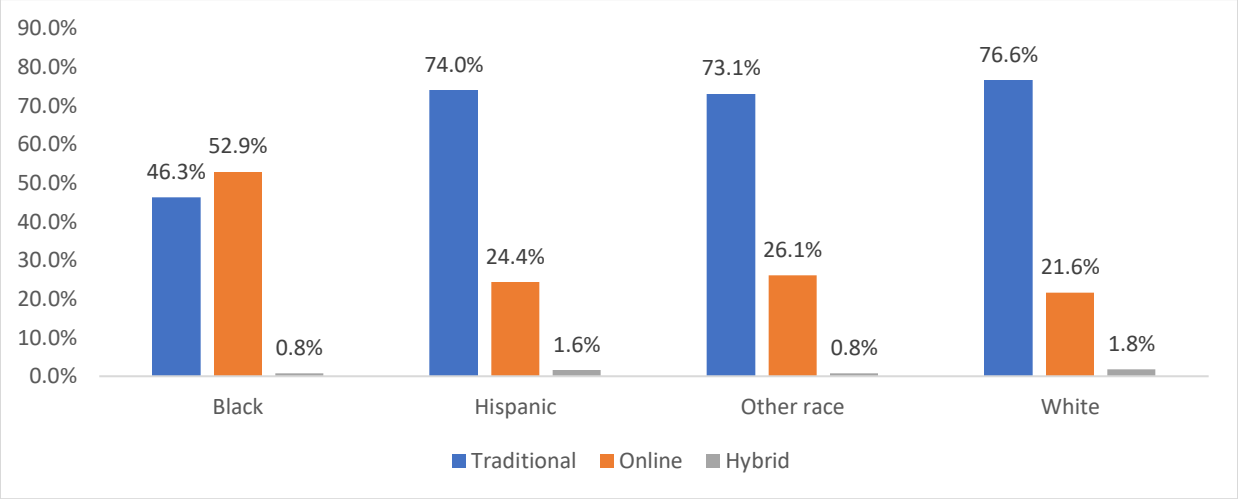
Figure 5. Associations between corequisite reading structural components and early college outcomes



Note. The charts are based on regression results reported in Appendix Table 3a. Bars represent regression point estimates and error bars present 99% confidence intervals.

Course delivery format for corequisite courses may also be a factor that exacerbated racial inequities in early college success measures. As shown in Figure 6, there were substantial variations in enrollments in online versus face-to-face sections by race for corequisite reading courses during our pre-pandemic analysis windows. More than half of Black students took corequisite reading online, while only around 20% of students of other racial groups did so. This pattern was partially driven by variations across institutions. Two of three colleges that offered corequisite courses almost exclusively online enroll much higher proportions of Black students than TBR averages (More than 60% of students at one of these colleges — Southwest Tennessee Community College — are Black students; the average proportion of Black student enrollments among Tennessee community colleges is 15%.). It is important to note that the regression results reported in Table 6 were based on the comparisons of students who took corequisite reading and its college-level pairing with different delivery formats within the same college, due to the inclusion of college fixed effects. Considering the large across-college variation in online course offering, as well as research evidence that indicated Black students experienced steeper performance declines in online courses, the negative impacts of taking corequisite courses online might even be underestimated.[32]

Figure 6. Corequisite reading delivery format by race: fall 2015 to fall 2019



Note. Authors' calculation based on TBR entering students who were referred to corequisite reading between fall 2015 and fall 2019.

V. Recommendations

This study echoes previous research showing that, compared to traditional prerequisite developmental education, corequisite approaches help many more students complete college-level gateway courses. At the same time, a nontrivial proportion of students referred into corequisite reading did not pass any courses they enrolled in. These students also dropped out of college after one or two semesters at alarming rates. For Black students, these trends were even starker. These findings suggest that reading proficiency is a vital foundational skill for success in college-level courses. It is also likely that students who need intensive academic support in reading face multifaceted challenges, perhaps related to work, financial insecurity, sense of belonging or caregiving responsibilities. To address these challenges, and improve policies and practices for developmental education, we recommend five practical steps systems and colleges can take to improve equitable outcomes for students in need of academic support in reading.

1. **Enroll all students deemed underprepared in reading in corequisite courses in their first term.** Findings from our analysis indicate enrollment in corequisite reading models increases the likelihood that a student will satisfy their developmental education requirement in reading and complete a college-level course (relative to prerequisite approaches). The benefit of enrollment in corequisite reading during the first term of enrollment was especially strong.

