COMMENTARY:

Characterizing the Effectiveness of Developmental Education: A Response to Recent Criticism

By Thomas Bailey, Shanna Smith Jaggars, and Judith Scott-Clayton

Although our research concludes that the current system of developmental education needs improvement, we do not advocate...the elimination of developmental education.

Thomas Bailey
Director
tbailey@tc.edu

Shanna Smith Jaggars
Project Leader, Virginia Study
Research Coordinator

Judith Scott-Clayton
Project Leader, Education and Interstate Mobility, Federal Work Study, and Subject-Area Incentive

Community College Research Center
Teachers College, Columbia University
Center for Analysis of Postsecondary Education and Employment
Box 174
New York, NY 10027

Abstract: ***Research conducted by the Community College Research Center (CCRC) and others was criticized in an article by Alexandros M. Goudas and Hunter R. Boylan (2012) published in the* Journal of Developmental Education*, Volume 36, Issue 1. They raise specific contentions related to the methodology applied in the CCRC studies, the review of related literature, and stated findings. Their article claims that we and others have overgeneralized, misinterpreted, and misapplied the data and research to advance a reform agenda that involves replacing prerequisite with corequisite developmental education. In this commentary we show that their key claims do not stand up to scrutiny. Moreover, we point out that, although we think research so far suggests that corequisite models have potential as part of a comprehensive reform of developmental education, we have never called for the elimination of prerequisite remediation. We conclude with some general suggestions—based on our research findings—for strengthening the services that community colleges provide to students with weak academic skills.***

Over the past several years, the Community College Research Center (CCRC), the National Center for Postsecondary Research (NCPR), MDRC, and other researchers and research organizations have conducted several research studies and reviews on developmental education (see http://ccrc.tc.columbia.edu/Developmental-Education-and-Adult-Basic-Skills.html). In a recent issue of the *Journal of Developmental Education,* Alexandros Goudas and Hunter Boylan (2012) aimed several criticisms at this body of work, with the key claims being that: (a) we unfairly portray developmental education as ineffective because it does not lead to outcomes *better* than those of college-ready students; (b) we ignore several studies showing positive results; and (c) we overgeneralize from results that are only valid for students near the developmental cutoff scores. These three claims are woven into a broader critique that we have "cherry-picked" negative results, neglected methodological problems with the studies yielding such results, and ignored positive results in order to advance our own reform agenda and, in particular, to support the notion of corequisite developmental education. (In the corequisite model, developmental students enroll in college-level courses and in the same term are provided additional academic support, which might include enrollment in a companion course or workshop that is linked to the college-level course for which they are weakly prepared.)

In this commentary, we address each of the claims advanced by Goudas and Boylan (2012). We disagree with their portrayal of our research as biased and flawed, yet we also believe that their comments may reflect some widespread confusion in the field about research on developmental education, so our response has significance beyond our particular disagreements with these authors. However, before addressing their claims, we wish to clarify a critical point.

We value and appreciate the challenging and important work performed by developmental education faculty within the classroom. Faced with underprepared students, these instructors can make a substantial positive difference in the academic and personal lives of the people they teach. We do not dispute this reality. However, this reality coexists with another one suggested by the research: The traditional system of assessment, placement, and developmental coursework has negative side effects (at the very least, developmental coursework takes time and resources and may discourage students) which, when considering *the developmental population as a whole,* tend to balance out its positive effects.

Although our research concludes that the current system of developmental education needs improvement, we do not advocate—nor do we believe that the results of our research support—the elimination of developmental education, the placing of all students into college courses, or the wholesale conversion of developmental education into a corequisite model. We do think, however, that community colleges can more effectively help

students who arrive with academic and nonacademic weaknesses that impede success. We recognize that improvements will draw heavily on the skill and experience of today's developmental faculty, but they cannot do it alone. We contend that the system of developmental education needs reform. Moreover, we are optimistic about the many exciting and innovative reforms being implemented in states and colleges all over the country. These reforms include changes in assessment, placement, financial aid, connections to high schools, links to college-level programs, curricular content, student supports, and pedagogy.

We also want to clarify our use of the term developmental education. Most of the research we cite refers to students who were referred to developmental education based on their scores on placement exams. Therefore those students could take advantage of all of the services provided by the college to students with weak academic skills, including developmental courses or other types of tutoring or non-credit assistance. Thus we are referring to the *system* of developmental education, including assessment and placement procedures, coursework, and related supports. If that system is not effective, the problem may be in the classrooms, but it might also result from inaccurate assessment procedures, poor alignment between developmental and college-level content, or other factors.

