THE PERFORMANCE-BASED SCHOLARSHIP DEMONSTRATION

DESIGNING SCHOLARSHIPS TO IMPROVE COLLEGE SUCCESS

Final Report on the Performance-Based Scholarship Demonstration

Alexander K. Mayer
Reshma Patel
Timothy Rudd
Alyssa Ratledge

November 2015

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BUILDING KNOWLEDGE TO IMPROVE SOCIAL POLICY

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with
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OVERVIEW

Performance-based scholarships have two main goals: to give students more money for college and to provide incentives for academic progress. They are designed to reduce the financial burden on low-income students and help them progress academically by offering financial aid contingent upon meeting pre-specified academic benchmarks. The scholarships are intended to cover a modest amount of students' educational costs during the semesters they are offered — generally between 15 and 25 percent of students' unmet financial need, the difference between students' calculated financial need to attend college and the financial aid they are awarded. The money is paid directly to students, on top of their existing federal and state need-based financial aid, and the students themselves decide how best to use the funds.

MDRC launched the Performance-Based Scholarship Demonstration in 2008 to evaluate the effectiveness of these scholarships for as broad a range of low-income students as possible, in a variety of settings, and with varying incentive structures. As such, the evaluation includes more than 12,000 students in institutions across six states to test different performance-based scholarship designs. Each program was developed for a different population of students and had a different scholarship structure; the scholarship amounts ranged from a few hundred dollars to $1,500 per term, depending in part on the benchmarks being tested. Institutions created performance-based scholarship programs tailored to what they perceived to be the specific needs of their students, by targeting the incentive, academic benchmarks, and in some cases additional services to address those needs.

Each of the six programs in the demonstration was evaluated using a randomized controlled trial — the highest standard of evidence for evaluation research. Students were randomly assigned by researchers either to receive only their usual financial aid package and services or to be eligible to receive supplemental financial aid and services in the form of a performance-based scholarship, contingent upon meeting the given academic benchmarks.

The results show that these scholarships improved students' academic progress during the program — effects that remained evident several years after the program ended. The effects on students' academic progress appear generally consistent across the different programs and student subgroups. In addition, one program targeted high school seniors and succeeded in increasing their matriculation in college, and three of the programs reduced students' dependency on loans. Most important, this evaluation finds that the programs modestly increased degree completion, measured after five years.

These results show that even relatively moderate investments in low-income students' education can have modest but long-lasting impacts on their academic outcomes. These findings may be especially relevant to states, institutions, and private scholarship providers seeking purposeful and efficient ways to give low-income students additional financial aid that can also help them succeed academically.

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PREFACE

Policymakers in the United States are increasingly focused on expanding the number of college graduates, in addition to ensuring broad and equal access to higher education. Rising tuition costs, however, pose a considerable challenge to these goals, particularly for low-income students, who enroll in and complete college at lower rates than their more affluent peers. Financial aid can help, but often it does not cover the full cost of higher education. Although the Pell Grant is the main source of federal aid, scholarships also play an important role: State and private donors award more than $20 billion annually to undergraduate students. Yet little rigorous research has been done to test whether and how scholarships increase college completion rates.

More than a decade ago, MDRC began evaluating performance-based scholarships, which are designed to encourage academic progress and are paid only when students achieve key academic benchmarks, such as enrolling in and then earning a pre-specified number of credits. Promising results from an early test of a performance-based scholarship program in Louisiana led to a broad demonstration study — the Performance-Based Scholarship (PBS) Demonstration — to test the effectiveness of this approach, using randomized controlled trials in multiple settings and with varying scholarship durations, amounts, and incentives.

This report marks the culmination of the PBS Demonstration, which included more than 12,000 students in six different states. The PBS programs generally lasted about a year, and the scholarships were designed to cover about 15 to 25 percent of students' remaining financial need exclusive of other aid. The programs produced impacts on academic outcomes that were evident several years after the programs ended, in some cases reduced student loans, increased college matriculation in one program that targeted high school seniors, and increased students' use of support services when the scholarship was conditioned on the use of those services. Perhaps most important, the scholarship programs helped students earn more credits toward their degrees and modestly improved graduation rates — and the effects appear consistent across different programs. A variety of performance-based scholarship programs have now been effectively implemented in multiple, diverse settings, at both the college and the state levels.

As the focus on college completion intensifies, the results of the PBS Demonstration are encouraging: Modest financial award programs aimed at encouraging academic progress can help students advance toward their degrees and can even make the difference in whether some students graduate. Financial aid providers that add to existing federal and state aid programs can build on these results by tying scholarship payments both to key steps that help students academically and to important markers of academic progress toward earning a degree.

Gordon L. Berlin
President, MDRC

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We also thank the colleges that supported the demonstration and the many dedicated staff and administrators at the colleges who participated in it: Borough of Manhattan Community College, Hillsborough Community College, Hostos Community College, Lorain County Community College, Owens Community College, Pima Community College, Sinclair Community College, and the University of New Mexico. Over the course of the PBS Demonstration, a countless list of vice chancellors, vice presidents, deans, tutors, registrars, administrators, presidents, coordinators, advisers, financial aid staff, and institutional research groups contributed to the successful implementation in the colleges involved in this study. Cash for College regional coordinators supported this work in California colleges.

Many MDRC staff members also contributed to this report. On the project team, we would like to recognize Lashawn Richburg-Hayes, Robert Ivry, and Colleen Sommo for their leadership and guidance throughout this project and their feedback on this report, as well as Amanda Grossman for resource management and contributions to numerous other aspects of the project. Margaret Bald, Gordon Berlin, John Hutchins, Cynthia Miller, and Evan Weissman also reviewed drafts of this report and provided valuable feedback. Nikki Gurley and Lisa Ramadhar wrote a portion of the programs to analyze the site-level data sets. Mike Weiss and Dan Cullinan supported work on the impact model. Jonathan Rodriguez provided research assistance for the cost analysis. Anna Marie Ivery coordinated the production of the report and fact-checked the content, with support from Himani Gupta. Rebecca Bender, with Alice Tufel, edited the report, and Carolyn Thomas prepared it for publication.

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The Authors

EXECUTIVE SUMMARY

Performance-based scholarships have two main goals: to give students more money for college and to provide incentives for academic progress. MDRC launched the Performance-Based Scholarship (PBS) Demonstration in 2008 to evaluate the effectiveness of these scholarships in a diverse set of states, institutions, and low-income student populations. The evaluation includes more than 12,000 students in eight institutions and one intermediary across six states to test different performance-based scholarship designs. Each of the programs in the demonstration was evaluated using a randomized controlled trial, widely considered to be the most reliable way to detect the impact of an intervention.[1]

THE PERFORMANCE-BASED SCHOLARSHIP DEMONSTRATION

MDRC launched the Performance-Based Scholarship Demonstration in 2008 with anchor funding from the Bill & Melinda Gates Foundation and a consortium of other funders: the Helios Education Foundation, the Institute of Education Sciences in the U.S. Department of Education, the Joyce Foundation, the Kresge Foundation, the NYC Center for Economic Opportunity, the Ohio Department of Job and Family Services through the Ohio Board of Regents, the Open Society Foundations, the Robin Hood Foundation, and the College Access Foundation of California, now the College Futures Foundation.

Table ES.1 presents the design of each program in the PBS Demonstration along with the student population that the program targeted. The Opening Doors Louisiana program, an earlier MDRC study whose results informed the PBS Demonstration, is included in the table for reference. Each program was designed for a different population of students and had a different scholarship structure; the institutions' leaders thought carefully about the needs of their students and designed programs accordingly. Across the demonstration, the scholarship amounts ranged from several hundred dollars to $1,500 per semester, depending in part on the academic benchmarks being tested and the level of students' financial need. The goal of the evaluation was to test the effectiveness of the programs for as broad a range of low-income students as possible, to see whether performance-based scholarship programs could work in a variety of settings, with a variety of target populations, and with a variety of incentive structures.

While the details differed from state to state, the programs all shared a few key components. Generally, students were offered multiple payments over the course of each semester for meeting a pre-specified academic benchmark. Each semester, the value of the scholarship payment associated with each

1. In a randomized controlled trial, study enrollees are randomly assigned either to a program group that is eligible to participate in the intervention, or to a control group that is not eligible to participate in the intervention. By comparing the outcomes of each group, the impact of the intervention can be estimated.

