Piecing Together the College Affordability Puzzle:

Student Characteristics and Patterns of (Un)Affordability

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BUILDING KNOWLEDGE TO IMPROVE SOCIAL POLICY

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I. Introduction

The cost of attending college has risen sharply over the last 40 years. Although more credit and grant aid have been made available to students, there are still major gaps between aid and the cost of attendance for many students in the United States, all of whom are left to figure out whether they can afford the remaining costs associated with attending college. Given that people with similar financial means may make different decisions about what they can and cannot afford to pay for college, it is difficult to identify a universal definition of affordability. Nevertheless, examining college cost, student financial need, and progress toward degree completion trends in concert with one another can help illuminate patterns of when college is unaffordable. This paper will develop a definition of college affordability by examining the literature on student financial need and student aid interventions as well as student data collected by MDRC to identify important indicators of college affordability and the lack thereof, which may ultimately help or impede college persistence and graduation.

The average cost of a public four-year institution increased from $617 to $5,491 in nominal terms (or by 270 percent adjusted for inflation) from 1976 to 2005.[1] Furthermore, in the five years spanning the 2007-2008 academic year to the 2012-2013 academic year, tuition and fees at four-year public universities increased by an additional 27 percent.[2] On average, 17 percent of net family income was needed to cover the cost of attending a public four-year institution after all financial aid received was applied in 2009. In contrast, among families in the lowest income quintile, over 60 percent of net family income was needed to cover the average cost of attending a four-year institution.[3]

Given the increasingly high relative cost of attending college for families at the low end of the income scale, it is not surprising that students from such backgrounds are less likely to stay enrolled in college than their higher-income peers. In fact, enrollment after the first year is about five times higher for high-income students than for low-income students.[4] Titus' study of college degree completion found that 71 percent of students in the highest economic quartile completed college within six years, but only 46 percent of students in the lowest economic quartile completed college within the same time frame.[5]

While academic preparation cannot be discounted as a key factor in college success, the negative consequences of high levels of unmet financial need on student success are likely to be

[1]Long and Riley (2007).
[2]College Board (2012).
[3]National Center for Higher Education Management Systems (2013).
[4]Chen and Zerquera (2011).
[5]Titus (2006).

greater for lower-income students than for higher-income students.[6] Long and Riley (2007) found substantial increases in unmet need from 1995-1996 to 2003-2004 for all full-time, full-year undergraduates. Moreover, these increases in unmet need were highest for low-income students. Over this period, there was a 68 percent increase in unmet need for low-income students attending two-year institutions, a 59 percent increase for these students attending public four-year schools, and a 49 percent increase at private four-year institutions. Figure 1 displays the unmet financial need averages for independent and dependent full-time, full-year students at both public and private four-year and two-year institutions after grant aid has been applied. For independent and dependent students in the highest income quartile, unmet need ranged, on average, from $6,865 to $7,566.[7] In contrast, students in the lowest income quartile in both groups had, on average, from $9,031 to $10,259 in unmet need. This figure helps to illustrate the large differences in unmet need between the highest- and lowest-income students. MDRC's analysis of program data from an experimental study of a financial aid program for traditional students at the University of New Mexico found that while 90 to 100 percent of students with unmet need of less than $9,000 in their first year registered in the second semester, college persistence rates declined for students with unmet need above $9,000.[8] This finding is in alignment with studies that suggest that low-income students who have significant financial needs often must work over 20 hours per week to support themselves and are more likely to extend their time to degree completion or even leave college altogether than if they worked less.[9] These trends collectively signal that for many lower-income students, the receipt of needed financial aid may be a critical factor in staying enrolled in college.

The next section of this paper provides a review of the literature on the relationships between unmet financial need and progress toward degree completion as well as a review of the findings from studies that show the effects of financial aid intervention on student persistence and completion. The following section then examines MDRC's experimental data from the Performance-Based Scholarship (PBS) Demonstration, a study spanning six states around the United States. This data analysis identifies important student characteristics and relationships between students' financial aid and their persistence and academic achievement. Finally, the paper concludes with recommendations for how these collective findings can be utilized by each sector in the financial aid policy arena. Ultimately, this paper offers several puzzle pieces that fit together to help identify the students for whom college may not be affordable. It also offers recommendations for how policymakers in various sectors can

[6]Unmet financial need is the amount of financial need that remains after all forms of financial aid and the expected family contribution are subtracted from the total cost of attendance.

[7]Long and Riley (2007).

[8]For more details on the program in New Mexico see Miller, Binder, Harris, and Krause (2011).

[9]Choitz and Reimherr (2013); Cochrane and Hernandez-Gravelle (2007).

respond to the affordability issues faced by the low-income students they serve and want to help to achieve success in college.

II. Financial Need, Financial Aid, and College Success

This section provides an overview of the relevant research on financial need, aid, and college success from published and conference papers from the early 2000s to the present. This time frame was characterized by an exponential rise in college prices.[10] The discussion of the literature in this section is divided into two subsections: the first covers the relationship between student financial need and academic progress in college, and the second discusses the effects of financial aid on student academic success.

Unmet Financial Need and Progress Toward Degree Completion

Several studies have documented how high levels of unmet need may potentially relate to students' prospects of staying enrolled in and completing college. Though the findings from these studies are primarily descriptive and correlational, they draw attention to issues that low-income students face. In Herzog's statistical analysis of first-time, first-year students enrolled in a public four-year university from 1996 to 2002, he found that students with $1,000 in unmet need had dropout and transfer-out odds 7 to 10 percent above those of students with no unmet need.[11] An analysis of the National Postsecondary Aid Study (NPSAS: 04) shows that low-income, first-generation students' mean amount of unmet need was nearly $6,000 before loans — half of their median annual income of $12,100. In an effort to meet their financial obligations in the absence of additional aid, 37 percent of these students worked full time outside of their studies.[12] King (2002) found that working 15 hours per week or more was negatively associated with college persistence and full-time enrollment.[13] In her study of trends in labor supply among undergraduates, Scott-Clayton notes that several studies have documented that working too many hours while in college may adversely affect student performance and progress toward degree completion.[14] The Bound, Lovenheim, and Turner study of student work behaviors also found that as work hours increased for undergraduate students, the length of time it took them to

[10]According to the College Board, "Published prices (both tuition and fees and room and board) at public four-year institutions rose more rapidly [between 2002-2003 and 2012-2013] ... than over either of the two preceding decades." College Board (2012).

[11]Herzog (2005).

[12]Engle and Tinto (2008).

[13]As cited in Cochrane and Hernandez-Grayelle (2007).

[14]Scott-Clayton (2012).

complete their degrees also increased. Additionally, Bound, Lovenheim, and Turner highlight evidence showing that students are likely to work more in order to meet rising college costs.[15]

Several researchers have analyzed the National Educational Longitudinal Survey (NELS: 88/2000) and reached similar conclusions about the low likelihood of college success when students attend college part time. The Attewell, Heil, and Reisel study showed that at four-year institutions, students who attended college part time during their first semester were about 5 to 7 percentage points less likely to graduate in 8.5 years than students who began college full time. At two-year institutions, students who attended part time during their first semester were about 8 to 13 percentage points less likely to earn an associate's degree or higher within 8.5 years. The negative relationship between starting college with a lower course load and likelihood of graduation also appears to be greater for lower-income students.[16]

After analyzing the same NELS data, Adelman found that earning less than 20 credits by the end of the first year decreased the likelihood of degree completion, as did part-time enrollment generally.[17] Out of this analysis and his other studies, Adelman developed the "momentum theory," which offers three ways that maintaining higher levels of credit enrollment may help students complete college. First, the intensity of enrollment at the start of college may set a trajectory for the likelihood of degree completion. Second, early momentum may have a stronger association with degree attainment than students' sociodemographic background and high school academic preparation. Third, maintaining momentum in college enrollment during summer and other low-enrollment terms may improve the prospects of degree completion.[18] This part of Adelman's theory is rooted in his finding that summer attendance significantly increased the probability that a community college student would transfer to a four-year institution, by nearly 20 percentage points.[19]

In alignment with "momentum theory," other studies show that full-time and summer college enrollment may increase the likelihood of success in college. Results from McCormick and Carroll's study of first-year students in a four-year institution show that 91 percent of students who completed the year with 30 credits completed their degrees, while only 45 percent of students who enrolled in fewer than 20 credits completed their degrees.[20] O'Toole, Stratton, and Wetzel's analysis of data from the Beginning Postsecondary Students Longitudinal Study (BPS: 90/94) found that students who always attended full time were much more likely to

[15]Bound, Lovenheim, and Turner (2010).
[16]Attewell, Heil, and Reisel (2012).
[17]Adelman (2006).
[18]Attewell, Heil, and Reisel (2012).
[19]Adelman (2005). This increase was observed at each of three levels of summer credits earned: zero credits earned, one to four credits earned, and more than four credits earned.
[20]As cited by Moore and Shulock (2009).

graduate within five years than students who attended part time for at least one term.[21] Attewell, Heil, and Reisel's study using NELS:88/2000 data revealed that at four-year institutions, students who enrolled in courses during the summer after freshman year were significantly more likely to graduate, by about 4 to 11 percentage points, than students who did not attend college during the summer. Among two-year entrants who attended college during their first summer, the likelihood of graduating within 8.5 years increased from about 7 percent to nearly 16 percent.[22] Finally, Kuh's analysis of data from the National Survey of Student Engagement rendered results showing that full-time students are more engaged in college than their part-time counterparts.[23] Although these findings do not confirm causation, they collectively suggest a common pattern: students who enroll part time (to work, to lower the cost of their education in the short term, or for other reasons) are less likely to complete college.

The Effect of Financial Aid on Academic Success

While there is a lot of descriptive research on unmet need and college completion, firm knowledge about how financial aid affects students' success in college is quite limited. Most studies that examine the relationship between financial aid and academic success offer correlational findings, while only a few studies use methods that yield true causal results. Correlational analyses of financial aid are unable to differentiate between the effects of additional aid and the influence of other student characteristics that are also associated with students' likelihood of receiving aid. For example, when compared with other students, low-income students may both be more academically underprepared *and* have higher levels of unmet need. Because students vary in both regards, a correlational analysis will not be able to estimate the effects of additional aid alone, distinct from the effects of academic underpreparedness or other similar characteristics.[24] This subsection of the review focuses on studies that attempt to estimate the impact of financial aid on college success. The research methods used in the studies reviewed include randomized controlled trials (RCTs) that provide strong evidence for the causal impact of financial aid and quasi-experimental designs (such as difference-in-differences and regression discontinuity) that generally provide weaker evidence, but do more to account for confounding factors than correlational analyses. (See Table 1 for details on each of the studies discussed in this section.)

