



## High School Dual Enrollment Programs: Are We Fast-Tracking Students Too Fast?

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Roughly one third of high school graduates do not enroll in postsecondary institutions, and a third of those who do are required to enroll in remedial education to prepare for college-level work (National Center for Education Statistics, 2003, 2004). One type of program designed to address these educational shortcomings is dual enrollment (hereafter *DE*), an arrangement by which high school students enroll in college courses and earn college credits. Proponents of *DE* believe that participation may promote college enrollment and completion by giving students a stronger preparation and a realistic idea of what college academics are like (see, e.g., Bailey, Hughes, & Karp, 2002). However, it is also the case that *DE* programs could potentially discourage those students who are academically or emotionally unprepared to handle the demands of college (Bailey & Karp, 2003) — or they may have no effect on college enrollment and completion at all if they only serve college-bound students.

Despite the growing popularity of *DE* programs, there is little quantitative evidence on their effectiveness. Assessing the impact of *DE* is difficult because of the problem of selection bias, which arises from two sources. First, high school students

choose to take college courses based on their academic ability, motivation, and expected gains from participation. Second, colleges are allowed to set their own admission requirements to ensure the integrity of their academic programs. Students who participate in *DE* programs, therefore, may differ in unobservable ways from students who do not participate, causing a spurious correlation between participation and outcomes.

The current study constitutes the first attempt to use a quasi-experimental method — the regression discontinuity (RD) design — to gauge the causal effect of *DE* on students' academic outcomes. Since dual enrollment can encompass a wide range of experiences, two separate analyses were performed. The first evaluates the impact of enrolling in any academic *DE* course using GPA as the eligibility criterion. Henceforth, this analysis is referred to as the effect of *DE*-basic. The second evaluates the impact of a particularly challenging and popular *DE* course, college algebra, which requires that students have a minimum score on a college placement test (CPT) in addition to meeting the GPA requirement. This analysis is referred to as the effect of *DE*-algebra. Outcomes of interest included high school graduation, two- or four-year college enrollment, and associate or bachelor's degree attainment.

### Method

#### *Data*

This study uses data from the Florida Department of Education, which includes all public school students in the 2000–01 and 2001–02 high school senior cohorts and tracks their postsecondary

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outcomes in the state's public system through summer 2007. The state's administrative records provide transcript information on courses taken and grades received in high school and college. The data contain basic demographic characteristics, such as gender, race, English language proficiency, and free lunch eligibility, as well as students' 10th grade state standardized test scores (from the Florida Comprehensive Assessment Test, or FCAT) and college placement test scores. State records on postsecondary enrollment (though not degree attainment) are complemented with data from the National Student Clearinghouse (NSC), which tracks postsecondary enrollment of students as they enroll in out-of-state colleges or private institutions. District characteristics, such as median income and urbanicity, are obtained from the 2000 Common Core Data and decennial census.

Two key features of the data are particularly relevant for a study of DE. First, the data track individual students as they transition from high school to college. Most previous studies on DE use college transcript records, restricting the analysis to students who go to college. Given that DE might change the composition of students who go to college, limiting the sample to college-goers induces sample selection bias. Not only might DE students who go to college differ from those who do not, but they also might differ from non-DE students who go to college without the program's help. Second, the data contain a unique identifier for DE courses, indicating their location (high school or college campus) and type (academic or vocational). Identifying DE students, course location, and course type based on college transcripts can be challenging because not all students transfer their DE credits, and when they do, credits are recorded as transfer credits, requiring high school graduation dates (which are not always available in college transcripts) to identify DE credits.

GPA eligibility requirements for DE were collected from the inter-institutional articulation agreements between the districts and colleges, personal communication with DE coordinators, and college catalogs for the years relevant for the study. The CPT cutoff scores for placement into the college algebra course were obtained from the college catalogs or, when unavailable, from state documentation on placement scores (Florida Department of Education, Articulation Coordinating Committee, 2006).

### *The Regression Discontinuity Design*

Florida provides a unique opportunity to assess the effect of dual enrollment because participation requirements are set forth by the state. In particular, students are required to have a minimum 3.0 high school GPA in order to take an academic dual enrollment course and, for courses such as college algebra, must demonstrate a minimum proficiency on a college placement test (CPT). These features of the program allow the use of two regression-discontinuity analyses to gauge the causal effect of the program by comparing the outcomes of students who barely pass with those of students who barely miss the required GPA or CPT cutoff (for algebra).

The first analysis captures mostly the effect of those academic DE courses for which only an eligible GPA suffices for enrollment. These courses are typically introductory community college courses in subject areas other than math or English. A course is considered academic if it counts toward the requirements of an associate degree, as opposed to vocational courses that are only applicable toward certificates. A standard regression discontinuity (RD) approach is used to compare the outcomes of students with a GPA just above 3.0 with those of students with a GPA just below 3.0. The RD approach requires that all determinants of the outcome except the treatment vary smoothly around the cutoff. While this assumption is at some level fundamentally non-testable, there is no evidence that students above the cutoff are statistically significantly different from those below the cutoff in characteristics known to affect outcomes (gender, race, English fluency, poverty, and pre-DE English and math test scores).