TABLE ES.1 Design of the Performance-Based Scholarships in Each State

Final Report on the Performance-Based Scholarship Demonstration

CHARACTERISTIC	OPENING DOORS LOUISIANA[a]	PERFORMANCE-BASED SCHOLARSHIP DEMONSTRATION					
		ARIZONA	CALIFORNIA	FLORIDA	NEW MEXICO	NEW YORK	OHIO
Eligible population	• Age 18-34 • Parent • Family income below 200% of poverty level	• Hispanic male • Fewer than 45 credits earned • EFC below 5,273[b]	• Age 16-19 • High school seniors applying for financial aid • Below Cal Grant A and C income threshold[c]	• Age 18+ • In need of developmental math • EFC below 5,273[b]	• Age 17-20 • Freshmen • Pell-eligible	• Age 22-35 • Live away from parents • In need of developmental education • Pell-eligible	• Age 18+ • Parent • Zero EFC
Maximum scholarship amount per term	$1,000	$1,500	$333 (quarter institutions) or $500 (semester institutions) to $1,000[d]	$600	$1,000	$1,300	$600 (quarter institutions) or $900 (semester institutions)
Scholarship duration	2 semesters	3 semesters	1 term to 2 years	3 semesters	4 semesters	2 full semesters and 1 summer semester[e]	2 semesters or 3 quarters
Maximum amount	$2,000	$4,500	$1,000 - $4,000	$1,800	$4,000	$2,600 - $3,900	$1,800
Academic benchmarks	Complete 6 credits or more with a "C" average or better	*Part-time:* Complete 6-11 credits with a "C" or better in each course *Full-time:* Complete 12 credits or more with a "C" or better in each course	Complete 6 credits or more with a "C" average or better	Complete a sequence of math courses with a "C" or better in each course	Complete 12 credits or more (1st semester) or 15 credits (subsequent semesters) with a "C" average or better	Complete 6 credits or more with a "C" or better in each course	*Part-time:* Complete 6-11 credits with a "C" or better in each class *Full-time:* Complete 12 or more credits with a "C" or better in each course

(continued)

TABLE ES.1 (continued)

CHARACTERISTIC	OPENING DOORS LOUISIANA[a]	PERFORMANCE-BASED SCHOLARSHIP DEMONSTRATION					
		ARIZONA	CALIFORNIA	FLORIDA	NEW MEXICO	NEW YORK	OHIO
Additional service criteria	Meet with adviser	Meet with adviser, complete tutoring and workshop requirements	None	Complete tutoring requirements	Meet with adviser	None	None
Sample size	1,019	1,028	4,921[f]	1,075	1,081	1,502	2,285

SOURCE: Scholarship designs at each site.

NOTES: [a]Opening Doors Louisiana, an earlier MDRC study of a performance-based scholarship program, is included for comparative purposes.

[b]The EFC (Expected Family Contribution) is a measure of 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.

[c]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.

[d]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).

[e]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.

[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.

benchmark increased over time. Most programs offered a small initial payment and a larger final payment each semester. For instance, students at the University of New Mexico program received a $250 scholarship payment for registering for the required number of credit-hours, another $250 scholarship payment for being enrolled in those credit-hours at midterm with a grade point average (GPA) of 2.0 or higher, and a final $500 payment for earning those credit-hours with a final GPA of 2.0 or higher at the end of the semester. The scholarships were designed so that students who earned them would get additional aid, but students who did not would not be penalized — they would still receive the same amount of Pell Grant and other financial aid that they would have received in the absence of the program.[2] In addition, students remained eligible for the scholarship throughout the duration of the program. For instance, students who missed a scholarship payment in one semester by falling short of the benchmark were still eligible for scholarship payments in all subsequent semesters during which the scholarship was offered.

The performance-based scholarship programs in the PBS Demonstration were successfully implemented at a variety of institutions, for diverse groups of low-income students. Institutions established processes to monitor students' progress and paid students appropriately. Nearly all students in the PBS programs received at least one scholarship payment, and students at every site earned more financial aid dollars on average because of the programs. In student surveys, moreover, students reported using the money primarily for education-related expenses such as tuition and fees, books, or basic living expenses.

KEY FINDINGS

- **The performance-based scholarship programs produced modest, positive impacts on students' academic progress.** The analyses pool up to five years of follow-up data on academic outcomes from the PBS programs. The programs showed modest, positive, statistically significant impact estimates — the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes — on credit accumulation in every year, as shown in Table ES.2.[3] After four years, students who were eligible to participate in the PBS program (the program group) had accumulated, on average, a total of 47.2 credits, compared with 45.1 credits earned by students who were not in the PBS program (the control group). The estimated impact on credit accumulation is 2.1 credits.

- **The programs modestly increased degree completion.** Table ES.3 presents impact estimates on degrees earned. After five years, 38.3 percent of students in the program group had completed a degree, compared with about 35.1 percent of students in the control group. The estimated impact on degree completion is 3.3 percentage points.

2. Students' loans were sometimes reduced in order to accommodate the additional aid. However, since the scholarships were typically intended to cover only 15 to 25 percent of students' unmet need, aid displacement other than loans was rarely a concern. Due to the design of the program in California, financial aid package data were not collected to assess whether displacement took place there.

3. A statistically significant impact is one that is unlikely to have occurred by chance alone.

TABLE ES.2 Impacts on Cumulative Credits Earned, Pooled

Final Report on the Performance-Based Scholarship Demonstration

YEAR[a]	SAMPLE SIZE	CUMULATIVE CREDITS EARNED: PROGRAM GROUP	CUMULATIVE CREDITS EARNED: CONTROL GROUP	IMPACT ESTIMATE[b]	STANDARD ERROR	P-VALUE
1	6,938	17.5	16.2	1.2***	0.24	0.00
2	6,938	28.6	26.7	1.9***	0.46	0.00
3	6,938	36.4	34.6	1.8***	0.64	0.00
4	4,835	47.2	45.1	2.1**	1.04	0.05

SOURCES: MDRC calculations using transcript data from Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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 site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

[a]Years 1, 2, and 3 each include Arizona, Florida, New Mexico, New York, and Ohio. Year 4 includes New Mexico, New York, and Ohio.

[b]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

- **The programs did not have a substantial impact on persistence (measured each year by whether students enrolled in school).** The programs produced small impacts on enrollment but did not produce the large gains observed in the Opening Doors Louisiana program. For example, in the PBS Demonstration, the programs produced an estimated average impact of 1.5 percentage points on enrollment in Year 2: That year, 79.3 percent of students in the program group and 77.8 percent of students in the control group enrolled. There is no evidence of larger impacts in later years. In contrast, the Louisiana program increased enrollment at the beginning of Year 2 by an estimated 12 percentage points: 49.4 percent of students in the program group and 37.6 percent of students in the control group enrolled at that time.[4]

4. See Table 4.3 in Lashawn Richburg-Hayes, Thomas Brock, Allen LeBlanc, Christina Paxson, Cecilia Elena Rouse, and Lisa Barrow, *Providing More Cash for College: Interim Findings from the Performance-Based Scholarship Demonstration in California* (New York: MDRC, 2009).

TABLE ES.3 Impacts on Degrees Earned, Pooled

Final Report on the Performance-Based Scholarship Demonstration

YEAR[a]	SAMPLE SIZE	PERCENTAGE WHO EARNED A DEGREE		IMPACT ESTIMATE[b]	STANDARD ERROR	P-VALUE
		PROGRAM GROUP	CONTROL GROUP			
1	11,613	2.9	2.8	0.2	0.3	0.61
2	11,613	8.3	7.4	0.9*	0.5	0.07
3	11,613	14.9	13.6	1.4**	0.7	0.04
4	9,510	26.4	25.7	0.7	0.9	0.44
5	4,868	38.3	35.1	3.3**	1.4	0.02

SOURCES: MDRC calculations using transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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 site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

[a]Years 1, 2, and 3 each include Arizona, California, Florida, New Mexico, New York, and Ohio. Year 4 includes California, New Mexico, New York, and Ohio. Year 5 includes New Mexico, New York, and Ohio.

[b]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

- **The scholarship programs varied along multiple dimensions, but they appear to consistently help students progress academically.** The PBS programs showed little evidence of variation in impacts across multiple dimensions. The programs appear to work for varying scholarship program designs, in different states and academic settings.

- **The scholarships worked for a variety of low-income students with different characteristics, including at-risk groups that traditionally perform poorly.** The programs were similarly effective for a wide variety of student groups, including younger and older students, men and women, and Hispanic and non-Hispanic students.

- **Evidence from the study in California suggests that offering students a scholarship in their senior year of high school increases enrollment in the first year of college.** The program in California was the only one to offer scholarships to high school students. The evidence suggests that the California program produced the strongest impacts on enrollment in the first semester of college, primarily for students who attended community colleges.

- **In sites where student services accompanied the performance-based scholarship, the use of these services increased markedly as a result of the program.** At Pima Community College in Arizona, Hillsborough Community College in Florida, and the University of New Mexico, student services such as tutoring, advising, and workshops were integrated in various ways with the award. Students' likelihood of using these services increased because of the scholarship program, which offered incentives to do so.