[21] O'Toole, Stratton, and Wetzel (2003).

[22] Attewell, Heil, and Reisel (2012).

[23] Kuh (2003).

[24] In this scenario, students' academic underpreparedness and any other characteristics that cannot be disentangled are said to be *endogenous*. Experimental designs allow researchers to estimate the *exogenous* effects of additional aid, that is, distinct from the influence of other student characteristics.

The literature on the impact of need-based grant aid on credits earned and college persistence has been consistently positive. Table 1 shows that Dynarski's study of the effects of a change in a Social Security benefit found that by age 23, students who were eligible for this benefit were 16 percentage points more likely to complete one year of college.[25] Additionally, both Bettinger's studies of the Ohio Opportunity Grant and the federal Pell Grant, as well as Goldrick-Rab, Harris, Kelchen, and Benson's study of the Wisconsin Scholars Grant, found similar positive effects on retention after the first year of a grant aid increase of $1,000 to low-income students.[26] Goldrick-Rab, Harris, Kelchen, and Benson's study also found positive effects on credits earned by the end of the first year.[27]

Grant aid, delivered either alone or accompanied by support services, has also had positive effects on graduation rates. Table 1 also shows that in a study of the need-based Florida Student Access Grant, Long and Castleman found that eligibility for an additional grant of $1,300 not only had a positive effect on persistence, but also yielded an impact on graduation within six years from a public four-year postsecondary institution.[28] Strong positive effects on persistence and graduation were also found in a study where additional financial support covering tuition, fees, books, and transportation was accompanied by additional student services.[29] The Accelerated Study in Associate Programs (ASAP) was designed to accelerate students' progress through community college by offering comprehensive financial support (such as tuition waiver covering the gap between aid and financial need, a public transportation pass, and free use of textbooks) and additional services (such as enhanced advising, career services, and special seminars) for three consecutive years. In addition to the positive effects on persistence in every academic term, including the strongest persistence effects during the summer and winter terms, ASAP had a positive effect on two-year associate's degree completion. The results from these two studies show that additional grant aid or similar financial support can help improve graduation outcomes. In the case of ASAP, the comprehensiveness of the additional services and the extended duration of the intervention may have played a substantial role in students' success. (See Table 1 for details on the impacts of the ASAP program.)[30]

The results from studies of the effects of additional incentive-based grant aid on student success have been more mixed.[31] Incentive-based grants are often need-based grants that are

[25]Dynarski (2003).

[26]Bettinger (2004); Bettinger (2010); Goldrick-Rab, Harris, Kelchen, and Benson (2012).

[27]Goldrick-Rab, Harris, Kelchen, and Benson (2012).

[28]Long and Castleman (2012).

[29]Students continued to have some unmet need, as additional aid did not cover the total cost of attendance.

[30]Scrivener and Weiss (2013).

[31]Richburg-Hayes and Patel (2013). This paper examined nine studies that used experimental methods. The pooled effects were positive and statistically significant for some outcomes, like credits earned, but statistically insignificant for others, like persistence.

disbursed to students contingent on their meeting academic or other benchmarks. Both the Opening Doors study of performance-based scholarships in Louisiana (the study that inspired the development of the PBS Demonstration, findings from which will be discussed in Section III) and the Foundations for Success project found positive effects of a $1,000 aid increase on student persistence.[32] However, neither the Project STAR Study nor the University of Amsterdam program, both of which provided similar assistance, found any effects on credits earned or persistence.[33] (See Table 1 for details on the impacts found in these studies.)

Though the correlational findings are interesting and the impact results are encouraging, additional research is needed to determine more clearly what kinds of aid interventions will help students the most and for which students they work best. Although the momentum perspective encourages summer enrollment, few studies have sought to isolate the effects of summer enrollment on persistence and graduation or the effects of summer financial aid on these two important outcomes. Though some of MDRC's financial aid studies have yielded promising findings regarding the effects of aid on summer enrollment and credits earned, more research is needed to clarify how financial aid and summer enrollment relate to each other and to student success. Additionally, more targeted research could be conducted on how aid affects students' academic outcomes at different levels of unmet need. This kind of research may help to identify the groups who may need additional aid the most in order to stay enrolled in college. Particularly in two-year institutional settings, where there is generally limited knowledge about what works to help students succeed, the field could greatly benefit from further research on how additional aid could encourage full-time enrollment (particularly among students who otherwise might have to work more hours) and ultimately help improve college completion rates.

The next section of this paper focuses on MDRC's analyses of experimental data from the PBS Demonstration. The discussion offers further insights into how low-income students' academic performance relates to their financial aid status and how this particular type of aid has helped students make academic progress.

III. Another Look at the Performance-Based Scholarship Demonstration

This section uses experimental data from the PBS Demonstration to further explore some of the ways that financial aid may help students make more efficient progress toward degree completion.

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[32]The Foundations for Success project studied the effects of a three-semester $750 fellowship (or $2,250 in total) that gave students an incentive to attend 12 sessions of student success services. Richburg-Hayes et al. (2009); MacDonald et al. (2009).

[33]Angrist, Lang, and Oreopoulous (2009); Leuven, Oosterbeek, and van der Klaauw (2010).

The performance-based scholarships in the PBS Demonstration offered students an opportunity to earn additional grant aid contingent on meeting an academic benchmark, such as earning a certain number of credits with a grade of "C" or better. Scholarship money was paid directly to students who met the benchmarks, and could be spent on whichever expenses the students incurred. Maximum annual award amounts varied from $1,800 to $4,500, depending on the site. (See Table 2 for a summary of the sites involved in the PBS Demonstration and the features of the program at each site.) The awards were not intended to fully meet students' unmet need, which was often a much greater amount (as discussed below), but rather were meant to help improve their financial situation and introduce additional incentives for them to meet performance benchmarks.

The studies conducted in the PBS Demonstration employed a random assignment methodology to evaluate the effects of offering performance-based scholarships to low-income students. Students who agreed to participate in each of the studies were divided randomly into two groups at each site: a "control group," which received the normal financial aid and student support services offered to all students, and a "program group," which received the opportunity to earn a performance-based scholarship in addition to the normal financial aid and other standard services offered.[34] Because students at each site were randomly assigned into the two groups, the groups are comparable both with regard to observable characteristics such as age, gender, and race, and with regard to unobservable characteristics such as tenacity and motivation. Differences in outcomes can therefore be attributed to the effects of the program and causal relationships can be established. Due to its rigor, random assignment is known as the "gold standard" of program evaluation.

Below, the characteristics of students who participated in some of the studies are described. Next, average enrollment outcomes for students in the control group are examined, and the relationship between financial aid and academic outcomes for these same students is explored. Lastly, the randomized design of these studies is used to estimate causal relationships between performance-based scholarships and academic progress.

Student Demographic and Financial Aid Characteristics

The PBS Demonstration randomly assigned more than 12,000 low-income students at sites in six states in order to estimate the effect of the offer of the scholarship on their academic achievement. PBS Demonstration program models varied somewhat among sites, depending on the needs and student population of each institution, but the essential features of the scholarship were the same, as shown in Table 2. Table 3 summarizes some demographic and financial aid

[34] At some sites, the program group also received additional student services along with the opportunity to earn a performance-based scholarship. See Table 2 for details.

characteristics at four PBS Demonstration sites for which detailed student-level financial aid data were available.[35] In order to show financial aid characteristics in the absence of the performance-based scholarship awards, only data for students assigned to the control group are shown, resulting in a total sample size of 1,702 across the four sites. Data for students in the program group are not shown, as these students' financial aid packages were affected by their participation in the program.

Table 3 shows that the demographic characteristics of the study sample varied among the sites. This is due partly to variation in the student populations at each school, and partly to the ways different PBS Demonstration programs were targeted. The program at Owens Community College, for example, targeted students with children, while the program at Pima Community College targeted Hispanic males. The study sample at the University of New Mexico (UNM) was composed of more "traditional" students (younger, unmarried, and without children) than the other sites; this may be linked to the fact that UNM is a four-year institution while the other sites are community colleges.

While the PBS Demonstration programs differ in some respects, all of the programs were targeted at low-income students. During their first year,[36] approximately 50 to 100 percent of control group students at each site had an expected family contribution (EFC) of zero,[37] and an average unmet need of approximately $4,000 to $8,600, representing anywhere from approximately 30 to 55 percent of the control group's average cost of attendance at each institution. As shown in Table 3, however, there was some variability in students' financial aid characteristics. For example, some students had much higher levels of unmet need, up to two to

[35]Detailed student-level financial data were available for the following PBS Demonstration sites: Hillsborough Community College in Florida, Owens Community College in Ohio, Pima Community College in Arizona, and the University of New Mexico. Student-level financial aid data available for each of these sites included at least one of the following: cost of attendance, EFC, gross need, or unmet need.

[36]Throughout this paper, "first year" generally refers to students' first year in the study, beginning with the semester in which they were randomly assigned. However, the first-year financial aid values used in Tables 3 and 5 do not all begin with students' semester of random assignment due to variations in the ways that different institutions calculate annual financial aid values. (For example, some institutions calculate annual aid using a leading summer schedule, grouping aid in summer semesters with the *following* fall and spring semesters. Other institutions calculate annual financial aid using a trailing summer schedule, grouping aid in summer semesters with the *preceding* spring and fall semesters.) The first-year financial aid values used in Tables 3 and 5 depend on the annual or semester-by-semester financial aid data available from each institution. When calculating annual aid awarded, researchers should be careful to align their calculations with the disbursement schedule used by each school when appropriate.

[37]EFC is an index that measures how much a student's family is expected to contribute toward college expenses. It is calculated from a student's Free Application for Federal Student Aid (FAFSA) and is based on family income, financial dependence status, and other factors. EFC is used as a criterion for awarding Pell grants and other federal aid.

five times the average amounts. Similarly, some students received much more financial aid than the average amounts.

Academic and Financial Aid Outcomes

As noted earlier, prior research has found that low-income students are an academically at-risk population.[38] Many students in the PBS Demonstration control group also exhibit additional at-risk characteristics.[39] This section examines the outcomes of students in the control group only (that is, not including students eligible for the performance-based scholarships) in order to show how this population performed in the absence of the intervention. The first set of analyses examines college persistence outcomes, while the second set examines the correlational relationships between financial aid and academic outcomes.

An analysis of the persistence of students in the PBS Demonstration control group, shown in Table 4, found that these students were less likely to persist with the passage of each additional semester.[40] By their third semester in the study at Hillsborough Community College (HCC), fewer than 60 percent of HCC control group students were enrolled, and only about half as many were enrolled full time (that is, enrolled in 12 or more credits). Similar results are observed for students' first four semesters of the study at Owens, and first two semesters of the study at Pima. Students at UNM were somewhat more likely to remain enrolled, with almost 75 percent of control students enrolled in their fourth semester of the study, and almost 70 percent of the control group enrolled full time.