2. **Provide embedded supports to meet the multifaceted needs of students deemed underprepared in reading.** These findings show that close to a quarter of students did not pass corequisite reading, an outcome that was strongly predictive of academic progression more broadly. These outcomes may be driven by a range of challenges beyond academic literacy. Thus, embedded supports like tutoring, advising, resources to address students' financial needs and other wraparound services may help to further

improve outcomes in corequisite reading. Stronger course outcomes in College Success, compared to other college-level pairings, suggest that students benefit from courses that foster active learning and address non-academic needs, such as developing college know-how.

3. **Consider high school GPA, perhaps among other measures, when determining the supports students need to be successful in college.** Our findings confirm previous research showing that high school GPA is a better predictor of college success than standardized tests.[33] This suggests that high school GPA may be useful for determining students' placement into corequisite courses. In addition, as noted above, to improve pass rates in corequisite reading and paired courses, institutions may need to provide embedded supports. High school GPA, perhaps paired with student self-reports, may help institutions identify students who could benefit from targeted supportive interventions.

4. **Adopt race-conscious frameworks when planning and implementing institutional policies, pedagogical practices and student supports related to corequisite reading.** We found that Black and Hispanic students were disproportionately placed into developmental reading courses. While corequisite courses narrowed outcome differences by race, disparities were not eliminated. This suggests that institutions must continue to adopt race-conscious frameworks to examine developmental education placement policies and practices as well as classroom practices. Previous research shows that culturally affirming teaching approaches, including intentionally building a sense of belonging, and faculty validation practices, may promote more equitable outcomes.[34]

5. **Strengthen the design and delivery of online corequisite reading models.** While our analysis examined data from before the pandemic and before the large-scale transition to and investment in online learning, we found taking corequisite reading and its college-level pairing course online significantly reduced the likelihood of passing these courses. Survey data collected from students during the pandemic suggests a wide range of challenges persisting with online teaching modalities, including instructor-student communication, training in online teaching for faculty, and availability and access to robust online campus support services.[35]

VI. Conclusion, Discussion and Areas of Challenge that Implementers Should Consider

Academic literacy is an integral component of all aspects of college, regardless of a student's area of study. Corequisite approaches to serve students with developmental needs in reading allow them to enroll in college-level study and build academic momentum as soon as they arrive at college. Indeed, our results show that students' early college success measures, such as first-year gateway course completion rates, experienced substantial improvements after TBR implemented corequisite reform.

However, under the corequisite model, students referred to developmental reading still faced a number of challenges. One quarter of students did not pass the corequisite pairing, and students who did not pass corequisite reading experienced other negative early-college outcomes. Despite the fact that the implementation of corequisite reading appears to have reduced outcome

differences by race, Black students continue to experience disproportionately higher failure rates, as compared to their peers. In addition, students assigned to developmental reading were more likely than students assigned to developmental writing and math to be required to take remediation in all three subjects. This made it virtually impossible for them to complete remedial requirements in a corequisite environment in their first term.

We also found that online courses were not able to produce student outcomes comparable to face-to-face instruction for developmental reading. This is consistent with an extensive body of research focusing on online instruction in higher education. However, in the wake of the COVID-19 pandemic, colleges may not be able to replace online offerings with face-to-face sections entirely. For some students, going to college is only made possible through online options, given work schedules, caregiving commitments or geographic constraints. For these students, the alternative of online courses is not traditional in-person classes, but to forgo college enrollment altogether. It is beyond the scope of this report to identify effective instructional practices for online courses; colleges should draw from the extensive literature to improve online course quality and provide targeted support for students taking online courses (See Xu, Li, & Zhou for an example of how to develop high-quality online courses.[36]).

Content alignment between corequisite and college-level pairings is a mechanism through which corequisite DE motivates students and better prepares them for subsequent learning, as shown by previous research on math pathways.[37] Proper content alignment between corequisite and college-level courses requires deliberate planning. The success in math pathway reforms was a result of collaboration among faculty, administrators and the math education research community. Simply linking learning support in reading with an existing college-level course will not ensure content alignment. Faculty planning time for curricular design is essential to accomplish effective alignment. While not addressed in this study, other research has suggested that the use of a single instructor may facilitate content alignment.[38] Colleges also need to establish infrastructure and funding for faculty undertaking the design and preparation.