- **The performance-based scholarships increased students' total financial aid, even when helping to reduce their dependency on loans.** The PBS program consistently increased the average amount of financial aid that students in the program group received, ranging from around $500 (at Lorain County Community College, Owens Community College, and Sinclair Community College in Ohio) to $2,200 (at Borough of Manhattan Community College and Hostos Community College in New York). Three of the programs also reduced students' loans during the time that they were offered a scholarship, with loan reductions ranging from about $330 to $600.

- **The scholarships cost additional money but did not increase the average cost per degree.** After five years of follow-up, the cost per degree for students in the program group and the control group is about the same.

CONCLUSIONS AND LESSONS FROM THIS DEMONSTRATION

This evaluation suggests that the performance-based scholarship programs accomplished their two main goals: The programs helped low-income students pay for college and helped them make greater academic progress toward their degrees. These results are also promising in the context of existing research on financial aid, which generally finds small positive impacts or no evidence of impacts for enrollment or credit accumulation, and less frequently finds impacts on graduation.[5] A key lesson for scholarship providers and policymakers at the federal, state, and local levels is that these programs did not depend on rigid adherence to a scholarship structure, but instead were guided by three core principles:

1. Scholarship payments were made in increments during a semester and were contingent on behaviors associated with greater academic success, such as enrollment in a certain number of credits and maintaining that course load over the semester.

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5. See, for example, Joshua Angrist, Daniel Lang, and Philip Oreopoulos, "Incentives and Services for College Achievement: Evidence from a Randomized Trial," *American Economic Journal: Applied Economics* 1, 1 (2009): 1-28; Melissa Binder, Kate Krause, Cynthia Miller, and Oscar Cerna, "Providing Incentives for Timely Progress Toward Earning a College Degree: Results from a Performance-Based Scholarship Experiment," MDRC Working Paper (New York: MDRC, 2015); Sara Goldrick-Rab, Douglas N. Harris, Robert Kelchen, and James Benson, *Need-Based Financial Aid and College Persistence: Experimental Evidence from Wisconsin* (Madison: Wisconsin Center for Educational Research, 2012); and Judith Scott-Clayton, "On Money and Motivation: A Quasi-Experimental Analysis of Financial Incentives for College Achievement," *The Journal of Human Resources* 46, 3 (2011): 614-646. See Reuben Ford, Douwere Grekou, Isaac Kwakye, and Claudia Nicholson, *Future to Discover: Fourth Year Post-Secondary Impacts Report* (Ottawa, Ontario: Social Research and Demonstration Corporation, 2014), for an example of a related program that shows evidence of graduation impacts in Canada.

2. Scholarship payments that were made at the end of each semester were tied to important benchmarks associated with graduation (such as receiving a minimum grade in a certain number of credits over the semester) while also providing funds to support students' education in the next semester.

3. When program design included additional student support services (such as advising or tutoring), the programs required that students use these services in order to earn the scholarships. This requirement improved participation in these services substantially.

The program designs in each state were created collaboratively with key stakeholders, who provided valuable insights related to the target populations for the scholarships, the benchmarks, and the student services, if any, that should be incorporated into the design. The flexible nature of the programs makes it possible for other scholarship providers — at the state or local level, public or private — to adapt the design to meet their own priorities.[6]

This study does not, however, suggest that all financial aid should be restructured to encourage performance — especially in regard to the federal Pell Grant program. The Pell Grant is generally the foundation of a student's aid package and can be much larger than the scholarship amounts studied here, which were paid to students in addition to any Pell dollars and other financial aid they already received. Changing disbursement criteria for Pell could alter behavior in ways very different from the PBS Demonstration results, and could negatively affect enrollment, since Pell is typically paid at the beginning of the semester and students may anticipate having those funds at the time they enroll in school. Providing students less financial aid up front could reduce their ability to cover tuition and fees at many colleges.[7]

The findings do suggest, however, possibilities for restructuring state and private aid, and any additional federal aid that might be provided in the future. State and private donors contribute more than $20.1 billion in scholarships to undergraduate students, and some of this aid may be more effectively offered as performance-based scholarships.[8] For the 2012-2013 academic year, 19 percent of all state-sponsored aid was reported as merit-based — typically based on students' high school performance, not their college performance. Students who receive this aid, however, may be likely

6. For more information on this topic, see Rashida Welbeck, Michelle Ware, Oscar Cerna, and Ireri Valenzuela, *Paying It Forward: A Technical Assistance Guide for Developing and Implementing Performance-Based Scholarships* (New York: MDRC, 2014).

7. In 2010-2011, the maximum Pell Grant amount was $5,500. That same year, the median tuition and fees for all public institutions was $4,632. For all public four-year institutions it was $6,780, and for all public two-year institutions it was $2,537. These figures represent tuition and fees over a full year; each semester would cost roughly half that. See National Center for Education Statistics, "Average Undergraduate Tuition, Fees, Room, and Board Rates for Full-Time Students in Degree-Granting Postsecondary Institutions, by Percentile, Control and Level of Institution: Selected Years, 2000-01 Through 2012-13" (Washington, DC: NCES, 2011), Table 330.30 (website: http://nces.ed.gov).

8. Sandy Baum, Diane Cardenas Elliott, and Jennifer Ma, *Trends in Student Aid 2014* (Washington, DC: The College Board, 2014).

to succeed in college without it.[9] Reallocating merit-based aid to low-income students through performance-based scholarship programs could be an effective strategy to help these students make greater academic progress. It could also help programs offer money to more students or increase the size of scholarships. This is because students in the programs were offered the opportunity to earn more scholarships, but not all students earned them: The programs did not pay those students the full amount that was offered. Some of this saved money, for example, could be offered to other students.

Some states have also used existing funds creatively to promote greater academic progress through college for low-income populations. Both the original performance-based scholarship program launched in Louisiana as part of the Opening Doors Demonstration and the Ohio PBS program described in this report used state Temporary Assistance for Needy Families (TANF) funds to offer these scholarships to low-income parents who were attending college. More recently, new legislation in Indiana includes provisions to give financial bonuses to some low-income students if they meet certain academic benchmarks. Students in the Frank O'Bannon program, for example — a need-based financial aid program — can earn an additional $1,300 in aid if they complete 39 credits annually.[10] California is currently considering a similar program.[11]

The results presented here demonstrate that performance-based scholarship programs have consistently helped students make modest gains in their academic progress and even helped some students graduate. The programs provide a flexible design that can be implemented widely, and they can be structured to meet the needs of diverse student populations. This evaluation shows that performance-based scholarships are an important tool for colleges, states, and scholarship providers who work to improve outcomes for low-income students.

9. National Association of State Student Grant and Aid Programs (NASSGAP), *44th Annual NASSGAP Survey Report, 2012-2013 Academic Year* (n.d.), website: www.nassgap.org; Sandy Baum, David W. Breneman, Matthew M. Chingos, Ronald G. Ehrenberg, Pamela Fowler, John Hayek, Donald E. Heller, Allison G. Jones, David A. Longanecker, Tim Nesbitt, Judith Scott-Clayton, Sarah E. Turner, Jane V. Wellman, and Grover "Russ" Whitehurst, "Beyond Need and Merit: Strengthening State Grant Programs" (Washington, DC: The Brookings Institute, 2012).

10. Indiana Commission for Higher Education, *Reforming Student Financial Aid to Increase College Completion: Early Progress Resulting from Indiana House Enrolled Act 1348* (Indianapolis: Indiana Commission for Higher Education, 2015).

11. For more information about this program, see California State Senate Majority Caucus, "Fact Sheet on SB 15: A Plan for Higher Education in California" (Sacramento: California State Senate Majority Caucus, 2014).

INTRODUCTION

Performance-based scholarships have two main goals: to give students more money for college and to provide incentives for academic progress. MDRC launched the Performance-Based Scholarship (PBS) Demonstration in 2008 to evaluate the effectiveness of these scholarships in a diverse set of states, institutions, and low-income student populations. Since then, MDRC has worked with more than 12,000 students in eight institutions and one intermediary across six states to test different performance-based scholarship designs.

Performance-based scholarships are designed to help low-income students pay for college by offering them financial aid contingent upon meeting pre-specified academic benchmarks. The scholarships are intended to cover a modest amount of students' educational costs during the semesters they are offered — generally between 15 and 25 percent of students' unmet financial need, or the difference between students' calculated financial need to attend college and the financial aid they are awarded. The money is paid directly to students, on top of their existing federal and state need-based financial aid, and the students themselves decide how best to use the funds. Students can spend the money on educational expenses, such as textbooks and tuition; on personal expenses, such as transportation or child care; or on other items. Unlike merit-based financial aid, which is offered based on past academic performance, these scholarships offer students money for future performance. By making the money conditional upon fulfillment of key academic benchmarks, such as full-time enrollment and credit accumulation with a "C" average or better, the programs seek to support and encourage students' academic progress at the same time.