Having made these larger points, we will now address each of Goudas and Boylan's (2012) claims. In order to do so, we must delve into some technical and methodological details in order to explain the misunderstandings undergirding their claims and to provide a more accurate understanding of the research and its implications. We hope the reader will have patience with this exercise; for those short on time, we provide a brief summary and conclusion at the end of this essay.

First Claim: We Unfairly Portray Developmental Education as Ineffective Because It Does Not Lead to Outcomes Better Than Those of College-Ready Students

The most simplistic way to estimate the effectiveness of the developmental education system would be to compare the outcomes of students provided with developmental education services with those who go directly into college-level courses. In such a comparison, one would hardly be surprised to see developmental education students doing worse, because they are selected for remediation on the basis of low test scores. Thus even if developmental education improved student outcomes, developmental students might still succeed at lower rates than students who arrive at college with stronger skills. It is in this context that Goudas and Boylan argue that it is unfair to expect developmental students to do better than college-ready students. They state that "to take students who do not understand basic math and English concepts and to get them to pass their gatekeeper course at the same rates as students who never require remediation should be considered a success for developmental education" (p. 4).

But we are not satisfied with a comparison of two groups of students who are not similar to begin with (comparing two groups who are not similar at the outset is the only kind of comparison in which a lack of any difference in outcomes can be recast as a positive impact). Instead, we focus our own research and our review of existing literature on methodologies that compare virtually identical students, some of whom are and some of whom are not assigned to developmental education. Because the two groups are identical prior to remedial assignment, if remediation has a beneficial effect, it would show up as a positive difference in outcomes. If both groups have the same ultimate outcomes, then the developmental group would have undergone the cost and time of developmental education without gaining any benefits.

A common strategy that has emerged over the past few years (and not just for studying remediation) is known as the "regression discontinuity" (RD) approach. Despite the fancy name, the intuition behind this approach is quite straightforward. The idea is that if students are assigned to remediation based on a cutoff score, and we narrow our focus to those students who score just above and just below the cutoff, then which students are and are not assigned to remediation is effectively random. Students very near the cutoff are virtually identical (even if, across the larger range of test scores, high-scoring and low-scoring students are quite different). This circumstance is illustrated in Figure 1.

Figure 1, which is based on data from a large urban community college system, shows data for students who scored between 40 and 50 on the COMPASS algebra exam. In the sample from which these data are drawn, the actual developmental cutoff score used was 30; thus, none of the students represented in the figure underwent remediation. Here we have drawn a vertical line at the score of 45, which represents a more typical college-level cutoff; that is, in many colleges, students scoring below 45 would be assigned to remediation (see Fields & Parsad, 2012). The figure shows that students on either side of the score of 45 have similar probabilities of earning a C or better in the college-level course; indeed, the students near this line also share similar observable and unobservable characteristics at the time of assessment. It is for this reason that they can be considered virtually identical for purposes of analysis.