Corequisite remediation in English and math has a strong evidence base and is proven to improve students' short-term outcomes (at the very least). This analysis suggests corequisite reading models likewise support the academic success of students. But, unlike English and math models, corequisite reading models raise particular implementation questions, most notably about which college-level disciplinary courses should be paired with the corequisite learning support. Our findings suggest this pairing is associated with material differences in course outcomes, and that passing corequisite reading is a particularly important milestone in building academic momentum. Given the outcome differences in course pass rates by race, institutions should pay particular attention to optimal pairings and strategies to increase course success. In this study, students enrolled in a paired College Success course were most likely to pass corequisite reading. This may suggest benefits to courses that intentionally foster student learning skills and improve college knowledge. As with other corequisite models, practitioners must also continue to experiment with curricular and instructional approaches to create inclusive and welcoming classroom environments to affirm and build on the strengths of students from historically marginalized groups. Language and literacy skills are critical to college success, and strong corequisite reading models have the potential to establish a foundation on which college coursework can build.

[1] Chen et al., 2020
[2] e.g., Calcagno & Long, 2008; Martorell & McFarlin, 2011; Xu, 2016; Xu & Dadgar, 2018
[3] Chen et al., 2020
[4] Education Commission of the States, 2021
[5] e.g., Logue et al., 2016; Ran & Lin, 2019; Miller et al., 2021
[6] ACT, 2021
[7] ACT, 2021
[8] Kodama et al., 2018
[9] Armstrong et al., 2015a, 2015b, 2016
[10] Some community colleges integrate instruction in literacy strategies into college-level, content-area instruction to support the completion of assigned reading and writing tasks (e.g., Perin, 2013).
[11] Jenkins et al., 2010; Cho et al., 2012
[12] Boatman, 2012
[13] Ran & Lin, 2019
[14] Denley, 2021a
[15] Logue et al., 2016; Miller et al., 2021
[16] Miller et al., 2021
[17] Logue et al., 2016; Logue et al., 2019
[18] e.g., Boatman, 2012; Daugherty et al., 2018
[19] Denley, 2021b
[20] Ran & Lin, 2019
[21] High school students in Tennessee are required to take a college entrance exam, either ACT or SAT, during 11th grade.
[22] College composition is the gateway English course at all TBR community colleges. Gateway math can vary depending on which math pathway students choose. For example, for those intending to pursue a STEM degree, gateway math is College Algebra; for students intending to enter a social science program, it is typically Elementary Statistics.
[23] At some colleges, it is possible for students who scored below college-level thresholds for both writing and reading to take College Composition paired with both learning support for writing and learning support for reading, concurrently.
[24] e.g., Attewell et al., 2012
[25] Belfield et al., 2019; Wang, 2017
[26] Scott-Clayton et al., 2014
[27] Since the vast majority of corequisite reading students were required to take corequisite courses in all three subjects, these students were likely to take college composition with both corequisite reading and corequisite writing concurrently.
[28] College Success is not a required course at TBR. At many TBR community colleges, it is reserved for corequisite reading students exclusively.
[29] Perin, 2018
[30] What Works Clearinghouse, 2016

[31] Karp et al., 2015; Cho & Karp, 2012
[32] Xu & Jaggars, 2014
[33] Barnett et al., 2018; Scott-Clayton et al., 2014
[34] Brady et al., 2020; Paris & Alim, 2014; Museus et al., 2017; Rendón et al., 2011
[35] Tennessee Higher Education Commission, 2021
[36] Xu, Li, & Zhou, 2020
[37] Ran & Lin, 2019
[38] Daugherty et al., 2018

References

ACT. (2021). The ACT Profile Report – National, Graduating Class 2021. Retrieved from https://www.act.org/content/dam/act/unsecured/documents/2021/2021-National-ACT-Profile-Report.pdf

Armstrong, S. L., Stahl, N. A., & Kantner, M. J. (2015a). Investigating academic literacy expectations: A curriculum audit model. *Journal of Developmental Education*, 2–23.

Armstrong, S. L., Stahl, N. A., & Kantner, M. J. (2015b). *What constitutes 'college-ready' for reading? An investigation of academic text readiness at one community college* (Technical Report Number 1). DeKalb, IL: Center for the Interdisciplinary Study of Literacy and Language, Northern Illinois University.