This report finds that performance-based scholarship programs consistently produced modest, positive impacts on key indicators of students' academic success over time. Students in the programs were more likely to meet key academic benchmarks and to use student services when they were tied to the scholarship payments, leading to gains in enrollment, credit accumulation, and degree completion. The demonstration also found that performance-based scholarships can be implemented in a wide variety of institutional contexts for diverse populations of low-income students. Offering these scholarships to students increased their total financial aid, even while reducing their dependency on loans.

Background

Over the past decade, tuition and fees at public colleges and universities across the United States have risen much faster than the rate of inflation. Since the 2000-2001 school year, published average tuition and fees for community college students have increased from $2,264 to $3,347 in the 2014-2015 academic year — an increase of nearly 50 percent. For students at public four-year institutions, the increase has been even higher, rising from $4,837 to $9,139, or 88 percent.[1]

College enrollment in the United States has grown steadily over the past several decades, but many low-income students still do not attend college. In 2009, only 55 percent of high school graduates

1. Prices are converted to 2014 dollars. For more information, see College Board (2015).

from low-income families went to college, compared with 67 percent and 84 percent of those from middle-income and highly affluent families, respectively.[2] Success rates are also quite low, especially among low-income students and students of color. Research by the U.S. Department of Education found that only 35 percent of incoming students at community colleges and 64 percent of incoming students at four-year institutions earn a certificate or degree from any college or university after six years.[3]

While financial aid allows many students and their families to pay less than the published prices for college tuition, that aid is often not enough to cover the full cost of attendance, which includes additional expenses such as textbooks, transportation, and living expenses — all of which have also increased in price. One study found that the vast majority of low-income students face unmet financial need: Among community college students with documented financial need, 80 percent still have unmet need after all financial aid has been awarded. Among this group are the 40 percent of community college students whose family incomes are so low that their Expected Family Contribution (EFC) is zero.[4]

Private scholarships, which award over $10 billion to undergraduate students annually, are one resource that can help cover students' unmet need.[5] A community college student who receives significant private scholarship money, however, is the exception, not the rule.[6] Private scholarships are traditionally merit-based and awarded to students based on their past academic success — often characterized by a good high school grade point average (GPA). This merit-based aid may not be within reach for the average low-income community college student.[7]

Several studies, however, show that financial aid correlates with college enrollment and persistence, suggesting that giving low-income students additional financial aid might help them academically.[8] Need-based grant aid, in particular, has been estimated to have a positive impact on credit accumulation and college persistence to the second year.[9] A review of the literature also notes that financial aid may affect students differently depending on their level of financial need.[10] Few studies, however, have used randomized controlled trials to examine the causal impact of innovative financial aid

2. Baum, Kurose, and McPherson (2013).
3. Walton Radford, Berkner, Wheeless, and Shepherd (2010).
4. The Institute for College Access and Success (2009). The Expected Family Contribution is a measure of a student's and/or family's ability to contribute toward the cost of college and is calculated according to a formula established by federal law. Elements of the formula may include the family's taxed and untaxed income, assets, and benefits, such as unemployment and Social Security; the size of the family; and the number of family members enrolled in postsecondary education in the given year.
5. Baum, Cardenas Elliott, and Ma (2014).
6. Baum and Ma (2014).
7. Huelsman and Cunningham (2013).
8. St. John, Andrieu, Oescher, and Starkey (1994); Avery and Kane (2004); Deming and Dynarski (2009); Cornwell, Mustard, and Sridhar (2006); Dynarski and Scott-Clayton (2013).
9. Dynarski (2003); Castleman and Long (2012); Bettinger (2004); Bettinger (2010).
10. Welbeck, Diamond, Mayer, and Richburg-Hayes (2014).

structures on long-term student achievement, particularly graduation,[11] and quasi-experimental studies have found that aid programs have mixed results. One such quasi-experimental study found that a merit-based aid program in Georgia produced large increases in graduation rates.[12] Follow-up studies that also used quasi-experimental designs, however, found no statistically significant differences in degree attainment for students receiving the Georgia scholarships.[13]

Studies that tested state scholarship programs with regression discontinuity designs also found mixed results.[14] One found that Tennessee's scholarship program had no effect on students' educational attainment,[15] while another found an impact on students' four-year graduation rates of 9 percentage points in West Virginia.[16] While differences in the student samples may explain these conflicting findings,[17] there may be other explanations, and the impact of such programs remains unclear.

MDRC's Opening Doors Demonstration in Louisiana, launched in 2004, was one of the first studies to rigorously test a need-based financial aid program for low-income students on a large scale, using a randomized controlled trial.[18] Using this research design alleviates concerns about whether students receiving financial aid differ in important ways from those not receiving aid, which could confound results, because random assignment ensures that no systematic factors determine whether students are receiving aid.

The Opening Doors Louisiana program offered low-income students with children a performance-based scholarship of $1,000 per semester for two semesters in exchange for enrolling in college at least half-time and maintaining a "C" average or better each semester.[19] MDRC's evaluation of the program found that students who were eligible for the scholarship were more likely to enroll in college full time and persist from semester to semester, compared with students in a control group who were not eligible for the scholarship. In fact, the program was estimated to increase enrollment in the second semester by 15 percentage points — a larger impact than MDRC had seen in other studies at the time, and one that inspired hope of impacts on graduation. Students eligible to receive the performance-based scholarship also accumulated an average of 2.3 more credits than students

11. Some of the exceptions are Angrist, Lang, and Oreopoulos (2009); Binder, Krause, Miller, and Cerna (2015); Ford, Grekou, Kwakye, and Nicholson (2014); Goldrick-Rab, Harris, Kelchen, and Benson (2012); and Richburg-Hayes et al. (2009). Castleman and Long (2012) identify this gap in the literature as resulting from the challenges in separating student characteristics from financial aid receipt. For example, low-income students who qualify for need-based financial aid may be more academically underprepared in addition to having higher levels of financial need compared with their higher-income peers.
12. Dynarski (2000).
13. Sjoquist and Winters (2012).
14. Regression discontinuity analysis is a quasi-experimental design that can be used to estimate program impacts by comparing outcomes for individuals who fall just above and just below a particular eligibility cutoff.
15. Bruce and Carruthers (2011).
16. Scott-Clayton (2011).
17. Binder, Krause, Miller, and Cerna (2015).
18. Other randomized controlled trials looking at financial aid programs have been conducted since 2004, including those listed in footnote 11.
19. Information in this paragraph is discussed in more detail in Richburg-Hayes et al. (2009).

in the control group during the first year. The devastation wreaked by Hurricane Katrina in 2005, however, disrupted students' education, and plans for a longer-term follow-up to look for impacts on degree receipt were discontinued.

The Performance-Based Scholarship Demonstration

Following the positive results in Louisiana, MDRC launched the Performance-Based Scholarship Demonstration in 2008 with anchor funding from the Bill & Melinda Gates Foundation and a consortium of other funders: The Helios Education Foundation, The Institute of Education Sciences in the U.S. Department of Education, The Joyce Foundation, The Kresge Foundation, The NYC Center for Economic Opportunity, The Ohio Department of Job and Family Services through the Ohio Board of Regents, The Open Society Foundations, The Robin Hood Foundation, and The College Access Foundation of California, now The College Futures Foundation. The PBS Demonstration aimed to test whether the promising results in Louisiana could be replicated in other states, institutions, and contexts and with other low-income student populations.

Table 1 presents the designs of each program in the PBS Demonstration along with the student population the program targeted. The Opening Doors Louisiana program is included for reference. Each program was designed for a different population of students and had a different scholarship structure; the scholarship amounts ranged from a few hundred dollars per term to $1,500 per term, depending in part on the benchmarks being tested and the level of students' financial need. The goal of the evaluation was to test the effectiveness of the programs for as broad a range of low-income students as possible, to see whether performance-based scholarship programs could work in a variety of settings, with different target populations, and with varying incentive structures. Institutions took advantage of this flexibility to create performance-based scholarship programs tailored to what they perceived to be the specific needs of their students, by targeting the incentives, benchmarks, and in some cases additional services to address those needs.[20]

In Arizona, the performance-based scholarship program operated at Pima Community College. The program focused on creating academic supports to help Latino males succeed and provided a financial incentive to encourage students to go to school full time. School administrators at Pima were concerned that these students were enrolling in too few credits and not taking advantage of the student support services available on campus. Students in the program were eligible to receive up to $1,500 per semester for three semesters for passing their courses with a "C" grade or better. Pima's program targeted Latino male students exclusively and provided incentives for attending advising and tutoring sessions, on top of the incentives for passing their courses. In addition, the program ran group sessions called *Pláticas* (Spanish for "conversations") in which students could discuss obstacles and issues unique to their lives. Students had to attend one *Plática* per semester to qualify for the full payment.