Students in the control group who received larger amounts of aid during their first year were somewhat more likely to persist in college, and also attempted and earned a greater number of credits in subsequent semesters, on average. Though there are some nuances, the relationship of these outcomes for low-income students to the amount of aid they received is similar to some findings in the literature.[41] The size of the relationship observed at PBS Demonstration sites varies, but on average, an additional $1,000 in aid received is associated with a 2 to 7 percent increase in persistence, and approximately 0.2 to 1.2 additional credits attempted or

[38]Titus (2006); Attewell, Heil, and Reisel (2012).

[39]Prior research found that seven "risk factors" were associated with a higher likelihood of leaving postsecondary education without attaining a credential. These risk factors included characteristics such as having children, being a single parent, and being considered financially independent for FAFSA purposes. See Horn, Berger, and Carroll (2004).

[40]Throughout the tables and figures in this paper, spring and summer semesters are combined when calculating semester-by-semester student academic outcomes such as persistence, credits attempted, and credits earned. Because student enrollment in summer semesters is typically lower than enrollment in the fall or spring, combined spring and summer academic outcomes are similar to outcomes for the fall or spring semesters alone.

[41]See Gross, Hossler, and Ziskin (2007).

earned. Across all four sites, these relationships are statistically significant at the 1 percent level, although the magnitudes of the relationships are small.[42] The top half of Table 5 shows these results. The bottom half of Table 5 shows the results of a similar analysis of the relationships between unmet need and persistence, unmet need and credits attempted, and unmet need and credits earned. These relationships are less consistent. While an additional $1,000 of unmet need is associated with a 2 to 4 percent decrease in persistence and a decrease of approximately 0.2 to 0.8 fewer credits attempted and earned at two of the four PBS Demonstration sites (HCC and UNM, statistically significant at the 1 percent confidence level), it is not associated with changes in these same academic progress outcomes at Pima. At Owens, an additional $1,000 of unmet need is associated with a 1 percent decrease in persistence, but not with changes in credits attempted or earned.

In addition to the results shown in Table 5, other control group student baseline demographic characteristics such as gender and first-generation student status were tested for relationships with students' chances of persistence. However, these other characteristics did not show any relationship with persistence for the control group students in the sample.[43]

Another analysis of data for the control group was conducted to see if decreases in persistence could be linked to particular levels of unmet need. Data at one site, UNM, revealed that student persistence drops for levels of unmet need above $9,000. Figure 2 illustrates these results. The x-axis shows students' unmet need in their first year in the study, while the y-axis shows the percentage of students who enrolled in the second semester. Students with an unmet need of less than $9,000 enrolled at a rate of 90 to 100 percent regardless of their level of unmet need. However, students with higher levels of unmet need were less likely to persist.[44] While

[42]The level of statistical significance is often used to assess the strength of statistical results, and the likelihood that those results are true results, as opposed to a product of random noise in the data. A 1 percent level of significance indicates that there is only a 1 percent chance that such results reflect random noise, and would be observed in the absence of any real relationship between the amount of financial aid received and persistence/credits attempted/credits earned.

[43]The following student characteristics were examined to see if they correlated with persistence: age, gender, current employment status, mother's level of education, father's level of education, EFC in the student's first year, a proxy for whether the student was considered financially independent under FAFSA rules, whether the student was the first person in the family to attend college, highest high school grade previously completed, and whether the student's primary language was English. Correlations were estimated for each site separately. Some characteristics appeared to be significantly correlated with persistence for selected sites, but no characteristics were consistently correlated with persistence. These correlations were estimated using data for control group students, but similar results could be expected for all students in the sample. This is because random assignment generates control and program groups that are comparable in both observed and unobserved characteristics.

[44]Similar data for other sites were also analyzed, but they did not show the same pattern as was seen at UNM. At Pima, HCC, and Owens, increased levels of unmet need were associated with lower levels of persistence, but no sharp drops in persistence were found at particular levels of unmet need.

any potential causal relationships are difficult to establish, these results suggest that the declining levels of persistence among UNM control group students shown in Table 2 may be driven by students with an unmet need in excess of $9,000.

Though Table 5 shows that control group students' levels of financial aid and unmet need were correlated with both their persistence and academic achievement, any potential causal relationships are difficult to determine using data for the control group alone. While increased financial aid or lower unmet need may lead to higher levels of academic achievement, it also is likely to be the case that students who enroll in more classes receive greater annual amounts of financial aid. Therefore, it is plausible that higher amounts of aid received or lower levels of unmet need do not cause increased persistence or academic achievement; rather, these relationships could be driven by a third factor or set of factors.

Experimental Analysis

The PBS Demonstration randomly assigned students to be offered an incentive-based scholarship. This section of the analysis makes use of that design in order to estimate causal relationships. This analysis first examines the effect of performance-based scholarships on students' total financial aid received in their first year in the program.[45] Figure 3 shows these effects for four PBS Demonstration sites for which these results are available. Among these four sites, the program increased total financial aid received by an average of around $500 to $2,000, which ranges from 7 to 38 percent of the aid that students would have received without the program. Excluding the New York impacts, which are the largest, the impact on total financial aid received at the other three sites ranges from 7 to 25 percent of the aid that would have been received in the absence of the performance-based scholarships. While impacts on unmet need are not available, it can be hypothesized that the increases in aid were probably accompanied by corresponding decreases in students' unmet need.

In addition to impacts on financial aid received, performance-based scholarships had impacts on enrollment outcomes and credit accumulation at several sites. At the Ohio, New York, and Arizona sites, the program led to a greater proportion of students enrolling full time in certain semesters: the size of the effect ranged from around 6 percent of students in Ohio and New York to 13 percent of students at Pima Community College in Arizona.[46] At the New York

[45]It is important to note that because the program offered students the opportunity to earn additional aid but only disbursed the aid to students who met the relevant benchmarks, this analysis estimates the impact of the *offer* of aid rather than the *receipt* of the aid itself. The *offer* of aid rather than the *receipt* of aid can be understood in terms of intent-to-treat (ITT) and treatment-on-the-treated (TOT) estimates, respectively. See Bloom (1984). This analysis uses ITT estimates.

[46]See Table 5 of Cha and Patel (2010); Appendix Table B.1 of Patel and Rudd (2012); and Table 4.1 of Patel and Valenzuela (2013).

site, the program also led to a greater proportion of students enrolling in the summer semester, again with an impact of around 6 to 7 percent.[47] Despite effects on other enrollment outcomes, the program did not have impacts on overall levels of registration. Performance-based scholarships also led to an increase in credit accumulation at multiple sites, as shown in Figure 4.[48] Credit impacts ranged from around one to around three credits.[49]

A three-year follow-up analysis has also been conducted at the three PBS Demonstration sites in Ohio. Three years after beginning the program, the program group completed degrees at a higher rate than the control group. While 23.3 percent of control group students earned degrees, 26.9 percent of the program group earned degrees. This 3.5 percentage-point difference was statistically significant at the 10 percent level. This finding provides evidence that the performance-based scholarships in Ohio helped program group students earn degrees who would not have done so in the same time frame in the absence of the intervention, though additional follow-up is needed to determine whether the effects last.[50]

Discussion

The findings above suggest that performance-based scholarships may have improved the affordability of college for program group students in several ways. In the short term, the program increased the amount of aid that students received and may have reduced their unmet need. While the program did not have an effect on students' overall persistence in college, it did convince students at several sites to enroll full time and invest their time and money more heavily in college in the short term.[51] In the longer term, performance-based scholarships may have increased the affordability of college by shortening some students' expected time to degree completion, lowering the average number of semesters that they would need to enroll before receiving a degree, and therefore lowering their total cost for obtaining a degree.[52] At

[47]See Table 3.2 of Patel and Rudd (2012).

[48]The sites shown include Louisiana; Louisiana was part of the earlier Opening Doors Demonstration that also followed a similar performance-based scholarship model and that served as the basis for the PBS Demonstration. Figure 4 shows that there were no impacts on credits earned or enrollment in Florida. This may be due to the design of the Florida performance-based scholarships, which unlike other performance-based scholarships focused specifically on students' progress through developmental math, not their overall level of enrollment or academic achievement.

[49]For a cross-site summary of the effects of performance-based scholarships, please refer to Patel, Richburg-Hayes, de la Campa, and Rudd (2013).

[50]See Table 2 of Patel, Richburg-Hayes, de la Campa, and Rudd (2013).

[51]Students who enroll full time may face higher tuition costs; full-time enrollment therefore represents an additional investment of both time and money.

[52]It is also possible that performance-based scholarships did not shorten students' average time to their degrees: because not all credits can be applied to degrees, an impact on credits earned may not necessarily translate to students earning a greater number of degree-applicable credits.

the Ohio sites, the program resulted in a higher proportion of students receiving a degree after three years. Through impacts on both financial and academic outcomes, performance-based scholarships may have improved multiple aspects of affordability for students participating in the program.

The magnitude of the effects observed for performance-based scholarships is broadly similar to that of the correlations shown in Table 5, which show that additional financial aid is correlated with slight improvements in college persistence, credits attempted, and credits earned. However, the experimental performance-based scholarships results offer two distinct advantages over this prior analysis. First, the results are based on a randomized controlled trial, which provides a strong argument for the causal effects of additional, incentive-based aid on academic outcomes. Second, because the program model does not award scholarships to students unless they meet academic benchmarks, the program as a whole may have lower costs than a program that distributes grants to all students, regardless of their academic progress. Depending on the size of the effects observed, the size of the awards distributed, and the frequency with which the awards are distributed, performance-based scholarships may be more cost-effective than a program model that awards grants to students without requiring them to meet performance benchmarks.