Armstrong, S. L., Stahl, N. A., & Kantner, M. J. (2016). Building better bridges: Understanding academic text readiness at one community college. *Community College Journal of Research and Practice, 40*(11), 885–908.

Attewell, P., Heil, S., & Reisel, L. (2012). What is academic momentum? And does it matter? *Educational Evaluation and Policy Analysis*, *34*(1), 27–44.

Barnett, E., Bergman, P., Kopko, E. M., Reddy, V. T., Belfield, C., & Roy, S. (2018). Multiple measures placement using data analytics: An implementation and early impacts report.

Belfield, C. R., Jenkins, D., & Fink, J. (2019). Early Momentum Metrics: Leading Indicators for Community College Improvement. CCRC Research Brief. Community College Research Center, Teachers College, Columbia University.

Boatman, A. (2012). *Evaluating institutional efforts to streamline postsecondary remediation: The causal effects of the Tennessee developmental-course redesign initiative on early student academic success*. Harvard University.

Brady, S., Cohen, G., Jarvis, S., & Walton, G. (2020). A brief social-belonging intervention in college improves adult outcomes for black Americans. *Psychological Science, 6*(18).

Calcagno, J. C., & Long, B. T. (2008). *The impact of postsecondary remediation using a regression discontinuity approach: Addressing endogenous sorting and noncompliance* (No. w14194). National Bureau of Economic Research.

Chen, X., Caves, L. R., Pretlow, J., Caperton, S. A., Bryan, M., & Cooney, D. (2020). Courses Taken, Credits Earned, and Time to Degree: A First Look at the Postsecondary Transcripts of 2011–12 Beginning Postsecondary Students. First Look. NCES 2020-501. National Center for Education Statistics.

Cho, S. W., & Karp, M. M. (2012). Student success courses and educational outcomes at Virginia community colleges. *CCRC Assessment of Evidence Series*, 1–19.

Cho, S. W., Kopko, E., Jenkins, D., & Jaggars, S. S. (2012). New Evidence of Success for Community College Remedial English Students: Tracking the Outcomes of Students in the

Accelerated Learning Program (ALP) (CCRC Working Paper No. 53). Community College Research Center, Teachers College, Columbia University.

Clearinghouse, W. W. (2016). WWC Intervention Report: First year experience courses. Retrieved from https://ies.ed.gov/ncee/wwc/Docs/InterventionReports/wwc_firstyear_102116.pdf

Daugherty, L., Gomez, C. J., Carew, D. G., Mendoza-Graf, A., & Miller, T. (2018). Designing and implementing corequisite models of developmental education. Rand Corporation, 12.

Denley, T., (2021a) Scaling Co-requisite Developmental Education, University System of Georgia Academic Affairs Technical Brief No.1. Retrieved from https://completegeorgia.org/scaling-co-requisite-developmental-education

Denley, T., (2021b) An analysis of Co-requisite Instructional Strategies, University System of Georgia Academic Affairs Technical Brief No.2. Retrieved from https://completegeorgia.org/sites/default/files/resources/CoRequisite%20Strategies_0.pdf

Edgecombe, N. D., Jaggars, S., Xu, D., & Barragan, M. (2014). Accelerating the integrated instruction of developmental reading and writing at Chabot College.

Education Commission of the States. (2021). 50-State Comparison: Developmental Education Policies. Retrieved from https://www.ecs.org/50-state-comparison-developmental-education-policies/

Fancsali, C., Abe, Y., Pyatigorsky, M., Ortiz, L., Chan, V., Saltares, E., et al. (2015). The Impact of the Reading Apprenticeship Improving Secondary Education (RAISE) Project on Academic Literacy in High School: A Report of a Randomized Experiment in Pennsylvania and California Schools. Research Report. Empirical Education Inc.

Fitzgerald, J., Shanahan, T. (2000). Reading and writing relations and their development. *Educational Psychologist, 35*, 39–50.

Jenkins, D., Brown, A. E., Fink, J., Lahr, H., & Yanagiura, T. (2018). Building Guided Pathways to Community College Student Success: Promising Practices and Early Evidence from Tennessee. Community College Research Center, Teachers College, Columbia University.