20. More information about implementing these scholarships can be found in Welbeck, Ware, Cerna, and Valenzuela (2014).

TABLE 1 Design of the Performance-Based Scholarships in Each State

Final Report on the Performance-Based Scholarship Demonstration

CHARACTERISTIC	OPENING DOORS LOUISIANA[a]	PERFORMANCE-BASED SCHOLARSHIP DEMONSTRATION					
		ARIZONA	CALIFORNIA	FLORIDA	NEW MEXICO	NEW YORK	OHIO
Eligible population	• Age 18-34 • Parent • Family income below 200% of poverty level	• Hispanic male • Fewer than 45 credits earned • EFC below 5,273[b]	• Age 16-19 • High school seniors applying for financial aid • Below Cal Grant A and C income threshold[c]	• Age 18+ • In need of developmental math • EFC below 5,273[b]	• Age 17-20 • Freshmen • Pell-eligible	• Age 22-35 • Live away from parents • In need of developmental education • Pell-eligible	• Age 18+ • Parent • Zero EFC
Maximum scholarship amount per term	$1,000	$1,500	$333 (quarter institutions) or $500 (semester institutions) to $1,000[d]	$600	$1,000	$1,300	$600 (quarter institutions) or $900 (semester institutions)
Scholarship duration	2 semesters	3 semesters	1 term to 2 years	3 semesters	4 semesters	2 full semesters and 1 summer semester[e]	2 semesters or 3 quarters
Maximum amount	$2,000	$4,500	$1,000 - $4,000	$1,800	$4,000	$2,600 - $3,900	$1,800
Academic benchmarks	Complete 6 credits or more with a "C" average or better	*Part-time:* Complete 6-11 credits with a "C" or better in each course *Full-time:* Complete 12 credits or more with a "C" or better in each course	Complete 6 credits or more with a "C" average or better	Complete a sequence of math courses with a "C" or better in each course	Complete 12 credits or more (1st semester) or 15 credits (subsequent semesters) with a "C" average or better	Complete 6 credits or more with a "C" or better in each course	*Part-time:* Complete 6-11 credits with a "C" or better in each class *Full-time:* Complete 12 or more credits with a "C" or better in each course

(continued)

TABLE 1 (continued)

CHARACTERISTIC	OPENING DOORS LOUISIANA[a]	PERFORMANCE-BASED SCHOLARSHIP DEMONSTRATION					
		ARIZONA	CALIFORNIA	FLORIDA	NEW MEXICO	NEW YORK	OHIO
Additional service criteria	Meet with adviser	Meet with adviser, complete tutoring and workshop requirements	None	Complete tutoring requirements	Meet with adviser	None	None
Sample size	1,019	1,028	4,921[f]	1,075	1,081	1,502	2,285

SOURCE: Scholarship designs at each site.

NOTES: [a]Opening Doors Louisiana, an earlier MDRC study of a performance-based scholarship program, is included for comparative purposes.

[b]The EFC (Expected Family Contribution) is a measure of 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.

[c]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.

[d]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).

[e]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.

[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.

In California, the program targeted low-income high school seniors planning to attend college who went to a Cash for College financial aid workshop. The resulting study population was over 60 percent Latino. Students were randomly assigned into seven groups: Five groups were offered performance-based scholarships of varying amounts and durations with enrollment and GPA requirements; one group was offered a traditional scholarship without performance criteria; and one group was a control group that was not offered a scholarship. The program allowed students to use their scholarship at any accredited two-year or four-year institution of their choosing, whether in California or across the country. This large-scale program operated at the state level rather than at individual institutions and gave students broad flexibility to choose institutions. The goal of placing students into different types of scholarship groups was to examine how varied scholarship durations and amounts affected student behavior.

> **"THE INSTRUCTORS AND THE . . . STAFF [HAVE] GIVEN ME A SENSE OF BELONGING, A SENSE THAT THEY DO CARE, AND THEY'RE WILLING TO STRETCH OUT FOR SOMEONE THAT'S BARELY NAVIGATING THEIR WAY AROUND. . . . THEY . . . KIND OF GIVE YOU A PATH TO FOLLOW AND THAT'S BETTER THAN JUST WINGING IT. I DIDN'T HAVE THAT SUPPORT WHEN I WENT TO SCHOOL BEFORE."**
>
> **— A STUDENT IN ARIZONA**

In Florida, school administrators at Hillsborough Community College identified a specific sequence of developmental math classes as a roadblock to student success. Hillsborough's scholarship program was designed to encourage students to enroll in and complete their developmental math course sequences. Reflecting the diversity of the school, the sample of students in this particular study was almost evenly split among white, black, and Latino students. The students were an average age of 27 years old at the time of random assignment, and many were parents, signifying that a large proportion of students were not of traditional college-going age. Students were offered a maximum of $600 per semester for three semesters for enrolling in and passing the developmental math course into which they had been placed. Each semester, they needed to enroll in and then pass the next course in the sequence to earn their scholarship payments. Program administrators at Hillsborough Community College also hoped to increase the number of students taking advantage of math support services and tutoring available on campus, so a service component was included in the scholarship: In order for students to receive the second payment each semester, they needed to complete a set number of hours in the campus Math Lab, a math learning center offering tutoring, group work, computerized practice sets, and more.

At the University of New Mexico — the only four-year institution in the demonstration to run a performance-based scholarship program — program designers wanted to encourage students of traditional college-going age to attempt and complete enough credits each semester to increase their likelihood of graduating on time. The performance-based scholarship program was structured to pay students for enrolling in and completing 12 credits in their first semester and 15 credits in

each subsequent semester, offering students a total of $1,000 per semester for four semesters. This program was predominantly composed of Latino students between the ages of 17 and 18 years old.

In New York, the program was designed to help nontraditional students with developmental education needs stay in college. The students at these colleges were an average age of 27 years old, and almost half were parents. More than 90 percent were students of color. Students were offered a maximum scholarship of $1,300 per semester for two semesters. The two New York institutions, Borough of Manhattan Community College and Hostos Community College, identified summer enrollment as a way for students to accumulate more credits, so some of the students were also randomly assigned to receive an additional scholarship offer for summer enrollment.

Finally, in Ohio, the program targeted low-income parents. Here, three schools participated: Lorain County Community College, Owens Community College, and Sinclair Community College. The vast majority of these student-parents were female, and they were an average age of 30 years old; almost two-thirds of these students were from households receiving public benefits. A differential full-time and part-time scholarship was created to help encourage students to enroll full time in school, while also supporting students who could attend only part time. Students who enrolled in 12 credits or more were eligible for a maximum award of $900 per semester, while students who enrolled in 6 to 11 credits were eligible for up to $450 per semester. At each institution, whether it operated on a semester or a quarter system, students were eligible for a maximum award of $1,800 over the course of the entire program.

Across these states, the scholarship programs' designs differed, but they shared a few key components. Generally, students were offered multiple payments each term for meeting a pre-specified academic benchmark. Over the course of each semester, the value of the scholarship payment associated with the benchmarks increased, with most programs offering a small payment at the beginning of the semester and a larger payment at the end of the semester, so that the total amount offered covered about 15 to 25 percent of students' unmet need for that semester. For instance, students at the University of New Mexico received a $250 scholarship payment for registering for the required number of credit-hours, another $250 scholarship payment for being enrolled in those credit-hours at midterm with a GPA of 2.0 or higher, and a final $500 payment for earning those credit-hours with a GPA of 2.0 or higher at the end of the semester. An important component of the design is that scholarship payments are made directly to students, who can use the money as they like, and the money is provided in addition to Pell Grants and any need-based state aid that students might receive. Though the scholarships were designed so that students who earned them would get additional aid, students who did not receive the scholarship were not penalized: All students in the study still received the same amount of Pell and other financial aid that they would have received in the absence of the program.[21]

21. Students' loans were sometimes reduced in order to accommodate the additional aid. However, since the scholarships were typically intended to cover only 15 to 25 percent of students' unmet need, aid displacement other than loans was rarely a concern. Due to the design of the program in California, financial aid package data were not collected to assess whether displacement took place there.

The goal of all the programs was to reduce financial burdens on low-income students, to provide incentives for good academic progress, and generally to help students succeed academically. Performance-based scholarships are theorized to work by offering students an incentive to make positive changes in their behaviors associated with academic success — for example, by increasing study time, encouraging students to work harder at their courses, and helping them to attempt and earn additional credits. As a result of the programs, students are expected to feel increased confidence in their ability to succeed and to feel less stress about money while in college. Additionally, students who earn scholarship dollars may have more money to put toward their college expenses in the subsequent semesters, which might lead students to spend less time at a job or to prioritize school over employment at key points in the semester, such as during midterm exams. At the institutions where a service component was tied to scholarship receipt, students were expected to benefit from that service in addition to the money they received. Tutoring, for example, could help students do better in class, and academic advising could help them make better academic decisions.