The second analysis, which evaluates the impact of DE-algebra, is complicated by the fact that an eligible student who does not take the course while in high school has the opportunity to take the course later, while in college. This could potentially result in a greater jump in outcomes around the CPT cutoff score and an overestimate of the true effect of DE-algebra. Standard RD estimation cannot accommodate the presence of a second treatment discontinuously changing at the same cutoff and therefore cannot disentangle the effect of algebra in high school from the effect of algebra in college. To address this, a sequential RD-matching estimator was used to extend the standard RD design to accommodate a subsequent treatment with the same eligibility requirement. This sequential RD

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estimator relies partially on matching techniques to compare the outcomes of DE non-participants scoring just above the cutoff with those of DE non-participants scoring just below the cutoff. The validity of the matching procedure follows from the same assumptions that make the RD design valid (Speroni, 2011). This approach is used to determine whether any observed effect on outcomes experienced after college can be attributed solely to DE.

## Results

### *Effect of Dual Enrollment-Basic on Academic Outcomes*

Overall, the data provide no evidence that academic DE courses in general had an impact on outcomes for students on the margin of eligibility. In terms of high school graduation rates, there is no evidence that participation in DE-basic had a significant effect (though there is little variability in this outcome measure, given that the data consists mainly of students who already made it to 12th grade). Likewise, the effect of DE-basic on college enrollment was negligible; the point estimate was slightly negative but statistically insignificant, suggesting that the program was unlikely to be affecting students' college enrollment decisions. While there is a slight indication that DE diverted students who would have otherwise gone to four-year institutions into two-year colleges, this effect is insignificant within a narrow bandwidth around the GPA cutoff.

Relative to students below the cutoff, DE-basic students just above the cutoff were not significantly more likely to obtain an associate degree. The point estimates on baccalaureate attainment roughly mirror the evidence on four-year college enrollment rates. However, the effects are fairly imprecisely estimated across bandwidths and only statistically distinguishable from zero with the inclusion of additional controls in the regression, despite the arguably large sample size. In general, the effect on college degree attainment (either associate or bachelor's) corresponds closely to the basic pattern found in bachelor's degree attainment: large point estimates that are unstable across discontinuity samples and not consistently significantly different from zero make it difficult to draw a definitive conclusion.

### *Effect of Dual Enrollment Algebra on Academic Outcomes*

The data indicate that participation in DE-algebra is associated with positive academic outcomes. There is some indication that, for students with a CPT score around the cutoff used for placement, taking DE-algebra increased the likelihood of obtaining a high school diploma. However, the effect is small, ranging from a 4 to 7 percentage point increase depending on the discontinuity sample, and not always statistically significant at conventional levels. The beneficial effect on college enrollment is much greater. The coefficients are large, statistically significant, and generally robust to discontinuity sample or regression specifications. The most conservative estimate suggests a 16 percentage point increase in postsecondary enrollment. Although it appears that DE-algebra students were more likely to go to college after high school, they were not more likely to enroll in a four-year institution.

Students who participated in DE-algebra were not only more likely to enroll in college but also more likely to earn a degree. DE-algebra increased associate degree attainment by 23 percentage points from a base of 17 percent just below the cutoff and increased bachelor's degree attainment by 24 percentage points from a base of 13 percent. Results from a series of robustness checks indicate that the positive and significant estimates on college degree outcomes are consistent and stable across a range of samples and model specifications.

College algebra is a gatekeeper course, and having it completed at the onset of college seems to have helped students make progress toward a degree. One potential explanation for this finding is that students who experience a more rigorous curriculum in high school might be better academically prepared for college and therefore more likely to persist toward a degree. DE students might have a better experience with the course (e.g., have a higher passing rate) in high school than in college as a result of the lower work load in high school or the availability of support (high school counselors are supposed to monitor students' progress in DE courses). A different hypothesis is that students who have already taken college-level algebra start college with higher self-esteem and confidence in their ability to obtain a degree. In addition, the effect of DE-algebra on degree attainment might be due not only to improvements in academic performance but also to an increase in the rate of college attendance.

## Conclusion

In the presence of discouraging statistics on postsecondary enrollment and attainment, there is a growing need to find effective ways to help high school students in their transition to higher education. There is substantial policy interest in finding effective interventions that not only get students into college but also help them succeed once enrolled. Policymakers are increasingly considering dual enrollment programs as a promising intervention. As these programs grow in popularity, it is important to understand their impact on students' academic progress.

Overall, based on data from the 2000–01 and 2001–02 high school graduating cohorts in selected Florida counties, there is little indication that simply taking dual enrollment increased the likelihood of high school graduation, college enrollment, or college completion for students on the margin of eligibility. However, this analysis encompasses a wide range of dual enrollment course experiences. Focusing the analysis on dual enrollment algebra reveals that participating students were significantly more likely than similar nonparticipating students to enroll in college and obtain a degree.

From a policy perspective, the current study provides credible evidence that dual enrollment programs can play a significant role in improving students' college access and success. It also highlights that factors such as the subject area, quality, or level of difficulty of the dual enrollment experience should be taken into account when expanding these programs with the objective of addressing the needs of high school students as they transition to postsecondary education. Districts and colleges should consider tracking outcomes for dual enrollment students and using the data they obtain to guide them as they adjust program structure for maximum impact.

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