Performance-based scholarships' positive impacts are encouraging, given that the program increased students' financial aid by around $500 to $2,000 per year, a relatively small amount compared with students' full cost of attendance. Taken together with the positive impacts, the size of the performance-based scholarships suggests that financial aid reform could come in the form of small increases to existing sources of aid. The incremental nature of performance-based scholarships could help refine the ways in which small amounts of funding are targeted and the conditions under which the aid is disbursed. The analyses above suggest several financial and academic outcomes that could be useful foci for future research and reform efforts:

- *Improved targeting of aid*. Research on performance-based scholarships has found that the scholarships are effective for a variety of types of students (see Table 6, which shows pooled impacts on credits earned after one year for all PBS Demonstration sites except California).[53] It is important to note that the PBS Demonstration targeted low-income students. However, additional work

[53]While the impacts shown in Table 6 are statistically significant, they are not different for different student subgroups, with the exception of gender subgroups. That is, Table 6 shows that men do better in the program group and that the intervention has more effect for men than women. However, for other subgroups tested (such as Hispanics compared with non-Hispanics), while both subgroups do well in the program group, the intervention does not work better for one group than the other.

could be done to identify those student populations — within the low-income student populations studied in the PBS Demonstration — who are least likely to persist in college and for whom college may be least affordable. Scholarships similar to those offered in the PBS Demonstration might be most effective if targeted to such students. The analyses described here show that it can be difficult to strongly predict student success, at least when focusing on low-income students, so it may be necessary to collect new data in order to better target financial aid. At some institutions, such as UNM, there may also be particular levels of unmet need associated with sharply worse academic outcomes. It may be helpful to ensure that students remain below these critical levels of unmet need.

- *Increasing intensity of enrollment*. Results at PBS Demonstration sites in Arizona, New York, and Ohio suggest that small amounts of aid can be used to increase the proportion of students who choose to enroll full time (defined as enrolling in 12 or more credits). Performance-based scholarship programs in Ohio and Arizona offered differential scholarship amounts in order to induce students to enroll full time, but the same was not true in New York. As discussed earlier, previous research has found that full-time enrollment is correlated with a higher probability of academic success, and early results in Ohio suggest that the program's impacts on full-time enrollment may be helping to drive impacts on graduation.[54] Future financial aid interventions could be structured to encourage full-time enrollment.

- *Enrollment in summer/winter terms.* Results at PBS Demonstration sites in New York show that performance-based scholarships can increase the proportion of students who enroll during summer sessions. As noted earlier, summer enrollment is correlated with higher transfer rates to four-year institutions, so financial aid during the summer may be a potentially fruitful area for additional research.[55] In addition to performance-based scholarships, other types of interventions may also be able to increase summer enrollment. For example, the ASAP program found a substantial impact on the rate of summer enrollment among program students, even though summer enrollment was a not a program requirement.[56] As noted earlier,

[54]Kuh 2003; O'Toole, Stratton, and Wetzel (2003); Adelman (2006); Attewell, Heil, and Reisel (2012).

[55]As noted earlier, Adelman (2006) found that earning credits during the summer significantly increased the probability of transfer to a four-year institution.

[56]See Figure 1 in Scrivener and Weiss (2013).

ASAP's comprehensive array of services included a variety of both financial and nonfinancial components.[57]

IV. Policy Recommendations

The findings in this paper from descriptive, correlational, and causational analyses all contribute pieces to the puzzle of defining college affordability. Collectively, these findings show that student behaviors and characteristics — such as unmet need, high levels of employment while enrolled in college, college enrollment intensity (part time or full time), and student response to aid received — help identify how affordable college is for a particular student.[58] Moreover, the impact findings from financial aid interventions provide some clarity regarding how well different approaches to offering additional aid have worked in helping low-income students to progress in college and ultimately obtain a degree. Given these findings, how should financial aid policymakers and administrators respond? What are some strategies that can be further tested in each sector of the financial aid policy landscape? This section of the paper seeks to put the puzzle pieces together by offering recommendations for strategies that may help make college more affordable and, at the same time, may help to illustrate what it looks like for college to be affordable for students.

Summer and Winter Financial Aid

Offering aid to students during the summer or winter would be a prime opportunity to test if aid during short terms helps students make stronger progress toward degree completion. There are several ways that different policy actors could approach this goal.

- *The federal government: Test Pell or Supplemental Educational Opportunity Grant (SEOG) funding.* Though there is currently no summer or winter federal financial aid, this type of financial aid could be pilot tested in an experimental environment where students were randomly offered the opportunity to receive summer and winter grant aid. Summer Pell (also known as Year-Round Pell) was previously implemented, but was cut due to rising costs. Tying the reintroduction of summer or winter Pell awards to some of the other strategies discussed in this section (targeted aid, for example, or incremental aid disbursements) could help control program costs and make the program more sustainable. Federal Student Aid could also partner with selected two-

[57]Program students received financial aid to cover all tuition and fees not already covered by federal and state aid. See Section II of this paper for additional description of ASAP program components.

[58]The relationship between high levels of employment and college affordability is discussed in the review of the literature in Section II.

year and four-year institutions to test offering additional SEOG funds for disbursement to students during summer and winter terms.[59]

- *States and institutions: Utilize internal or external grant funding.* States and institutions with flexible grant aid dollars could allocate some of those funds toward grants for summer and winter college enrollment. Additionally, states and institutions could seek out partnerships with local and national donor organizations committed to helping low-income students graduate from college. The effect of summer grant aid on students' academic success could be tested by randomly assigning students to one of three groups: aid during the summer and winter, more aid during all academic terms, or no additional aid. Designing a test with these three variable conditions would help to inform the field about how much summer aid helped students, and about whether summer aid alone was enough to see a meaningful impact on student success.

- *Foundations: Invest in grant aid and research.* Foundations can inform federal, state, and institutional policy by funding scholarships and experimental research to learn how summer/winter aid affects students' progress toward degree completion.

Aid Aimed More Intentionally at Students Who May Need It Most

Throughout the PBS Demonstration, MDRC worked with sites to help them determine which students might be most in need of additional aid and why. Through this process, different low-income student populations were identified, and aid was targeted at groups who were deemed to potentially have some of the greatest needs at each site. Financial aid interventions could continue the work of identifying and targeting aid to at-risk low-income student populations.

- *The federal government: Implement additional requirements or incentives.* Federal Student Aid can require or provide incentives for states and institutions to focus more of their discretionary aid on students who national student financial aid data indicate may be at risk of not enrolling or of dropping out due to financial challenges. The federal government could also research ways to restructure the FAFSA in order to direct more aid to student populations for whom it may have a larger impact.

[59]Institutions have discretion over the schedule of SEOG disbursements, so this initiative would need to be a partnership between Federal Student Aid and selected institutions.

- *States and institutions: Intensively explore in-house data.* States and institutions may want to consider testing various forms of targeting to learn how to most effectively allocate future increases or decreases in aid. By thoroughly examining their student data on how student outcomes correlate with levels of unmet need and other characteristics, they might identify particular at-risk groups to whom it might be good to target additional aid.

- *Foundations: Conduct in-depth review of public student data or institutional data.* By using public student data from sources like the Integrated Postsecondary Education Data System (IPEDS), foundations could gain a better sense of which students in different geographic areas might have the greatest need for additional financial aid. Based on the results of this review of data, foundations could better target grant and scholarship aid dollars to students, institutions, or states.

Comprehensive Aid

After identifying the students who have the greatest needs, policymakers may find that in addition to offering these students supplemental financial aid, more services may be needed to help these students succeed, such as the kinds of assistance that were offered in the Foundations for Success, ASAP, and PBS Demonstration programs.

- *Institutions: Attach support for services to grant aid.* Based on results from studies that examined the effects of programs that required or offered support services to students in tandem with financial aid or support, institutions could identify students who might benefit from receiving support services in addition to aid and then pilot test one of the above-mentioned models that combines financial aid and support services.

- *Foundations: Support demonstrations of promising strategies.* Foundations can help contribute to the body of evidence necessary to determine if comprehensive programs have replicable effects by financially supporting program components, such as scholarships and book vouchers, and research into what aspects of comprehensive programs are most needed in order to achieve large positive effects on educational outcomes.

Alternative Aid Distribution Models

In order to encourage students to stay enrolled and to reduce the inefficiencies and risks of disbursing financial aid at the start of the semester in a lump sum, states and institutions could consider incremental aid disbursement options.

- *States: Test performance-based aid against merit-based aid programs.* States that primarily offer merit-based aid could test performance-based scholarships as an alternate approach to allocating scholarship dollars. This approach might not only increase equity among lower- and higher-income students being offered aid, but might also increase the efficiency of the grant program by only allocating dollars to students after they met program requirements during the term that the aid was offered, rather than disbursing aid based on performance prior to college. This might help to stretch grant aid further and reach more students while providing students with a stronger incentive to rise to and maintain strong academic progress. Additionally, states that are considering increasing or decreasing financial aid may want to consider connecting these changes to a performance-based scholarship or grant.

- *Institutions: Allocate lump sum aid in small increments.* Altering the way loan dollars are disbursed to students may both increase the likelihood of students staying enrolled and make it more likely for the money to be used in the way that it was intended. If loan funds were disbursed to students in small biweekly or monthly increments, those students could potentially better budget and manage the financial aid that they receive. This type of strategy could easily be tested by offering the new and old approach to disbursing aid to students at random.[60] Some students receive large financial aid refunds and then drop out of college, both putting themselves at risk of not being able to pay back their student loans and also contributing to lower levels of efficiency in the aid program itself. This approach might therefore help to make college more affordable to students in both the short and longer term.

Research and Refinements of Work-Study to Help Improve College Success Among Low-Income Students

Given that students who are employed full time while enrolled in college risk dropping out or at least prolonging their time to degree completion, work-study could be expanded to more low-income students to reduce their need to work full-time jobs disconnected from their educational pursuits.

- *The federal government: Test against the current model a modified work-study program designed to help low-income students make career advances*

[60]MDRC is currently evaluating one program, Aid Like A Paycheck (ALAP), that is designed to apply this approach to some grant awards.

while in college. To date, little research has been conducted to test the effectiveness of the Federal Work-Study program. The few studies that have been conducted of such aid have been quasi-experimental and have yielded heterogeneous findings.[61] Given the amount of money expended on this aid program, it would be a worthy endeavor to conduct experimental research on both the current model and a refined model designed to address the challenges raised in this paper, to clarify how to help students with work-study aid most effectively.

Conclusion

The consistent thread connecting all of these recommendations is that they all make defining college affordability an active rather than a passive process. Much can be learned about college affordability by taking steps to help students stay enrolled and succeed academically. Testing strategies as pilot programs to determine their effectiveness in helping students make stronger academic progress is the key to moving toward policies that actually work. By coordinating efforts across policy sectors to implement an innovative agenda and strategy within the current level of resources, testing and refinement can be implemented that could shed light on what is meant by "affordable" while simultaneously helping students.

[61] Scott-Clayton (2011).

References

Adelman, Clifford. 2005. *Moving Into Town — and Moving On: The Community College in the Lives of Traditional-Age Students*. Washington, DC: U.S. Department of Education.

Adelman, Clifford. 2006. *The Toolbox Revisited: Paths to Degree Completion From High School Through College*. Washington, DC: U.S. Department of Education.

Angrist, Joshua, Daniel Lang, and Philip Oreopoulos. 2009. "Incentives and Services for College Achievement: Evidence from a Randomized Trial." *American Economic Journal: Applied Economics* 1, 1: 36-63.