> **"I GOT OUT OF HIGH SCHOOL. I HAD TWO BABIES. I SUPPORTED MYSELF WITH WAITRESSING, AND I JUST GOT FED UP WITH IT. . . . SO I DECIDED TO COME BACK TO SCHOOL TO GET A MORE STABLE JOB . . . TO BE ABLE TO HAVE MONEY . . . AND THE THINGS THAT WE WANTED."**
>
> —A STUDENT IN OHIO

These short-term outcomes could help students stay in college and shorten the amount of time it takes to attain a degree. Ultimately, these behavioral changes are expected to lead to an increased likelihood of graduation, better employment prospects, and higher earnings associated with a college credential.

All of the institutions in the demonstration were purposeful in the design of their scholarship program, focusing on the perceived needs of their students and targeting the incentives and benchmarks to those needs. While no scholarship program offered enough to fully cover students' unmet financial need, they did seek to offer an amount large enough to influence students' behavior.

Research Questions and Design

The PBS Demonstration addresses the following research questions:

- Can performance-based scholarships be implemented widely, in diverse settings, for diverse groups of students?

- Do performance-based scholarships affect important academic outcomes, as measured by enrollment, the number of credits students earn, and attainment of degrees and certificates?

- Do the impacts of performance-based scholarships vary for different scholarship programs or for different types of students?

- What is the cost to implement performance-based scholarship programs?

- Are performance-based scholarship programs cost-effective?

MDRC evaluated the Performance-Based Scholarship Demonstration using a random assignment research design. Widely considered to be the gold standard in social science research, random assignment constructs two groups of study enrollees — a program group and a control group — who are, on average, similar at the outset of the study in both their observable characteristics (for example, ethnicity, gender) and their unobservable ones (such as motivation and personal obstacles). As a result, any subsequent differences in outcomes between the two groups can be confidently attributed to the performance-based scholarship program. In the PBS Demonstration, eligible students who consented to join the study were randomly assigned to either a program group, in which they were eligible to receive performance-based scholarships, or to a control group, in which they received their usual financial aid package and all standard services their institution offered but no additional performance-based scholarship.

This report analyzes pooled data from each of the sites included in the PBS Demonstration and synthesizes findings across the studies to present conclusions drawn from the entire demonstration related to feasibility, efficacy, and cost-effectiveness. It provides long-term follow-up data for all sites, including up to five years of follow-up for academic outcomes. The PBS Demonstration adds to a growing knowledge base about the effectiveness of scholarships in improving students' academic outcomes. This large demonstration allows analysis of diverse student populations receiving different types of scholarship offers. This report shows that while the performance-based scholarships covered just a portion of students' overall unmet financial need, they produced consistently positive, modest impacts on academic outcomes.

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The balance of this report presents the data sources for the evaluation and demographics for the students in the study, followed by the findings on implementation, impacts, and costs. The report concludes with the implications of these findings for states, institutions, and scholarship providers.

DATA SOURCES FOR THIS REPORT

The evaluation of performance-based scholarships in this report is based on the data sources described below.

- **Baseline data.** All students in the PBS Demonstration completed a baseline information questionnaire before random assignment, detailing a range of demographic and other background information. These data are used to describe the sample and to identify students for subgroup analyses. Appendix Table A.1 shows the baseline information for the sample students by state.

- **Financial aid information.** MDRC received financial aid data for all sites except California for at least the first full year after random assignment took place. These data include information on the performance-based scholarship amounts awarded to or actually received by students, as well as federal Pell Grants, student loans, and other financial supports unique to the individual sites. The colleges in the study provided financial aid data directly to the study team. As a result, California data were not obtained because students in that state were able to take their scholarship to any accredited two-year or four-year school.

- **Operational site visits, field research, and student surveys.** As a complement to the administrative data collected on students, MDRC conducted interviews and focus groups with students in both the program and control groups at several of the sites. In addition, surveys were conducted with the students in California, at the Ohio colleges, at Pima Community College in Arizona, and at Hillsborough Community College in Florida.

- **Student records data.** Student records follow-up data were available for varying lengths of time in different sites. Table 2 shows the data source and the follow-up periods available for each of the academic outcomes included in this report. For all states except California, data from the National Student Clearinghouse supplemented the data sets for enrollment and degrees earned.[22] The Clearinghouse, a nonprofit organization, collects and distributes enrollment, degree, and certificate data from more than 3,600 colleges that (combined) enroll 98 percent of the nation's college students.[23]

- **Cost data.** All of the institutions provided expenditure data on their respective programs. These data were used to estimate the cost of the program at each site. To estimate the cost of college services used by students, data on credits attempted by students and annual expenditures for all of the institutions in the demonstration were collected from the Integrated Postsecondary Education Data System (IPEDS). The Higher Education Price Index was used to update all cost data to reflect 2014 dollars to account for inflation over the course of this study.

The initial 2004 study of performance-based scholarships, the Opening Doors study in Louisiana, is excluded from much of the remainder of this report. Due to the destruction caused by Hurricane Katrina, researchers did not examine that program's long-term impacts.[24]

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22. California's analysis includes five different types of performance-based scholarships. Aalysis of a sixth scholarship type, which was not performance-based, is not included in this report.

23. Coverage reflects information published by the National Student Clearinghouse (2015). Coverage may have changed since students' records data were obtained in November of 2014. When there was overlap in the data coverage, the individual site data were used to identify academic outcomes at the schools of random assignment and the Clearinghouse data were used to identify academic outcomes at other schools. In situations where there was an additional year of Clearinghouse data beyond the overlap period, the Clearinghouse data were used to identify academic outcomes at both the school of random assignment and any other school. For New York and Ohio, this approach resulted in an additional year of follow-up. For California, Clearinghouse data were used as the primary data source for the full follow-up period (four years).

24. Barrow, Richburg-Hayes, Rouse, and Brock (2014).

TABLE 2 Follow-Up Period and Data Source for Each Site, by Outcome

Final Report on the Performance-Based Scholarship Demonstration

	ARIZONA	CALIFORNIA	FLORIDA	NEW MEXICO	NEW YORK	OHIO
Outcome						
Credits earned/ attempted	3 years	Not available	3 years	4 years[a]	4 years[b]	4 years
Enrollment	3 years	4 years	3 years	5 years	5 years[c]	5 years[c]
Degrees earned	3 years	4 years	3 years	5 years	5 years[c]	5 years[c]
Primary data source	Pima Community College	National Student Clearinghouse	Hillsborough Community College	University of New Mexico	City University of New York (CUNY)[d]	Ohio Board of Regents[e]

NOTES: For all sites except California, National Student Clearinghouse data supplemented the data sets for enrollment and degrees earned.

[a]Five years of data were processed for this outcome, but only 4 years were used since no other site had more than 4 years of follow-up data available.

[b]Transcript and degree outcomes were missing for 33 students (out of 1,502) in the New York data provided by CUNY. These students were excluded from the credit value outcome impact analyses. The degree and enrollment outcomes for these students are based only on National Student Clearinghouse data for all 5 years of follow-up.

[c]Year 5 includes only National Student Clearinghouse data.

[d]Includes data for all CUNY colleges.

[e]Includes data from all Ohio public colleges.

IMPLEMENTATION FINDINGS

Evaluation studies of the individual PBS programs consistently found that the programs were successfully implemented in diverse settings.[25] While there was some variation by site, each program integrated the scholarship into the college (with the exception of California, where the program was not housed at a particular college), sometimes with the addition of supplemental service components.

25. This section provides an overview of previous implementation findings. For more information, see individual reports published on each state: Patel and Rudd (2012); Patel and Valenzuela (2013); Sommo et al. (2014); Binder, Krause, Miller, and Cerna (2015); Mayer, Patel, and Gutierrez (2015); Richburg-Hayes et al. (2015).

Structure and Staffing

At each institution, the program was supported by leadership at the college, who helped champion the program and customize it for the college and population it was meant to serve. Sometimes the program was housed in the financial aid department, other times in the student services department. In all cases, the program required a considerable amount of coordination between different groups. For example, the program at Pima Community College in Arizona involved a scholarship component combined with a comprehensive set of student services. In order to implement the program successfully, the program coordinator worked with the Learning Centers, student services staff, financial aid department, information technology (IT) department, and student accounts department.

At each site, additional staff were hired to implement the program. Sometimes just one additional staff member was hired, but the number ranged up to three staff members for more complex programs. Consequently, at least one dedicated staff member was available to answer questions for students regarding the performance-based scholarship program. Each college had a program coordinator whose main responsibilities were to enroll students, check students' eligibility requirements for each payment, and ensure that students were paid correctly. While some of these processes were automated to varying degrees, some amount of coordination with different departments was still necessary to implement the program. Through MDRC field visits and checks of student records, researchers confirmed that erroneous payments were rare.