Jenkins, D., Speroni, C., Belfield, C., Jaggars, S. S., & Edgecombe, N. (2010). A Model for Accelerating Academic Success of Community College Remedial English Students: Is the Accelerated Learning Program (ALP) Effective and Affordable? CCRC Working Paper No. 21. Community College Research Center, Columbia University.

Karp, M. J. M., Raufman, J., Efthimiou, C., & Ritze, N. (2015). Redesigning a student success course for sustained impact: Early outcomes findings.

Kodama, C. M., Han, C. W., Moss, T., Myers, B., & Farruggia, S. P. (2018). Getting college students back on track: A summer bridge writing program. *Journal of College Student Retention: Research, Theory & Practice*, *20*(3), 350–368.

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.

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.

Martorell, P., & McFarlin Jr, I. (2011). Help or hindrance? The effects of college remediation on academic and labor market outcomes. *The Review of Economics and Statistics*, *93*(2), 436–454.

Miller, T., Daugherty, L., Martorell, P., & Gerber, R. (2021). Assessing the effect of corequisite English instruction using a randomized controlled trial. *Journal of Research on Educational Effectiveness*, 1–25.

Museus, S. D., Yi, V., & Saelua, N. (2017). The impact of culturally engaging campus environments on sense of belonging: An examination of differences between White students and students of Color. *The Review of Higher Education*, *40*(2), 467–483.

Paris, D., & Alim, H. S. (Eds.). (2017). *Culturally sustaining pedagogies: Teaching and learning for justice in a changing world*. Teachers College Press.

Paris, D., & Alim, H. S. (2014). What are we seeking to sustain through culturally sustaining pedagogy? A loving critique forward. *Harvard Educational Review, 84*(1), 85–100.

Perin, D. (2013). Literacy skills among academically underprepared students. *Community College Review*, *41*(2), 118–136.

Perin, D. (2018). Academic preparedness. In *Handbook of college reading and study strategy research* (pp. 179–190). Routledge.

Ran, F. X., & Lin, Y. (2019). The Effects of Corequisite Remediation: Evidence from a Statewide Reform in Tennessee. CCRC Working Paper No. 115. Community College Research Center, Teachers College, Columbia University.

Rendón Linares, L. & Munoz, S. (2011). Revisiting validation theory: Theoretical foundations, applications, and extension. *Enrollment Management Journal, 5*, 12–33.

Scott-Clayton, J., Crosta, P. M., & Belfield, C. R. (2014). Improving the targeting of treatment: Evidence from college remediation. *Educational Evaluation and Policy Analysis*, *36*(3), 371–393.

Tennessee Higher Education Commission. (2021). COVID-19 Student Survey Report. Retrieved from https://www.tn.gov/content/dam/tn/thec/bureau/research/special-projects/Fall%20COVID%20Survey%20Report_Final_w%20Cover.pdf

Wang, X. (2017). Toward a holistic theoretical model of momentum for community college student success. *Higher education: Handbook of theory and research*, 259–308.

Xu, D. (2016). Assistance or obstacle? The impact of different levels of English developmental education on underprepared students in community colleges. *Educational Researcher*, *45*(9), 496–507.

Xu, D., & Dadgar, M. (2018). How effective are community college remedial math courses for students with the lowest math skills? *Community College Review*, *46*(1), 62–81.

Xu, D., & Jaggars, S. S. (2014). Performance gaps between online and face-to-face courses: Differences across types of students and academic subject areas. *The Journal of Higher Education*, *85*(5), 633–659.

Xu, D., Li, Q., & Zhou, X. (2020). Online Course Quality Rubric: A Tool Box. Online Learning Research Center, University of California, Irvine.

Appendix. Supplementary Figures and Tables

Figure 1a. College-level corequisite learning support for reading across college and time