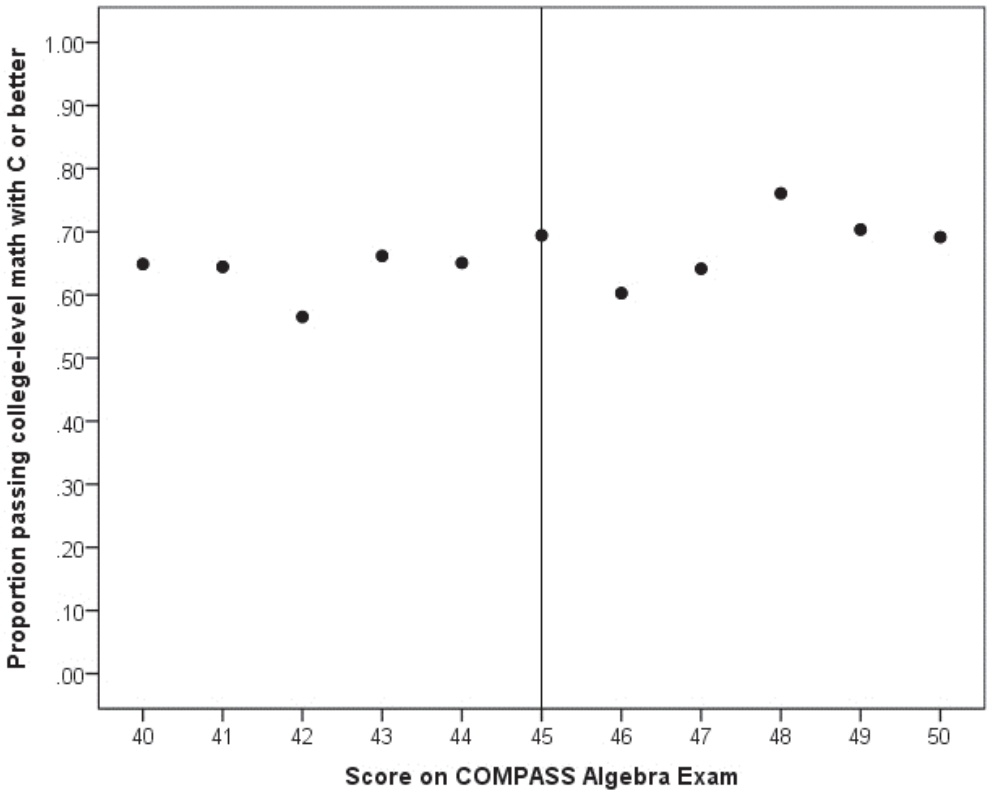

Figure 1. Plot graph representing student success rate (y) by placement exam score (x) among students (N=1,149) advancing directly to college-level math in a data set from a large urban community college system.

In a college where 45 was the cutoff score, students just below the cutoff would be assigned to remediation. And if remediation had a positive effect, then one would expect students just to the left of the line to end up with better outcomes than the college-ready students just to the right of the line; in other words, one would expect to see a discontinuity in outcomes right around the cutoff. We should emphasize that this analysis does not compare students with a much lower score (for example, a 20) to college-ready students. Students with a score of 20 have a much lower probability of earning a C in the gatekeeper course, so we would never argue that they are similar to college-ready students.

In general, however, regression discontinuity studies have *not* found that students to the left of the line, after undergoing remediation, fare better than students to the right. Instead, remediated students just to the left of the cutoff score have no better and sometimes worse long-term outcomes (such as persistence, enrollment in college-level courses, and performance in college-level courses) than students just to the right. This is the conclusion of the regression discontinuity studies (Calcagno & Long, 2008; Martorell & McFarlin, 2007, 2011) discussed by Goudas and Boylan (2012). Moreover, three new regression discontinuity studies also find largely null and negative effects (Dadgar, 2012; Scott-Clayton & Rodriguez, 2012; Xu, 2013). This overall conclusion holds for the studies that measure the effects on completion of the first college-level course in the remedial subject area (Calcagno & Long, 2008, Scott-Clayton & Rodriguez, 2012). So Goudas and Boylan are correct that we criticize remediation for not raising the outcomes of developmental students above those of college-ready students in these studies. Goudas and Boylan characterize developmental students as "students who do not understand basic math and English concepts" (p. 4), but these are not the developmental students being compared in these studies. Both the developmental and college-ready students being compared in these studies scored within the same narrow range on a placement test, so they start out essentially at the same point. Therefore, if remediation is effective, it is appropriate to expect that students to the left of the cutoff, after undergoing remediation, would demonstrate stronger long-term outcomes than students to the right of the cutoff.

Second Claim: We Neglect the Results of Studies that Find Positive Outcomes of Developmental Education

Goudas and Boylan (2012) assert that we focus exclusively on the most negative results of the research articles and reports that we cite. They argue that we also ignore some studies with positive results.

For example, they point out that a paper by Boatman and Long (2010) showed some positive results for developmental education, but we tend to cite the study as showing that remediation is not effective. Boatman and Long examined eight outcomes: grade in first relevant college-level course, one-year any-credit accrual, second-term persistence, three-year persistence, three-year any-credit accrual, three-year college-credit accrual, six-year any-degree completion, and six-year bachelor's degree completion. (In the outcomes that we discuss here, we eliminate completion of a bachelor's degree since it was captured in the completion-of-any-degree variable.) Boatman and Long report these outcomes in two samples: community college and four-year college students. We will focus on the results for community colleges, although they are substantially the same for four-year students. In their study, they analyzed the effects of referral to developmental math, reading, and writing. For reading and writing, they examined two different levels (college-ready vs. assigned to higher-level developmental, and assigned to higher-level developmental vs. assigned to lower-level developmental), and for math they examined the effects for two levels (college-level and one and two levels below college-level). That is, the paper analyzed 49 effects for community colleges, of which 10 were negative, 4 were positive, and the remaining 35 were null. One of the outcomes examined was the student's grade in the first college-level course in the remediated subject area. The highest level remedial courses in all three subject areas showed no positive effect on these grades. Enrollment in the lower-level writing course did have a positive effect on grades in the first college-level course, but there were no positive results for grades for the other lower-level remedial courses. We do not think it is a stretch to characterize this pattern as, overall, indicating a null result.

We cannot be confident that students who choose to skip developmental education, despite the referral, are equivalent to students who choose to comply.