In California, the preexisting Cash for College program was an initiative to help low-income students apply for financial aid; it provided workshops on the application as well as one $1,000 scholarship to one or two randomly selected students at each Cash for College workshop with 25 attendees or more (as an incentive to increase attendance at the workshop). The program was adapted in 2008 to implement performance-based scholarships, showing that a large-scale, portable scholarship program can be executed successfully. The study required more procedures in order to manage the various scholarship types, the increased volume of students in the program group, and the additional requirements attached to the disbursement of the award, as well as the portable nature of the scholarships. Additionally, the study in California was built into a statewide program — a public-private partnership, bringing together high schools, community agencies, and businesses with a number of partner organizations. These organizations were able to adapt the performance-based scholarship design into their regular operations over the course of this study.

Sites with Student Services Components

Three of the six programs — those at Pima Community College in Arizona, Hillsborough Community College in Florida, and the University of New Mexico — successfully complemented the scholarship by requiring students to participate in support services in order to receive the award. Across these three states, service use increased markedly as a result of the programs.

- **At Pima Community College, students in the program group participated at high rates in the advising, tutoring, and workshops that were offered.** For example, in the first term, over 96 percent of students in the program group attended the orientation, nearly 84 percent met

with their advisers at least twice during the term, and almost 80 percent attended at least one *Plática* session.[26]

- **At Hillsborough Community College, students in the program group were much more likely than students in the control group to visit the tutoring center.** For example, in the first term, almost 89 percent of students in the program group visited the tutoring center, compared with 60 percent of control group members. Students in the program group averaged 11.5 visits in the first term, compared with 4.9 visits from students in the control group.[27]

- **At the University of New Mexico, students in the program group reported more visits (albeit shorter ones) with their adviser.** Students in the program group saw an adviser on average about five times, while students in the control group did so about three times. The average length of the visit was about 15 minutes for students in the program group versus 18.5 minutes for students in the control group. Students in the program group appeared to have experienced greater satisfaction with the advisement process than students in the control group.[28]

Overall, researchers found that performance-based scholarships could be paired successfully with student services and used to promote their use. Most of the time, the services were ones that were already offered at the college — including tutoring and workshops at Pima Community College, tutoring at Hillsborough Community College, and advising at the University of New Mexico. This finding suggests that other colleges could also see an increase in the use of services at their campuses if a scholarship were tied directly to it.

Scholarship Receipt

Students generally responded positively to the scholarship offer and took advantage of the opportunity. In each program, a majority of students earned at least one scholarship payment. Figure 1 shows the total amount of scholarship dollars that students received (solid bars), compared with the amount available to them (dashed bars).

In Arizona, where students had the opportunity to earn a part-time or full-time award, over the three semesters of the scholarship program students earned an average of $1,981 (around 44 percent) of the total of $4,500 available to them in the same period. Similarly, in Ohio, where there was a part-time and full-time differential, students earned $764 of the $1,800 available to them (about 43 percent). In New York, students were required only to earn a "C" or better in six credits or more to receive the full award; they received the largest proportion of the award available to them (77 percent).

26. Patel and Valenzuela (2013). Some of the services in Arizona, such as tutoring and workshops, were also available to the control group. However, the advising that was offered to students in the program group in Arizona was different from that available to students in the control group.

27. Sommo et al. (2014).

28. Binder, Krause, Miller, and Cerna (2015). Calculations are from an online survey of second-cohort study participants conducted by the University of New Mexico.

FIGURE 1 Average Scholarship Amount Received Among Program Group Members, by Site: All Program Terms

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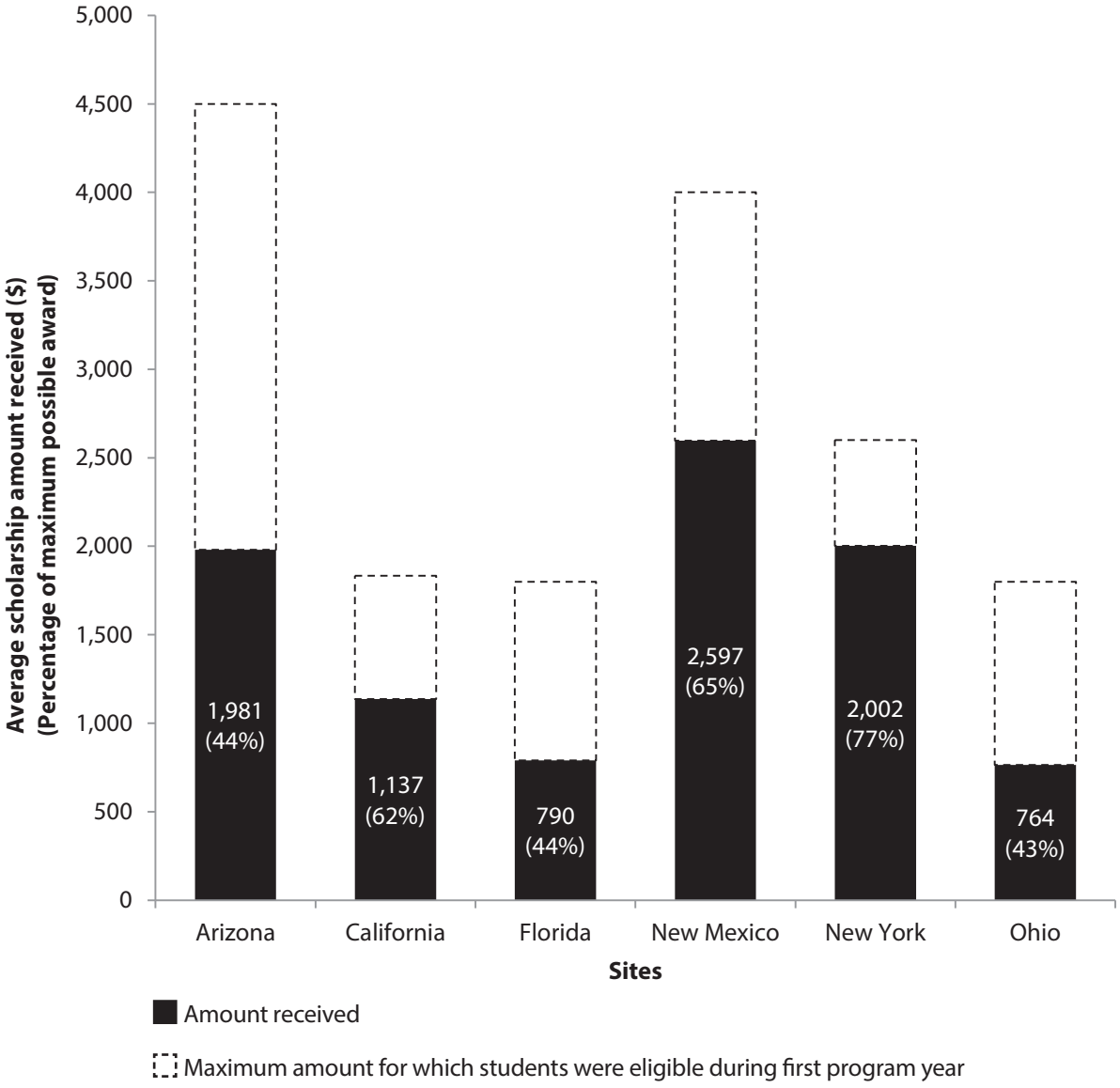

SOURCES: MDRC calculations using scholarship payment data from Pima Community College, the California Student Aid Commission, Hillsborough Community College, Lorain County Community College, Owens Community College, Sinclair Community College, the University of New Mexico, Borough of Manhattan Community College, and Hostos Community College.

NOTE: Estimates differ from those in Table 3 because they are not adjusted by site and research cohort.

As the scholarship requirements grew more stringent, fewer students earned the scholarships, as might be expected. In the New York colleges, for example, where the benchmark was relatively low (getting a "C" or better in six credits or more), students earned the highest proportion of the scholarship. At Pima Community College and the University of New Mexico, on the other hand, where the benchmarks were more stringent, students earned a lower proportion of the award.