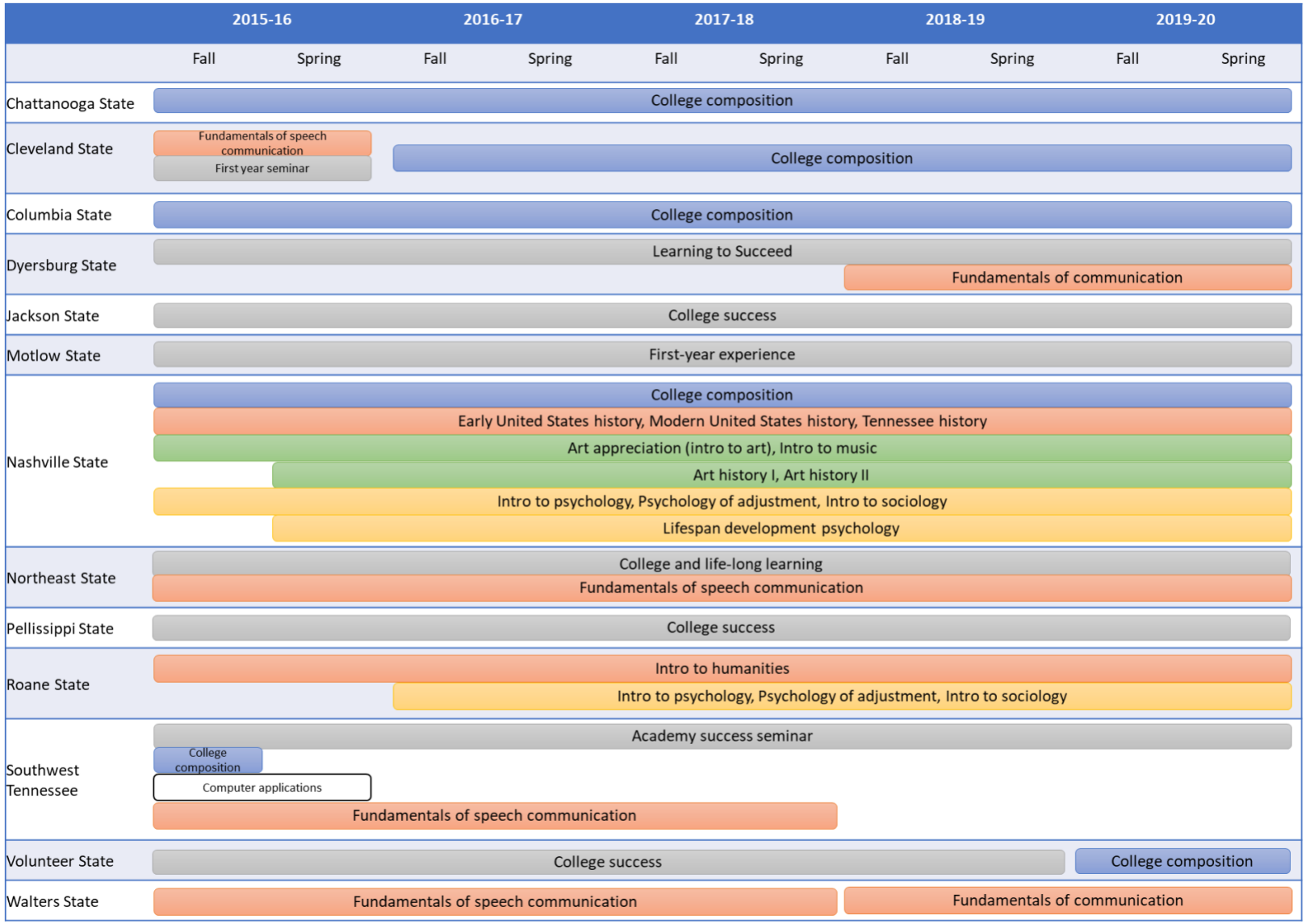


Table 1a. Regression estimates of student characteristics and early college outcomes