Similarly, Goudas and Boylan (2012) state that a study by Bettinger and Long (2005b, 2009) shows that "remediation has positive effects overall." Bettinger and Long's findings are slightly more nuanced: They conclude that remediation decreased the probability of dropping out and increased the probability of completing a bachelor's degree, but had no influence on credit accumulation or transfer up. Goudas and Boylan are correct that we rarely cite this study, because our research focuses on community colleges and approximately 90% of the students in this analysis started in four-year colleges. Thus we more typically cite Bettinger and Long's (2005a) companion study, which used the same methodology but focused on full-time community college students who took the ACT and declared the intention of earning a bachelor's degree. This study reported that community college students placed in math remediation were more likely to transfer and to accumulate more credit hours but were not less likely to stop out nor more likely to earn a degree. There was no statistically significant difference between the four measured outcomes for students enrolled in English remediation and comparable nonremedial students. The positive results are encouraging, but two positive and six null results in their study do not fundamentally change the overall picture that emerges from the collection of studies. Moreover, because the sample included only students who had an ACT score and had declared that they wanted to earn a bachelor's degree, this study's results are not as generalizable as regression discontinuity studies that do not make these restrictions. Accordingly, we typically put less weight on this study in our overall consideration of results.

Goudas and Boylan (2012) also point to one of CCRC's own studies (Bailey, Jeong, & Cho, 2009, 2010a) as evidence of a positive effect of remediation. Goudas and Boylan argue that a superior method to regression discontinuity of testing the effect of developmental education would be to compare students who tested into remediation but went directly to gatekeeper courses ("skippers") with students who were referred to remediation and who took the remedial courses ("compliers"). They assert that the data in this CCRC study show that the math developmental skippers passed the gatekeepers courses at much lower rates than the compliers (12% compared to 50%) but that we never mention these results in subsequent studies. Their conclusion is a misinterpretation of the study's data (the rates were 70% and 79% , respectively), but, in any case, such a comparison cannot be used to assess the effectiveness of remediation since it makes no attempt to make the two groups comparable by controlling for observable characteristics such as assessment scores or unobservable attributes such as motivation. We cannot be confident that students who choose to skip developmental education, despite the referral, are equivalent to students who choose to comply. That is why we appropriately do not include these results in our summaries of research.

Goudas and Boylan (2012) also describe two studies which have appeared in peer-reviewed research journals and have positive outcomes for

developmental education but which they say are not typically cited in summaries of research on the effectiveness of remediation: Attewell, Lavin, Domina, and Levey (2006) and Bahr (2010).

Attewell and his colleagues (2006) used national survey data to compare graduation rates of students (at both the community college and four-year level) who took developmental courses with those who did not, controlling for high school preparation and prior academic skills. The method they used to create comparability between the treatment and comparison group, known as propensity score matching, discards college-ready students who have no good match in the remedial group and likewise discards remedial students who have no good match in the college-ready group. In this study, they discarded approximately 70% of the potential sample due to lack of match on observable characteristics (i.e., demographics, high school preparation, and prior academic skills). In essence, then, like the studies discussed thus far, the Attewell et al. analysis focused on students at the margin of college readiness, and it compared two groups of students who already had similar probabilities of positive outcomes.

Most of the Attewell et al. (2006) study focused on the effect of enrolling in developmental education; that is, among two students with a similar level of readiness, did the one who enrolled in developmental education have better outcomes than the one who did not? Their analyses showed rather discouraging results: among 16 tests, only 3 had positive effects, 6 had negative effects, and the remaining 7 were null. This pattern closely matches the patterns found in the regression discontinuity studies.

However, Goudas and Boylan (2012) may have been more interested in the second set of Attewell et al.'s (2006) analyses, which focused on the effect on graduation of passing all remedial courses taken. Among four-year college entrants, the effects were all null, but among two-year college entrants, the effects were positive for both reading and writing remediation (although they remained null for math remediation).

Goudas and Boylan (2012) also point to a study by Bahr (2010) that compared developmental students who eventually completed remediation to students who started in college-level courses. To create more comparability between the two groups, Bahr controlled for a variety of demographic and enrollment characteristics. He found that in general the two groups had similar outcomes in terms of graduation and transfer and thus argued that, for those who completed their sequences, remediation effectively brought developmental students up to college level.

Who are the one third to one half of developmental students who completed their sequences?

There are two problems with studies that compare developmental education completers to college-ready students. First, these studies ignore the problem of noncompletion. Fewer than half of community college developmental education students complete their assigned remedial sequences, and many fewer do so among those students assigned to multiple levels. Only a third of math remedial students complete their sequences (Bailey, Jeong, & Cho, 2009, 2010a, 2010b). Should not the ability to get students to completion be part of any judgment about the success of a program?

But there is a second problem as well. Even if one ignores the completion problem and focuses on the effect of remediation on those who complete, a comparison between the outcomes of developmental passers and academically similar students who did not enroll in remediation still cannot determine the effect of remediation on the completers. It cannot do so because the two groups that are being compared are not equivalent at the outset. Who are the one

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third to one half of developmental students who completed their sequences? We know that they are a group of students who have enough determination and motivation to get through a sequence of courses that foil the majority of students who try them.