Attewell, Paul, Scott Heil, and Liza Reisel. 2012. "What is Academic Momentum? And Does it Matter?" *Educational Evaluation and Policy Analysis* 34, 1: 27-44.

Baum, Sandy, and Jennifer Ma. 2012. *Trends in College Pricing 2012*. Washington, DC: The College Board.

Bettinger, Eric. 2004. "How Financial Aid Affects Persistence." Pages 207-237 in C. M. Hoxby (ed.), *College Choices: The Economics of Where to Go, When to Go and How to Pay for It*. Chicago: The University of Chicago Press.

Bettinger, Eric. 2010. *Need-Based Aid and Student Outcomes: The Effects of the Ohio College Opportunity Grant*. Stanford, CA: Stanford University.

Bloom, Howard S. 1984. "Accounting for No-Shows in Experimental Evaluation Designs." *Evaluation Review* 8, 2: 225-246.

Bound, John, Michael Lovenheim, and Sarah Turner. 2010. "Increasing Time to Baccalaureate Degree in the United States." NBER Working Paper No. 15892. Cambridge, MA: National Bureau of Economic Research.

Cha, Paulette, and Reshma Patel. 2010. *Rewarding Progress, Reducing Debt: Early Results from Ohio's Performance-Based Scholarship Demonstration for Low-Income Parents*. New York: MDRC.

Chen, Jin, and Desiree Zerquera. 2011. "Unmet Financial Need and College Persistence of Middle-Income Students." Paper Presented at the 36th Annual Meeting of the Association for Education Finance and Policy. Seattle, WA: Association for Education Finance and Policy.

Choitz, Vickie, and Patrick Reimherr. 2013. *Mind the Gap: High Unmet Financial Need Threatens Persistence and Completion for Low-Income Community College Students*. Washington, DC: Center for Postsecondary and Economic Success.

Cochrane, Deborah Franke, and Hilda Hernandez-Gravelle. 2007. *Green Lights and Red Tape, Improving Access to Financial Aid at California Community Colleges.* Berkeley, CA: The Institute for College Access and Success.

College Board. 2012. *Trends in College Pricing 2012*. New York: The College Board.

Dynarski, Susan M. 2003. "Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion." *The American Economic Review* 93, 1: 279-288.

Engle, Jennifer, and Vincent Tinto. 2008. *Moving Beyond Access: College Success for Low-Income, First-Generation Students*. Washington, DC: Pell Institute for the Study of Opportunity in Higher Education.

Goldrick-Rab, Sara, Douglas N. Harris, Robert Kelchen, and James Benson. 2012. *Need-Based Financial Aid and College Persistence: Experimental Evidence from Wisconsin*. Madison, WI: Institute for Research on Poverty.

Gross, Jacob P. K., Don Hossler, and Mary Ziskin. 2007. "Institutional Aid and Student Persistence: An Analysis of the Effects of Institutional Financial Aid at Public Four-Year Institutions." *Journal of Student Financial Aid* 37, 1: 28-39.

Herzog, Serge. 2005. "Measuring Determinants of Student Return vs. Dropout/Stopout vs. Transfer: A First-to-Second Year Analysis of New Freshmen." *Research in Higher Education* 46, 8: 883-928.

Herzog, Serge. 2008. "Estimating the Influence of Financial Aid on Student Retention: A Discrete-Choice Propensity Score-Matching Mode." Education Working Paper Archive. Reno, NV: University of Nevada, Reno.

Horn, Lauren, Rachael Berger, and C. Dennis Carroll. 2004. "College Persistence on the Rise? Changes in 5-Year Degree Completion and Postsecondary Persistence Rates Between 1994 and 2000." Washington, DC: U.S. Department of Education, National Center for Education Statistics.

King, Jacqueline E. 2002. *Crucial Choices: How Students' Financial Decisions Affect Their Academic Success*. Washington, DC: American Council on Education.

Kuh, George. 2003. "What We're Learning About Student Engagement from NSSE: Benchmarks for Effective Educational Practices." *Change* 35, 2: 24-32.

Leuven, Edwin, Hessel Oosterbeek, and Bas van der Klaauw. 2010. "The Effect of Financial Rewards on Students' Achievement: Evidence from a Randomized Experiment." *Journal of the European Economic Association* 8, 6: 1243-1265.

Long, Bridget Terry, and Benjamin L. Castleman. 2013. "Looking Beyond Enrollment: The Causal Effect of Need-Based Grants on College Access, Persistence, and Graduation." NBER Working Paper No. 19306. Cambridge, MA: National Bureau of Economic Research.

Long, Bridget Terry, and Erin Riley. 2007. "Financial Aid: A Broken Bridge to College Access?" *Harvard Educational Review* 77, 1: 39-63.

MacDonald, Heather, Robert Malatest, Rob Assels, Rana Baroud, Lili Gong, Larry Bernstein, Cristopher Price, and John Greenwood. 2009. *Final Impacts Report: Foundations for Success*. Ottawa, Ontario: R.A. Malatest & Associates LTD.

Miller, Cynthia, Melissa Binder, Vanessa Harris, and Kate Krause. 2011. *Staying on Track: Early Findings from a Performance-Based Scholarship Program at the University of New Mexico*. New York: MDRC.

Moore, Colleen, and Nancy Shulock. 2009. *Student Progress Toward Degree Completion: Lessons from the Research Literature*. Sacramento, CA: Institute for Higher Education Leadership and Policy.

National Center for Higher Education Management Systems Information Center. 2013. "Net Cost of Attendance: Percent of Family Income Needed to Pay for College — By Type of Institution." Web site: www.higheredinfo.org.

O'Toole, Dennis, Leslie Stratton, and James Wetzel. 2003. "A Longitudinal Analysis of the Frequency of Part-Time Enrollment and the Persistence of Students Who Enroll Part Time." *Research in Higher Education* 44, 5: 519-537.

Patel, Reshma, Lashawn Richburg-Hayes, Elijah de la Campa, and Timothy Rudd. 2013. *Performance-Based Scholarships: What Have We Learned?* New York: MDRC.

Patel, Reshma, and Timothy Rudd. 2012. *Can Scholarships Alone Help Students Succeed? Lessons from Two New York City Community Colleges*. New York: MDRC.

Patel, Reshma, and Ireri Valenzuela. 2013. *Moving Forward: Early Findings from the Performance-Based Scholarship Demonstration in Arizona*. New York: MDRC.

Richburg-Hayes, Lashawn, Thomas Brock, Allen J. LeBlanc, Christina Paxson, Cecilia Elena Rouse, and Lisa Barrow. 2009. *Rewarding Persistence: Effects of a Performance-Based Scholarship Program for Low-Income Parents*. New York: MDRC.

Richburg-Hayes, Lashawn, and Reshma Patel. 2013. *Incentivizing Success: Lessons from Experimenting with Incentive-Based Grants*. Washington, DC: American Enterprise Institute.

Scott-Clayton, Judith. 2011. "The Causal Effect of Federal Work-Study Participation: Quasi-Experimental Evidence from West Virginia." *Educational Evaluation and Policy Analysis* 33, 4: 506-527.

Scott-Clayton, Judith. 2012. "What Explains Trends in Labor Supply Among U.S. Undergraduates, 1970-2009?" NBER Working Paper No. 17744. Cambridge, MA: National Bureau of Economic Research.

Scrivener, Susan, and Michael J. Weiss. 2013. *More Graduates: Two-Year Results from an Evaluation of Accelerated Study in Associate Programs (ASAP) for Developmental Education Students*. New York: MDRC.

Titus, Marvin A. 2006. "Understanding College Degree Completion of Students with Low Socioeconomic Status: The Influence of the Institutional Financial Context." *Research in Higher Education* 47, 4: 371-398.

Exhibits

List of Exhibits

Table

Figure

Table 1

Studies Examining the Effect of Financial Aid on Academic Success

Study	Methodology	Key Study Eligibility Criteria	Analysis Sample	Maximum Amount	Program Duration	Impacts
Social Security Student Benefit Program (United States) Dynarski, 2003	Difference-in-differences	Child under 23 with a deceased parent Full-time student High school senior in 1979, 1980, 1981, 1982, or 1983	3,545 (P: 2,558; C: 987)	N/A	5 years	1. By age 23, students who were eligible for aid were 24.3 percentage points more likely to attend college full time. 2. By age 23, students who were eligible for aid were 16.1 percentage points more likely to complete at least a year of college. 3. Each $1,000 of aid offered increased completed schooling by 0.16 years.
Pell Grant Ohio (United States) Bettinger, 2004	Regression discontinuity	First-time, first-year student in the 1999-2000 academic year Enrolled in an Ohio public 2-year or 4-year institution	37,028	$3,125-3,300	N/A	A $1,000 increase in Pell receipt improved first-year persistence by 2-4 percentage points.
Opening Doors Louisiana (United States) Richburg-Hayes et al., 2009	Random assignment	Age 18 to 34 Parent Family income below 200 percent of poverty level	537 (P: 264; C: 273)	$2,000	2 semesters	1. The study yielded a 3.2 percentage-point increase in retention per $1,000 of additional aid. 2. On average, students earned an additional 1.5 credits in the first year and 1.7 credits in the second year per $1,000 increase in aid. 3. The program increased the likelihood of full-time enrollment in the first semester by 9.3 percentage points, in the second semester by 20.3 percentage points, and in the third semester by 10.7 percentage points.

Table 1 (continued)

Study	Methodology	Key Study Eligibility Criteria	Analysis Sample	Maximum Amount	Program Duration	Impacts
Foundations for Success (Canada) MacDonald et al., 2009	Random assignment	Enrolled full time Canadian citizen Identified as at-risk based on Accuplacer and FastTrack survey	3,110 (P: 2,056; C: 1,054)	$2,250	3 semesters	An additional $1,000 of aid improved student persistence by 2.3 percentage points.
Project STAR (Canada) Angrist, Lang and Oreopoulous, 2009	Random assignment	Full-time, first-year college student High school GPA in first to third quartile[a]	1,571 (P: 619; C: 952)	$5,000	2 semesters	The program had little effect on credit accumulation or persistence.
Ohio College Opportunity Grant (United States) Bettinger, 2010	Difference-in-differences	First-time, incoming student in the 2005-2006 or 2006-2007 academic year Defined as dependent by FAFSA Enrolled in a public Ohio 2- or 4-year institution	83,259 (P: 41,062; C: 42,197)	$2,496	N/A	An $1,000 increase in aid decreased dropout rates by 1.7-2.4 percentage points.