	(1) Pass both CR & CL	(2) Complete gateway English by Y1	(3) Persist into 2nd academic year	(4) Complete gateway English by Y1	(5) Persist into 2nd academic year
Outcomes in corequisite reading (CR) & college-level (CL) pairing (reference = passed both CR & CL)					
Passed CR, failed CL				-0.481***	-0.241***
				(0.040)	(0.016)
Failed CR, passed CL				-0.154***	-0.253***
				(0.029)	(0.029)
Failed CR & CL				-0.666***	-0.479***
				(0.032)	(0.013)
Student characteristics					
Female	0.033**	0.034**	0.029*	0.016	0.016
	(0.007)	(0.010)	(0.010)	(0.008)	(0.011)
Race(reference = white)					
Black	-0.057**	-0.053**	-0.000	-0.018	0.019
	(0.013)	(0.015)	(0.012)	(0.014)	(0.012)
Hispanic	0.031*	0.053**	0.086**	0.033**	0.067**
	(0.013)	(0.014)	(0.017)	(0.011)	(0.015)
Other race	0.009	0.003	0.075**	-0.001	0.063**
	(0.020)	(0.024)	(0.017)	(0.018)	(0.013)
Age when first enrolled	0.009**	0.005**	0.003	0.001	-0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
First-time-in-college students	-0.015	0.017	-0.008	0.024	-0.004
	(0.015)	(0.025)	(0.024)	(0.023)	(0.022)
Starting in Spring	-0.019	-0.043	0.138***	-0.032	0.141***
	(0.018)	(0.023)	(0.015)	(0.022)	(0.010)
Starting in Summer	0.074*	0.068	0.270***	0.012	0.231**
	(0.032)	(0.053)	(0.038)	(0.044)	(0.041)
Enrolled at TBR during the same year of HS graduation	-0.034**	0.033	-0.016	0.049**	-0.002
	(0.011)	(0.016)	(0.015)	(0.013)	(0.014)
High school GPA	0.207***	0.201***	0.169***	0.080***	0.080***
	(0.012)	(0.011)	(0.015)	(0.008)	(0.011)
ACT scores					
Reading	0.012***	0.013***	0.008**	0.006***	0.002
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Writing	0.009***	0.001	0.003	-0.003	-0.000
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Math	0.003	0.002	0.006	0.001	0.004
	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)
Observations	32,580	32,580	27,158	32,580	27,158
R-squared	0.110	0.124	0.093	0.421	0.237

Notes. Samples include students who entered TBR between fall 2015 and spring 2020 and enrolled in corequisite learning support for reading (N = 32,580). Analyses on enrollment persistence excluded students who entered during or after fall 2019 to allow sufficient tracking time. All regressions included cohort fixed-effects, college fixed-effects and demographic variables listed in Table 1.

Table 2a. Effects of college-level course pairing on course and persistence outcomes

	(1)	(2)	(3)	(4)
	Pass both CR & CL reading courses		Persisted into 2nd year	
Paired course (reference = composition)				
College success	0.085***	0.066**	-0.007	-0.009
	(0.006)	(0.017)	(0.006)	(0.008)
Humanities	0.038**	-0.010	-0.014***	-0.007
	(0.008)	(0.017)	(0.000)	(0.010)
Arts	-0.004	0.003	0.019	0.034
	(0.017)	(0.031)	(0.016)	(0.022)
Social science	0.024*	-0.001	-0.011	0.003
	(0.010)	(0.020)	(0.008)	(0.014)
Student Covariates	Yes	Yes	Yes	Yes
Cohort Fixed-Effects	Yes	Yes	Yes	Yes
College Fixed-Effects	No	Yes	No	Yes
N	32,580	32,580	27,158	27,158

Note. Samples include students who entered TBR between fall 2015 and spring 2020 and enrolled in corequisite learning support for reading (N = 32,580). Analyses on enrollment persistence excluded students who entered during or after fall 2019 to allow sufficient tracking time.

Table 3a. Effects of corequisite reading and college-level pairing course features on student outcomes

	Pass both CR & CL reading	Complete gateway English by Y1	Persisted into 2nd year
Corequisite course features			
Delivery (reference = traditional)			
Hybrid	-0.008	0.029	-0.010
	(0.048)	(0.041)	(0.032)
Online	-0.121	-0.072**	-0.038
	(0.066)	(0.025)	(0.035)
Credit hours = 3	-0.033	0.057	0.146*
	(0.170)	(0.085)	(0.067)
Took coreq reading during first enrollment term	-0.032	0.146***	-0.031
	(0.024)	(0.030)	(0.026)
Enrollment size	0.000	0.001	0.002*
	(0.001)	(0.001)	(0.001)
College-level course features			
Delivery (reference = traditional)			
Hybrid	-0.040	0.011	0.002
	(0.032)	(0.025)	(0.024)
Online	-0.102**	-0.088*	-0.040
	(0.034)	(0.037)	(0.024)
Enrollment size	0.000	0.001	0.001
	(0.001)	(0.001)	(0.001)
Peer composition (% of on-level students in the section)	-0.020	-0.007	0.054**
	(0.046)	(0.035)	(0.018)
N	32,580	32,580	32,580

Note. Sample includes students who entered TBR between fall 2015 and spring 2020 and enrolled in corequisite learning support for reading. All models controlled for student demographic, academic covariates, cohort fixed-effects, college fixed-effects and high school fixed-effects.