The college-ready students who are included in the comparison scored above a cutoff on an assessment. The remedial completers are included because they scored below the cutoff *and* enrolled in and passed one or more courses. The remedial sequence is likely to screen out less determined students, students who face more nonacademic problems, and perhaps those who lack support networks outside of college. The assessment test taken by the college-ready students is less likely to screen students in this way. Moreover, our research suggests that over 40% of students who are assigned to remediation could earn a C or better in a college-level course without going through remediation (Scott-Clayton, 2012, p. 21). If the developmental education completers are drawn from the most motivated and academically prepared among the developmental students, then it may not be surprising that they do as well as or even better than the college-ready students.

Thus developmental sequences may strengthen student academic skills, but they also act to screen out many students. Students who enter directly into college-level courses do not get the benefit of the remedial instruction, but neither are they subject to the screening. Comparisons between outcomes of developmental education completers and students who enter directly into college-level courses cannot differentiate between the academic benefits (what we want to measure) and the effects of screening (which tends to exaggerate the measured positive academic effects).

In contrast, the regression discontinuity analyses do not try to separate the positive academic from the negative screening effects. By starting the comparison at the point when students are assessed, they measure the net effect of these two factors. It is true that these analyses do not reveal the effect on academic skills of students who complete their sequences. But the methods used in the Attewell et al. (2006) or Bahr (2010) studies are not able to answer this question either. In any case, we think that the RD studies answer the most relevant policy question. For the students included in the analysis, they measure the effect of the policy that is available to the colleges: offering remedial services. Colleges cannot refer a student to developmental education completion in the way that they can refer students to developmental education enrollment.

Third Claim: We Overgeneralize from Results that Are Only Valid for Students Near the Developmental Education Cutoff Scores

It is true that regression discontinuity results are most reliable for students who score near the developmental cutoff. (We point this out in any study in which we have used this method.) That is, a study focusing on the COMPASS algebra cutoff of 45 can demonstrate that developmental education does not help improve the outcomes of students who score between 40 and 45, but it is not reliable for measuring the effectiveness of developmental education among students who score a 20.

This criticism is a reasonable one, although it can also be leveled at the studies that Goudas and Boylan cite as supporting a more positive view. The Attewell et al. (2006) and Bettinger and Long (2005b, 2009) studies are also most reliable for the marginally college-ready student.

But the power of this criticism is diluted by the fact that the definition of "marginally college-ready" varies widely across institutions and therefore also varies from study to study. For example, using the COMPASS algebra exam, Boatman and Long (2010) examined a statewide college-level cutoff of 50, whereas Scott-Clayton and Rodriguez (2012) examined a college-level cutoff that varied from 27 to 40 across the colleges in their sample. Using the COMPASS reading exam, Boatman and Long examined a statewide college-level cutoff of 68, whereas Xu (2013) examined a college-level cutoff that varied from 72 to 81 across the colleges in her sample. Thus, the findings from the literature do encompass students at different levels of incoming ability.

Colleges cannot refer a student to developmental education completion in the way that they can refer students to developmental education enrollment.

In addition, regression discontinuity studies have considered very poorly scoring students by focusing on lower level cutoffs, such as the cutoff between an upper level and lower level developmental course. For example, some of the Boatman and Long (2010) analyses we discussed earlier focused on students at the margin between top level and midlevel developmental math, between midlevel and lowest level developmental math, between upper level and lower level reading, and between upper level and lower level writing. Only for developmental writing did Boatman and Long find some positive effects of being assigned to the lower level course. Similarly, Dadgar (2012) examined the margin between upper level and lower level math and found negative or null effects, and Xu (2013) examined the margin between upper level and lower level reading and writing and found negative or null effects for being assigned to the lower level course in both subject areas.

The studies cited in this section suggest that students at many points in the developmental continuum are unlikely to be harmed by attempting courses that are slightly more difficult than their placement scores suggest they can handle. For example, a student whose score is just below the assessment margin between two and three courses below college-level math does not benefit from taking the third-level course. This interpretation aligns with work from the K-12 literature demonstrating that academically lagging students benefit from more challenging courses taken with more-advanced peers (Burris, Wiley, Welner, & Murphy, 2008; Levin, 2007). However, that does not necessarily imply that students scoring at the very lowest levels should be placed in college-level courses. Some low-scoring students can succeed in college-level work, but many cannot. With additional supports such as corequisite models, perhaps more of these very low-scoring students would succeed in college-level courses, but certainly some would continue to fail.