Table 1 (continued)

Study	Methodology	Key Study Eligibility Criteria	Analysis Sample	Maximum Amount	Program Duration	Impacts
University of Amsterdam (Netherlands) Leuven, Oosterbeek, and van der Klaauw, 2010	Random assignment	First-year college student in economics or business	249 (P: 167; C: 82)	$215 or $644	3 terms	This program had little effect on credit accumulation or persistence.
Wisconsin Scholars Grant (United States) Goldrick-Rab, 2012	Random assignment	Wisconsin resident Attended a state public high school Enrolled full time at a public state university Completed the FAFSA, qualified for a Pell Grant and still had some unmet need after all grant aid	14,847 (P: 2,125; C: 12,722)	$3,500	Up to 5 years or 10 academic semesters	1. An increase of $1,000 in aid improved second-year retention by 2.5 percentage points. 2. Students who were enrolled in the program were 2.4 percentage points more likely to earn at least 12 credits by the end of the first semester.

Table 1 (continued)

Study	Methodology	Key Study Eligibility Criteria	Analysis Sample	Maximum Amount	Program Duration	Impacts
Florida Student Access Grant (United States) Long and Castleman, 2012	Regression-discontinuity	High school senior in 2000-2001 Enrolled in a public postsecondary institution in Florida EFC between $1,000 above and below the grant eligibility cutoff of $1,590	7,171	$1,300	The grant could be renewed from one year to the next	1. $1,000 in grant aid eligibility (in 2000 dollars) increased the likelihood of earning a bachelor's degree within six years by 4.6 percentage points. 2. Continuous enrollment through the spring semester in the first year increased by 4.3 percentage points per $1,000 in additional grant aid eligibility. 3. On average, students eligible for $1,000 in aid earned 2.1 more credits in three years.
Accelerated Study in Associate Programs (United States) Scrivener and Weiss, 2013	Random assignment	Eligible for a Pell Grant Needing to take 1 or 2 remedial classes New York City resident New or returning student with less than 12 credits	896	The balance of student's tuition after other grant aid was applied	3 years	1. The program improved fall and spring semester retention by 8 to 10 percentage points. 2. The program increased intersession enrollment by 10 to 25 percentage points. 3. After two years, the program increased the amount of credits earned by an average of 7.6 credits. 4. The program increased two-year graduation rates by 5.7 percentage points.

SOURCES: Angrist, Lang, and Oreopoulous (2009); Bettinger (2004); Bettinger (2010); Dynarski (2003); Goldrick-Rab, Harris, Kelchen, and Benson (2012); Leuven, Oosterbeek, and van der Klaauw (2010); Long and Castleman (2012); MacDonald et al. (2009); Richburg-Hayes et al. (2009); Richburg-Hayes and Patel (2013); and Scrivener and Weiss (2013).

NOTES: P = program group, C = control group. FAFSA = Free Application for Federal Student Aid. EFC = Expected Family Contribution, the amount of money that a family is expected to be able to contribute to a student's education, as calculated according to federal guidelines.

[a]Academic benchmark was conditional on high school grade quartiles. See Richburg-Hayes and Patel (2013) for description.

[b]The low-reward group was offered 227 euros ($215 in 2002 dollars); the high-reward group was offered 681 euros ($644 in 2002 dollars).

Table 2

Summary of Performance-Based Scholarship Programs

	Opening Doors Louisiana	PBS Arizona	PBS California	PBS Florida	PBS New Mexico	PBS New York	PBS Ohio
Sample selection criteria							
Age	18-34	No age criteria	16-19	At least 18	17-20	22-35	At least 18
Income requirements	Family income below 200 percent of poverty level	EFC below 5,273[a]	Below Cal Grant A/C Income Threshold[b]	EFC below 5,273[a]	Pell-eligible	Pell-eligible	Zero EFC[a]
Additional requirements	Parent earned a high school diploma, GED certificate, or passing score on college entrance exam	Hispanic male < 45 credits earned	1st-year student Completed FAFSA and Cal Grant	In need of remedial math	1st-year student	Live away from parents In need of at least 1 remedial course	Parent
Intervention							
Scholarship amount per term	$1,000	Up to $1,500	$333-1,000[c]	$600	$1,000	$1,300	$300-900
Scholarship duration	2 semesters	3 semesters	1-4 semesters	3 semesters plus 1 summer term	4 semesters	2 semesters plus 1 summer semester[d]	2 semesters or 3 quarters
Max amount	$2,000	$4,500	$1,000-4,000[c]	$1,800	$4,000	$2,600-3,900[d]	$1,800
Sample size	537[e]	1,028	4,921[f]	1,075	1,081	1,502	2,285
Program	264	611	1,640	674	536	754	1,359
Control	273	417	3,281	401	545	748	926

(continued)

Table 2 (continued)

	Opening Doors Louisiana	PBS Arizona	PBS California	PBS Florida	PBS New Mexico	PBS New York	PBS Ohio
Performance benchmarks							
Academic criteria	Enroll in college, and complete at least 6 credits with a "C" average or better	Part time: 6-11 credits with "C" or better in each Full time: 12 or more credits, "C" or better in each	Enroll in college, and complete at least 6 credits with a "C" average or better	Complete a sequence of math courses with a "C" or better	Complete at least 12 (first semester) or 15 (subsequent semesters) credits with a "C" average or better	Enroll in college, and complete at least 6 credits with a "C" or better in each	Part time: 6-11 credits with "C" or better in each Full time: 12 or more credits, "C" or better in each
Service criteria	Meet with adviser	Meet with adviser, complete tutoring and workshop requirements	N/A	Complete tutoring requirements	Meet with adviser	N/A	N/A
Participating institutions							
Participating institutions	Delgado Community College Louisiana Technical College	Pima Community College	California Student Aid Commission and L.A. Chamber of Commerce	Hillsborough Community College	University of New Mexico	Hostos Community College Borough of Manhattan Community College	Lorain County Community College Owens Community College Sinclair Community College

(continued)

Table 2 (continued)

SOURCE: Performance-Based Scholarship study design.

NOTES: Scholarships are limited to the institution where the evaluation occurred, with the exception of PBS California. For this site, scholarships were portable to any accredited, degree-granting, two-year or four-year postsecondary institution in the U.S.

[a]The EFC (Expected Family Contribution) is the amount of money that a family is expected to be able to contribute to a student's education, as calculated according to federal guidelines. Students with an EFC of up to 5,273 during the 2010-2011 year were eligible for federal Pell grants.

[b]Cal Grant is a financial aid program funded by the state of California. The awards do not have to be paid back, but to qualify students must fall below certain income and asset ceilings.

[c]The study in California randomly assigned program group members to one of six scholarship types that varied in amount (from $1,000 total to $4,000 total) and duration (from one term to two years). Students could take the award to any degree-granting, accredited institution in the country, and payments were adjusted to reflect the institution type (quarter or semester).

[d]The study in New York randomly assigned program group members to one of two scholarship types. One type was offered over two semesters only; the other was offered over two semesters plus one summer semester.

[e]Although there were 1,019 study participants, only 537 participants from the first and second cohorts were analyzed, as Hurricane Katrina disrupted the follow-up period for the third and fourth cohorts.

[f]Although there were 5,160 study participants, undocumented immigrant students were excluded from the analysis because of data reliability concerns. Thus, the analysis sample was 4,921 participants.

Table 3

Demographic and Financial Characteristics of Control Group Students: Selected Performance-Based Scholarship Sites

Characteristics	Hillsborough Community College	Owens Community College	Pima Community College	University of New Mexico
Gender[a] (%)				
Male	32.2	15.0	100.0	39.8
Female	67.8	85.0	0.0	60.2
Age (%)				
17-26 years old	58.9	44.2	74.3	100.0
27-30 years old	12.0	17.1	6.5	0.0
31 and older	29.2	38.6	19.2	0.0
Marital status (%)				
Married	19.0	18.6	12.2	0.7
Unmarried	70.1	77.6	81.5	89.9
Missing	11.0	3.8	6.2	9.4
Number of children (%)				
0	54.3	0.0	74.8	98.2
1	16.7	40.5	9.7	1.8
2	13.1	30.1	7.7	0.0
3 or more	15.9	29.5	7.7	0.0
Race/ethnicity[b] (%)				
Hispanic	30.3	9.3	99.8	61.0
White	27.8	55.3	0.0	22.2
Black	37.6	31.8	0.0	2.2
Asian	0.5	0.0	0.0	3.9
Other	3.8	3.6	0.2	10.7
Currently employed (%)	51.5	47.6	43.9	48.5
First person in family to attend college (%)	33.2	28.7	38.7	33.5
Financial aid in the first year[c]				
Cost of attendance ($)	15,834	13,623	9,985	16,199
Expected Family Contribution (EFC)	832	0	647	1,077
Students with zero EFC (%)	66.8	100.0	66.2	48.8
Gross need ($)	14,818	13,623	9,349	15,122
Financial aid received ($)				
Average	6,256	9,342	4,831	10,330
Maximum	19,454	18,406	15,421	27,722
Unmet need ($)				
Average	8,563	4,281	3,962	4,792
Maximum	21,772	20,639	13,656	20,210
Sample size (total = 1,702)	401	339	417	545

(continued)

Table 3 (continued)

SOURCES: MDRC calculations using Baseline Information Form (BIF) data and financial aid data from Pima Community College, Hillsborough Community College, Owens Community College, and the University of New Mexico.

NOTES: Missing values are only included in variable distributions for characteristics with more than 5 percent of the sample missing.

Distributions may not sum to 100 percent because of rounding.

[a]Female students are not eligible to participate in the program at Pima Community College; thus, gender was imputed and not explicitly asked on the BIF.

[b]Respondents who said they were Hispanic and chose a race are included only in the Hispanic category. Respondents who said they were not Hispanic and chose more than one race are considered Multiracial. These respondents, combined with those who said they were American Indian or Alaskan Native or another race/ethnicity, are included in the category "Other."

[c]Estimates of annual financial aid are based on full-year data when available. For some students, the financial aid year used begins after their first semester in the study.

Table 4

Enrollment Outcomes of Control Group Students:

Selected Performance-Based Scholarship Sites

Characteristics	Hillsborough Community College	Owens Community College	Pima Community College	University of New Mexico
Enrolled (%)				
First semester	94.0	95.9	97.1	99.1
Second semester	78.1	82.3	74.8	91.2
Third semester	58.6	62.8		78.5
Fourth semester		51.6		74.1
Enrolled in 12 or more credits (%)				
First semester	60.8	72.6	74.3	98.3
Second semester	46.1	58.7	50.1	88.4
Third semester	30.9	38.3		73.8
Fourth semester		30.7		69.7
Sample size (total = 1,702)	401	339	417	545

SOURCES: MDRC calculations using transcript data from Hillsborough Community College, the Ohio Board of Regents, Pima Community College, and the University of New Mexico.