Summary and Recommendations

Thus the three criticisms made by Goudas and Boylan (2012) do not stand up to scrutiny. But they do echo misunderstandings about the conclusions and implications of these developmental education studies that we have often encountered when presenting our findings at conferences, colleges, and state-level meetings. We will summarize our conclusions about their three claims.

Do we unfairly expect that remediation should raise outcomes of remedial students above those of college-level students? The conclusions from the regression discontinuity studies suggesting that remediation is not effective because it fails to raise the outcomes of developmental students above those of similar college-ready students may indeed sound puzzling. Since one tends to think that developmental and college-ready students are two distinct categories, it is often difficult to understand a methodology based on the idea that some students in these two apparently distinct groups are in fact very much the same (at the time of assessment). It is this pool of virtually identical students on each side of the cutoff that are examined in the regression discontinuity studies, and for them it is appropriate that we expect

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remediation to raise outcomes for "developmental" students above outcomes for the "college-ready" students. The large majority of the outcomes in these studies find no improvement or even negative results, although there are a small number of positive results. Focusing only on success in the first college-level course does not yield a more positive general result.

Do we ignore studies with positive outcomes? The most positive findings that Goudas and Boylan (2012) cite are based on comparisons of developmental education completers and college-ready students. Focusing on the completers makes intuitive sense: It is worthwhile knowing the effect of a service for those who experience it, and indeed we frequently hear college personnel state that their developmental education completers do as well as their college-ready students. But unfortunately, this comparison cannot differentiate between the positive academic effects of remediation, which surely some students experience, and the screening effect, which eliminates from the comparison many of the weaker students who fail to complete remediation. These analyses also completely dismiss the experience of many students who are assigned to developmental education but fail to make it through their assigned sequence. There are some positive results in the Attewell et al. (2006), Bettinger and Long (2005b, 2009), and Boatman and Long (2010) studies of the effects of enrollment in or assignment to remediation, but these studies also mostly find no effects and reveal as many negative effects as positive ones.

Do we overgeneralize from results that are only valid at the remediation margin? The criticism that regression discontinuity studies cannot be generalized because they are valid for only those students around the cutoff score is a reasonable one for any single study, but there are now several studies that examine cutoff scores at different levels Results for very low cutoff scores (or margins between multiple levels of remediation) are similar to results for higher scores.

What are the implications of these conclusions? Research analyzes outcomes for large samples of students and reveals "average" effects, but there is wide variation around those central tendencies. If on average the effects of remediation are disappointing, that does not mean that there are not many individual students who do benefit. This is partly reflected in the positive findings from some of the studies. Because faculty and administrators see these students and can observe the progress that they make, it is often difficult to understand research that concludes that on average there is little effect.

We certainly have not argued for the wholesale elimination of prerequisite developmental education. In fact, we have publicly argued against approaches that do not provide students with very weak academic skills the supports they need (Bailey, Hughes, & Jaggars, 2012). The corequisite model, in which many students assessed into remediation are placed in college-level courses with some additional supports, seems appropriate for students at the upper end of the developmental spectrum. It may also be appropriate for students in certain occupational certificate programs who require a limited and specific set of math, reading, and writing skills to succeed in their chosen occupation. However, very poorly prepared students aspiring to an associate degree or beyond need a different model.

Recommended Models

A fair interpretation of this body of research provides legitimate motivation for all to look for ambitious new ways to help all community college students succeed. Although Goudas and Boylan (2012) emphasize the "negative" aspects of our research, we prefer to focus on the insights that it provides for improving outcomes for community college students. Innovative instructors and administrators all over the country are building on their experiences to develop exciting approaches to working with students who arrive at college with serious weaknesses that function as barriers to success. Descriptions of some strategies that we believe show promise follow.

Improvements in the assessment and placement process would make a huge difference.

First, some students are referred to developmental education who in fact do not need it, for a variety of reasons. They may have performed more poorly on the exam than their actual skill levels warrant, or they may have other strong nonacademic skills (such as help-seeking behaviors and study skills) that allow them to succeed in courses that seem above their current skill level. For these students, improvements in the assessment and placement process would make a huge difference. In a recent report, CCRC researchers reviewed a variety of innovative and promising improvements in this regard that are occurring across the country (Hodara, Jaggars, & Karp, 2012).

Second, outside of weaknesses in specific reading, writing, and math skills, many developmental students (as well as many college-ready students) struggle due to weaknesses in an array of other academic and nonacademic skills which go undiagnosed and unaddressed within the traditional system. For example, students may not realize when they need to seek academic help such as tutoring nor may they know how to effectively seek the help they need. An improved assessment and placement system could help diagnose these challenges and provide students with the support they need (c.f., Hodara, Jaggars, & Karp, 2012). Early-warning systems may also help identify students who are struggling and support intervention before those students fail or drop out.