Table 5

Linear Model of First-Year Financial Aid Values and Subsequent Academic Outcomes, Control Group Students Only:

Selected Performance-Based Scholarship Sites

Model	Number of Students	Estimated Change Per $1,000	T-statistic	R^2
Total financial aid and persistence				
Hillsborough Community College	401	2.36	3.98 ***	0.04
Owens Community College	339	3.48	7.10 ***	0.13
Pima Community College	417	6.78	12.05 ***	0.26
University of New Mexico	545	3.14	7.34 ***	0.09
Total financial aid and credits attempted				
Hillsborough Community College	401	0.34	4.76 ***	0.05
Owens Community College	339	0.49	6.95 ***	0.13
Pima Community College	417	1.24	16.08 ***	0.38
University of New Mexico	545	0.61	7.81 ***	0.10
Total financial aid and credits earned				
Hillsborough Community College	401	0.18	2.86 ***	0.02
Owens Community College	339	0.35	5.66 ***	0.09
Pima Community College	417	0.89	11.44 ***	0.24
University of New Mexico	545	0.54	7.08 ***	0.08
Unmet need and persistence				
Hillsborough Community College	401	-2.06	-3.71 ***	0.03
Owens Community College	339	-1.10	-2.22 **	0.01
Pima Community College	391	-0.79	-1.08	0.00
University of New Mexico	545	-3.90	-8.80 ***	0.12
Unmet need and credits attempted				
Hillsborough Community College	401	-0.26	-3.95 ***	0.04
Owens Community College	339	-0.09	-1.23	0.00
Pima Community College	391	-0.14	-1.22	0.00
University of New Mexico	545	-0.78	-9.71 ***	0.15
Unmet need and credits earned				
Hillsborough Community College	401	-0.18	-3.01 ***	0.02
Owens Community College	339	-0.06	-1.01	0.00
Pima Community College	391	0.01	0.10	0.00
University of New Mexico	545	-0.70	-8.85 ***	0.13

(continued)

Table 5 (continued)

SOURCES: MDRC calculations using transcript and financial aid data from Hillsborough Community College, Owens Community College, the Ohio Board of Regents, Pima Community College, and the University of New Mexico.

NOTES: Linear regression models were run with first-year financial aid or unmet need as the dependent variable and persistence, credits attempted, or credits earned as the independent variable.

Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

Estimates of annual financial aid are based on full-year data when available. For some students, the financial aid year used begins after their first semester in the study.

Academic outcomes for Owens Community College and the University of New Mexico are from students' fourth semester in the study. For Hillsborough Community College, outcomes are from students' third semester, and for Pima Community College outcomes are from students' second semester.

Unadjusted r^2 shown for all models.

Table 6

Credits Earned in the First Year:

Selected Performance-Based Scholarship Sites, by Subgroup

Subgroup	Sample Size	Program Group	Control Group	Difference	Standard Error	Difference Between Subgroups
Gender						†
Male	2,588	17.5	15.7	1.8 ***	0.4	
Female	4,383	17.2	16.2	1.0 ***	0.3	
Sample size	6,971					
Hispanic						
Yes	2,845	17.9	16.8	1.1 ***	0.4	
No	4,033	16.9	15.4	1.5 ***	0.3	
Sample size	6,878					
Parent						
Yes	3,721	15.5	14.1	1.4 ***	0.3	
No	3,212	19.4	18.3	1.1 ***	0.3	
Sample size	6,933					
Younger than 20 years old						
Yes	1,826	21.6	20.6	1.0 **	0.5	
No	5,145	15.8	14.4	1.4 ***	0.3	
Sample size	6,971					
First in family to attend college						
Yes	2,211	16.9	15.3	1.6 ***	0.4	
No	4,574	17.5	16.5	1.0 ***	0.3	
Sample size	6,785					
Employed at beginning of program						
Yes	3,424	17.2	15.9	1.3 ***	0.3	
No	3,413	17.5	16.2	1.3 ***	0.4	
Sample size	6,837					
Program with services component[a]						
Yes	3,184	19.0	17.7	1.2 ***	0.4	
No	3,787	15.9	14.6	1.4 ***	0.3	
Sample size	6,971					

(continued)

Table 6 (continued)

SOURCES: MDRC calculations using Baseline Information Form (BIF) data and transcript data from Pima Community College, Hillsborough Community College, the Ohio Board of Regents, the University of New Mexico, Borough of Manhattan Community College, and Hostos Community College.

NOTES: A two-tailed t-test was applied to differences between research groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

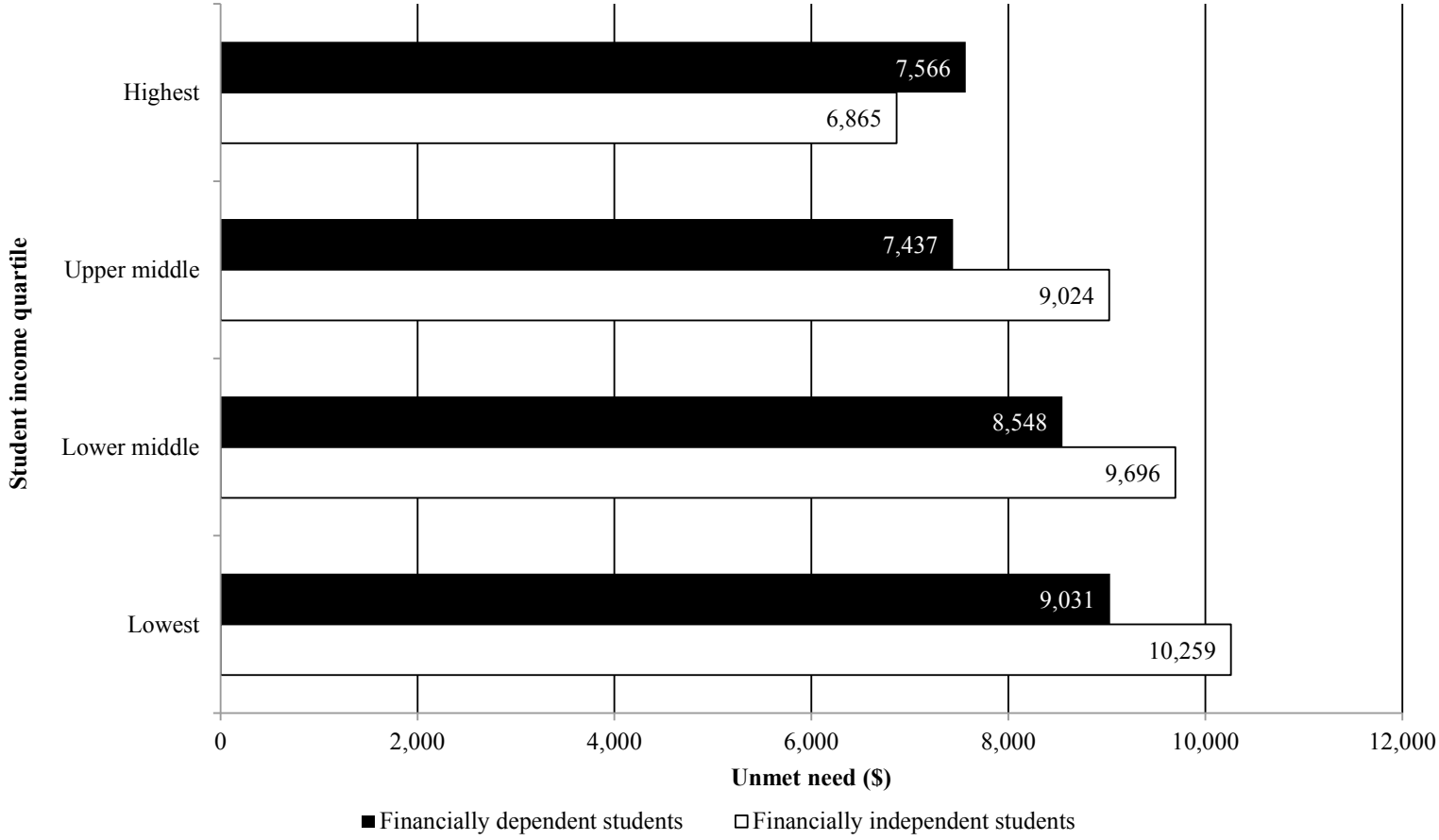
Rounding may cause slight discrepancies in sums and differences.

Estimates are adjusted by research cohort and campus.

[a]The programs with services components are located in Arizona, Florida, and New Mexico.

Figure 1

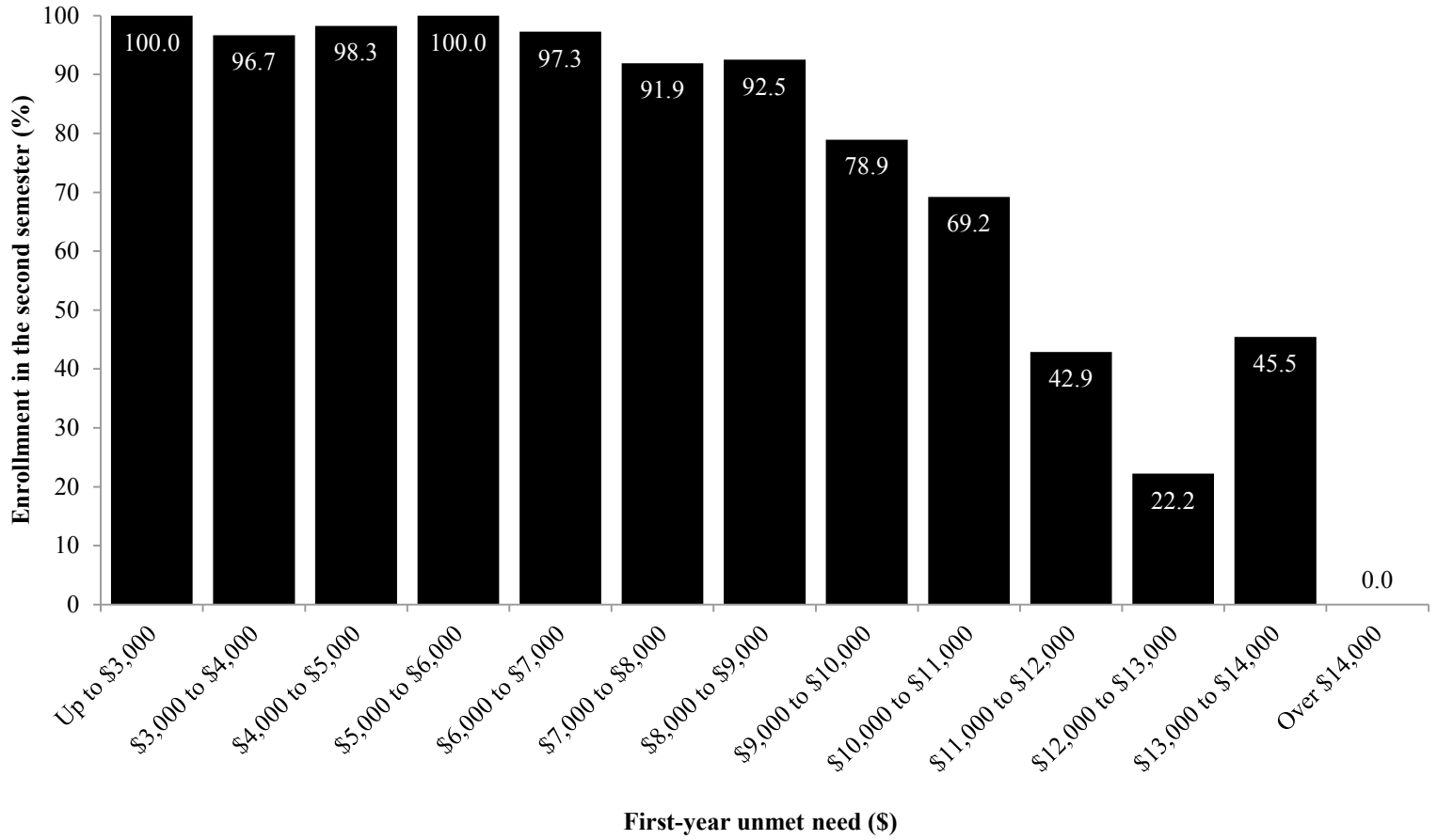
Average Unmet Need After Grant Aid Applied:
Full-Time, Full-Year U.S Undergraduates by Student Income Quartile, 2003-2004