Third, even among students who deeply need developmental education, lengthy sequences eat away at financial aid and may encourage students to drop out before they ever reach college-level courses. As we noted earlier, research suggests that students at any point in the developmental pipeline are not harmed by tackling *slightly more difficult* coursework than their test scores suggest they can handle. Along these lines, many colleges are experimenting with accelerated developmental sequences, which still provide in-depth and intensive instruction but allow students to successfully complete developmental prerequisites within fewer semesters (e.g., Edgecombe, Jaggars, Baker, & Bailey, 2013; Hern, 2011). For students along the upper range of the developmental spectrum, corequisite models which incorporate thoughtfully designed academic supports have also demonstrated positive results (e.g., Cho, Kopko, Jenkins, & Jaggars, 2012). Several of these acceleration programs incorporate supports for instructors through collaborative instructional development activities, which help instructors remain energized and intellectually engaged in work that is both challenging and satisfying.

Fourth, developmental curricula are sometimes poorly aligned with college-level assignments and expectations; accordingly, students who complete developmental courses may learn more than necessary about some skills while still lacking other skills foundational to success in college-level math, English, and other disciplinary courses such as history and biology. The Carnegie Foundation's Statway and Quantway programs represent one well-known example of an attempt to align the developmental curriculum with the expectations of the liberal arts college-level math curriculum (Cullinane & Treisman, 2010). In the realm of English, some researchers and practitioners have argued that developmental students benefit from practicing the same types of assignments they would encounter in college-level courses (e.g., Callahan & Chumney, 2009; Hern, 2012). In order to align developmental and college-level curricula, states such as Virginia and North Carolina have found it very helpful to convene developmental curriculum design committees that include developmental and college-level instructors in the given subject area, as well as college-level instructors in other disciplinary areas.

Overall, educators should reject the notion that they can neatly divide students into two distinct groups This perspective has not been helpful either for those labeled "developmental" or for those labeled "college ready." After all, many "college-ready" students also struggle, and they could benefit from the lessons that we are learning in how to work with the "developmental" students. Students who arrive with weak academic skills should nevertheless be thought of as college students, and, as much as possible, the special services provided for them should help them get established in a coherent college-level program of study. These services should be the first step in such a student's college education, not a barrier that they have to overcome before they can start college.

Conclusion

To help make developmental education more effective, we strongly agree with Goudas and Boylan (2012) that cost-cutting half-measures—such as eliminating all developmental education outside of a corequisite model—will not be helpful. Rather, reformers must thoughtfully design models that not only shorten developmental sequences and use corequisites when appropriate but also strengthen curricular alignment, leverage noncognitive measures as part of the placement system, integrate strong academic and nonacademic supports, and tie developmental education more closely to college-level programs. Many professors, administrators, and state officials have already embraced the idea that they can make significant progress in helping developmental students successfully meet their goals. CCRC wants to continue to support their efforts by helping to identify where problems are, generate potential solutions, and evaluate the effectiveness of those solutions in practice. We look forward to continuing our collaborative partnerships with researchers and practitioners in this important work.

References

ACT, Inc. (2006). *COMPASS/ESL reference manual*. Iowa City, IA: Author.

Attewell, P. A., Lavin, D. E., Domina, T., & Levey, T. (2006). New evidence on college remediation. *Journal of Higher Education*, *77*(5), 886–924.

Bahr, P. R. (2010). Revisiting the efficacy of postsecondary remediation: The moderating effects of depth/breadth of deficiency. *Review of Higher Education*, *33*(2), 177–205.

Bailey, T., Hughes, K., & Jaggars, S. S. (2012, May 18). Law hamstrings college remedial programs. *Hartford Courant*. Retrieved from http://www.courant.com/

Bailey, T., Jeong, D. W., & Cho, S. W. (2009). *Referral, enrollment, and completion in developmental education sequences in community colleges* (CCRC Working Paper No. 15). New York, NY: Columbia University, Teachers College, Community College Research Center.

Bailey, T., Jeong, D. W., & Cho, S. W. (2010a). Referral, enrollment and completion in developmental education sequences in community colleges. *Economics of Education Review, 29*(2), 255–270.

Bailey, T., Jeong, D. W., & Cho, S. W. (2010b). *Student progression through developmental sequences in community colleges* (CCRC Brief No. 45). New York, NY: Columbia University, Teachers College, Community College Research Center.

Bettinger, E., & Long, B. T. (2005a). Remediation at the community college: Student participation and outcomes. In C. Kozerachi (Ed.), Special issue: Responding to the challenges of developmental education. *New directions for community colleges, 129* (pp. 17–26) Hoboken, NJ: Wiley..