SOURCE: Long and Riley (2007).

Figure 2

Control Group Enrollment in the Second Semester by First-Year Unmet Need: University of New Mexico

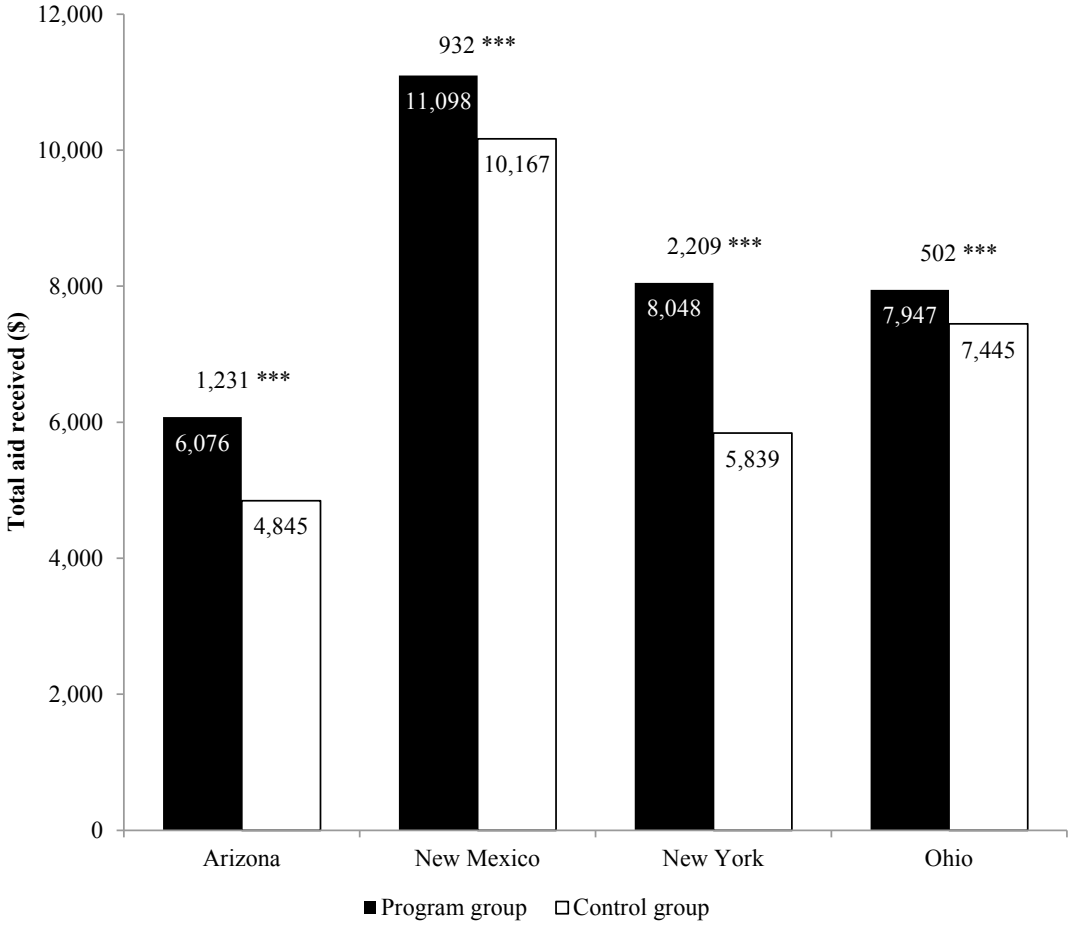


SOURCES: MDRC calculations using transcript data and financial aid data from the University of New Mexico.

Figure 3

Total Financial Aid Received in the First Year:

Selected Performance-Based Scholarship Sites



SOURCES: MDRC calculations using financial aid data from Pima Community College, the University of New Mexico, the CUNY Institutional Research Database, Lorain County Community College, Owens Community College, and Sinclair Community College.

NOTES: Students in the program groups were eligible for higher amounts of aid (as illustrated in Table 2) if they met all of the benchmarks of their programs. These amounts include only the performance-based scholarship awards that students actually *earned*.

A two-tailed t-test was applied to differences between the research groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

Rounding may cause slight discrepancies in sums and differences.

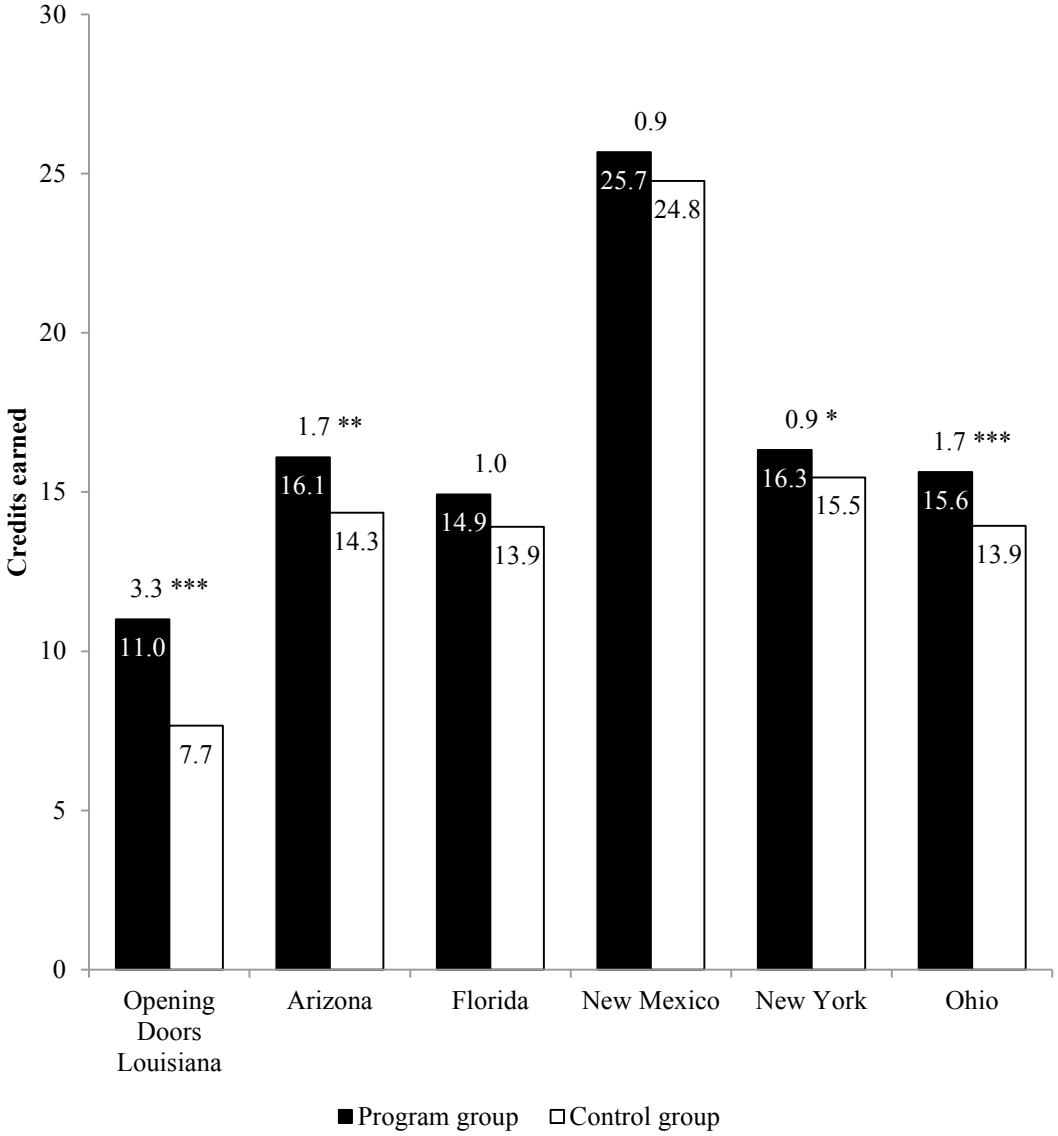
Estimates are adjusted by research cohort and campus.

Financial aid outcomes for the New York study represent financial aid awarded, which is distinct from financial aid received. Financial aid outcomes for the Arizona, New Mexico, and Ohio studies represent financial aid received.

Figure 4

Credits Earned in the First Year:

Selected Performance-Based Scholarship Sites



SOURCES: MDRC calculations using transcript data from Delgado Community College, Louisiana Technical College, Pima Community College, Hillsborough Community College, the University of New Mexico, Borough of Manhattan Community College, Hostos Community College, and the Ohio Board of Regents.

NOTES: A two-tailed t-test was applied to differences between research groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

Rounding may cause slight discrepancies in sums and differences.

Estimates are adjusted by research cohort and campus.

Only the first two cohorts are shown for Opening Doors Louisiana.