Bettinger, E., & Long, B. T. (2005b). *Addressing the needs of under-prepared students in higher education: Does college remediation work?* (NBER Working Paper No. 11325). Cambridge, MA: National Bureau of Economic Research.

Bettinger, E., & Long, B. T. (2009). Addressing the needs of underprepared students in higher education: Does college remediation work? *Journal of Human Resources*, *44*(3), 736–771.

Boatman, A., & Long, B. T. (2010). *Does remediation work for all students? How the effects of postsecondary remedial and developmental courses vary by level of academic preparation* (NCPR Working Paper). New York, NY: National Center for Postsecondary Research.

Educators should reject the notion that they can neatly divide students into two distinct groups.

Burris, C. C., Wiley, E., Welner, K. G., & Murphy, J. (2008). Accountability, rigor, and detracking: Achievement effects of embracing a challenging curriculum as a universal good for all students. *Teachers College Record*, *110*(3), 571–607.

Calcagno, J. C., & Long, B. T. (2008). *The impact of postsecondary remediation using a regression discontinuity approach: Addressing endogenous sorting and noncompliance* (NCPR Working Paper). New York, NY: National Center for Postsecondary Research.

Callahan, M. K., & Chumney, D. (2009). "Write like college": How remedial writing courses at a community college and a research university position "at-risk" students in the field of higher education. *Teachers College Record*, *111*(7), 1619–1664.

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* (CCRC Working Paper No. 53). New York, NY: Columbia University, Teachers College, Community College Research Center.

Cullinane, J., & Treisman, P. U. (2010). *Improving developmental mathematics education in community colleges: A prospectus and early status report on the Statway initiative*. New York, NY: National Center for Postsecondary Research. Retrieved from http://www.postsecondaryresearch.org/conference/PDF/NCPR_Panel4_CullinaneTreismanPaper_Statway.pdf

Dadgar, M. (2012). *Essays on the economics of community college students' academic and labor market success* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (Accession Order No. [3506175])

Edgecombe, N., Jaggars, S. S., Baker, E. D., & Bailey, T. (2013). *Acceleration through a holistic support model: An implementation and outcomes analysis of FastStart@CCD.* New York, NY: Columbia University, Teachers College, Community College Research Center.

Fields, R., & Parsad, B. (2012). *Tests and cut scores used for student placement in postsecondary education: Fall 2011*. Washington, DC: National Assessment Governing Board. Retrieved from http://www.nagb.gov/content/nagb/assets/documents/commission/researchandresources/test-and-cut-scores-used-for-student-placement-in-postsecondary-education-fall-2011.pdf

Goudas, A. M., & Boylan, H. R. (2012). Addressing flawed research in developmental education. *Journal of Developmental Education, 36*(1), 2–13.

Hern, K. (2011). *Accelerated English at Chabot College: A synthesis of key findings*. Retrieved from http://cap.3csn.org/files/2012/02/Chabot-Accelerated-English-Synthesis1.pdf

Hern, K. (2012). Acceleration across California: Shorter pathways in developmental English and math, *Change: The Magazine of Higher Learning, 44*(3), 60–68.

Hodara, M., & Jaggars, S. S. (2012, April). *Accelerating community college students' progression through developmental education: Does it work?* Paper presented at the annual meeting of the American Educational Research Association, Vancouver, British Columbia, Canada. Retrieved from http://ccrc.tc.columbia.edu/media/k2/attachments/accelerating-progression-developmental-education.pdf

Hodara, M., Jaggars, S. S., & Karp, M. M. (2012). *Improving developmental education assessment and placement: Lessons from community colleges across the country* (CCRC Working Paper No. 51). New York, NY: Columbia University, Teachers College, Community College Research Center.

Levin, H. M. (2007). On the relationship between poverty and curriculum. *North Carolina Law Review*, *85*(5), 1382–1418.

Martorell, P., & McFarlin, I. (2007). *Help or hindrance? The effects of college remediation on academic and labor market outcomes*. Retrieved from http://www.maxwell.syr.edu/uploadedFiles/cpr/events/cpr_seminar_series/previous_seminars/mcfarlin.pdf

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

Scott-Clayton, J. (2012). *Do high-stakes placement exams predict college success?* (CCRC Working Paper No. 41). New York, NY: Columbia University, Teachers College, Community College Research Center.

Scott-Clayton, J., & Rodriguez, O. (2012). *Development, discouragement, or diversion? New evidence on the effects of college remediation* (NBER Working Paper No. 18328). Cambridge, MA: National Bureau of Economic Research.

Xu, D. (2013). *Assistance or obstacle? The impact of different levels of English remediation on underprepared students in community colleges* (Unpublished doctoral dissertation). Teachers College, Columbia University, New York, NY.