> "IT MAKES ME FEEL THAT I CAN GO TO SCHOOL. IT TOOK AWAY STRESS. I WAS WORRIED I WOULD BE DROPPED FROM MY CLASSES BECAUSE YOU HAVE TO PAY YOUR FEES BY THE DEADLINE. I WAS ABLE TO USE THE SCHOLARSHIP TO PAY MY TUITION."
>
> —A STUDENT IN CALIFORNIA

On surveys, students reported that they primarily used the additional scholarship dollars for college-related expenses (like tuition, fees, or books) or basic living expenses. Students rarely reported using scholarship dollars in order to work fewer hours or to cover child care costs — even though a large number of students were working while attending college or were parents. This finding may be an indication that the timing of the scholarship was not appropriate or the amount was not enough for such students, given that the scholarships were intended to only partially augment their financial aid. It could be a sign that despite most students receiving financial aid, they still have school expenses and living expenses that are not fully covered.[29]

Lack of Unintended Consequences

With any incentive program, there is a concern that students could respond to the incentives in ways that reasonably reflect the incentive structure but do not necessarily meet desirable outcomes from a policy perspective. For performance-based scholarships, these unintended consequences include the following possibilities: taking fewer credits in an effort to meet the benchmark (but potentially delaying graduation), selecting easier courses, reducing efforts at school (resulting in lower grades that cluster around the benchmark among students in the program group), and getting around the system in other ways (such as cheating, petitioning for grade changes, delaying developmental education courses, and so forth).[30]

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29. The surveys also examined other results, such as student motivation, time usage, level of effort toward studies, and employment patterns, as well as state-specific questions. For more information on the findings of these individual surveys, refer to Richburg-Hayes et al. (2015) and Sommo et al. (2014). See, also, Barrow and Rouse (2013).

30. The literature on financial incentives is somewhat mixed on unintended consequences — many studies have noted the ones mentioned here. Cornwell, Lee, and Mustard (2005) report reduced full-time enrollment, increased course withdrawals, and concentration among "easier" majors in response to Georgia's HOPE program. There is a large literature in psychology that suggests external rewards can reduce intrinsic motivation such that once the rewards are removed, productivity declines. See Eisenberger and Cameron (1996) for a meta-analytic review that suggests the limited conditions under which these negative outcomes occur.

While it is not possible to effectively rule out all of these scenarios, the survey data captured across some of the sites provide some insight, namely in California, Florida, Arizona, and Ohio. Very few students reported taking easier or fewer classes in order to receive the award. Additionally, the survey examined motivation levels using the Relative Autonomy Index, which measures overall motivation toward a particular action (such as completing course work).[31] Across the states, students in the program group were not less motivated as a result of the award offer. In some cases, students in the program group exhibited an overall increase in motivation, albeit by a small amount.

IMPACTS ON FINANCIAL AID AND STUDENT OUTCOMES

Each of the programs in the Performance-Based Scholarship Demonstration was evaluated using a randomized controlled trial. Financial aid and academic data were used to estimate the impacts of the program on student outcomes. The durations of the programs varied, so the financial aid outcomes analyzed in this report were measured at the end of each program. For the same reason, the financial aid impacts are estimated separately for each program.

A primary research question for this report is whether performance-based scholarships had an impact on long-term outcomes for enrollment, credits earned, and degree and certificate attainment. Consequently, the measures for academic outcomes use up to five years of follow-up data and are pooled across programs. Since the programs varied, pooling was not an obvious choice. California, for example, included scholarships of varying amounts and durations. It was also the only statewide program and the only program to target high school students before they enrolled in college, whereas other programs focused on students who had already enrolled at specific colleges, often including older students. The programs varied within a common model, however, so pooling allows for more precise estimates of the average long-term impacts of the model, as it was implemented in the demonstration. As described below, moreover, additional tests show little evidence that the impacts of the programs varied across the colleges.

The analyses below show that the programs increased students' financial aid over the duration of each program. These scholarships were intended to provide about 15 to 25 percent of students' total aid during the programs. This amount is relatively modest in the context of students' overall financial aid packages, particularly when the years following the program are considered. However, it was an amount that could nonetheless have some effect on student outcomes. The analyses also provide encouraging findings for the programs' short- and long-term impact on students' academic progress: The programs modestly increased enrollment, credit accumulation, and degree receipt.

Box 1 explains how to read and interpret the impact tables that are discussed next.

31. Deci, Koestner, and Ryan (2001).

BOX 1

How to Read the Impact Tables in This Report

Most tables in this report use the format illustrated in the table excerpt below, which displays cumulative credits earned by students in the program and control groups after Year 4. The row of data shows that students in the program group earned an average of 47.2 credits, and students in the control group earned an average of 45.1 credits.

The "Impact Estimate" column in the table shows the observed difference in outcomes between the two research groups — that is, the estimated average impact of the opportunity to participate in the program. For example, the estimated average impact on credits earned can be calculated by subtracting 45.1 from 47.2, yielding an impact estimate of 2.1 credits.

Differences marked with one asterisk or more are considered statistically significant, meaning that there is a low probability that the difference occurred by chance. Differences that have no asterisk indicate that the opportunity to participate in the program did not have a discernible effect on that outcome. Assuming the true effect is zero, the number of asterisks indicates the probability that an estimate at least as large as the observed difference could have occurred by chance. One asterisk corresponds to a probability greater than 5 percent and less than or equal to 10 percent; two asterisks corresponds to a probability greater than 1 percent but less than or equal to 5 percent; and three asterisks correspond to a probability of 1 percent or less. The more asterisks that appear next to a positive difference, the more likely it is that the opportunity to participate in the program had a true positive average impact on the outcome. The p-value in the table identifies the probability. The impact in the table excerpt below has a p-value of 5 percent and two asterisks, indicating that the impact is statistically significant at the 5 percent level — meaning that there is a 5 percent chance of observing an estimated average impact this large (or larger) if the opportunity to participate in the program actually had no average effect on credits earned. In other words, there is a 95 percent level of confidence that the opportunity to participate in the program had a positive impact on credits earned.

Also shown in the table is the standard error of the impact estimate. The standard error is a measure of uncertainty or variability around the impact estimate. A useful guideline is that the confidence interval is usually calculated as 1.96 multiplied by the standard error (for a 95 percent confidence interval). In the example below, the confidence interval is about 2.0 (1.96 multiplied by the standard error, or 1.96×1.04). Thus, there is a 95 percent chance that the "true" average impact on credits earned lies in the confidence interval between about 0.1 credit earned and 4.1 credits earned, calculated as $2.1 \pm (1.96 \times 1.04)$.

		CUMULATIVE CREDITS EARNED				
YEAR	SAMPLE SIZE	PROGRAM GROUP	CONTROL GROUP	IMPACT ESTIMATE	STANDARD ERROR	P-VALUE
4	4,835	47.2	45.1	2.1 **	1.04	0.05

NOTE: Year 4, shown in this table excerpt, includes New Mexico, New York, and Ohio only.

Financial Aid

Table 3 shows estimates of the impact on financial aid outcomes during each program.[32] The duration of the financial aid outcomes in Table 3 varies by program length, during which students could increase their financial aid through performance-based scholarships.

- **The programs increased students' financial aid.**

The first panel of Table 3 demonstrates that the PBS programs had a consistently positive impact on the total average financial aid that students received during the programs. The impact estimates are positive and statistically significant in each state, ranging from a low of $502 at the Ohio colleges to a high of $2,209 at the New York colleges. The second panel of Table 3 shows that in each of the states, performance-based scholarship payments represented a substantial proportion of the financial aid increase. In each state, the estimates are positive and statistically significant, and they correspond closely to the overall estimated increases in financial aid.

> "[PBS] SOMEWHAT EMPOWERED ME BECAUSE I WAS ABLE TO GO AT THE PACE I NEEDED TO GO FINANCIALLY AND I WAS ALSO ABLE TO COVER THE COST ON MY OWN . . . AS AN ADULT STUDENT IT WAS JUST LIKE DECLARING AND TAKING OWNERSHIP . . . OF MY EDUCATION."
>
> —A STUDENT IN NEW YORK

- **Three of the programs reduced students' loans.**

The third panel of Table 3 provides evidence that three of the performance-based scholarship programs also helped students reduce their dependency on student loans.[33] At Pima Community College in Arizona and at the Ohio colleges, where students' overall financial aid receipt was relatively low in the control groups ($6,602 and $7,445, respectively, as shown in the first panel), students in the program groups reduced their loans by an average of $352 and $334, respectively. At the University of New Mexico, where financial aid receipt was higher ($18,576 for students in the control group), students in the program group reduced their loans by an average of $606. In each of these states, students in the program groups took out smaller loans on average and had less student debt, but they still received more average financial aid in total when compared with students in the control group.

32. Financial aid data were not collected for the California program.

33. In some programs there were cases where loans had to be reduced in order for the performance-based scholarship to be awarded. In these cases, the colleges worked directly with students to ensure that they understood and were comfortable with their financial aid package.

TABLE 3 Financial Aid Outcomes, by Site: All Program Terms

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OUTCOME	SAMPLE SIZE	SCHOLARSHIP DURATION	AMOUNT RECEIVED ($) PROGRAM GROUP	CONTROL GROUP	IMPACT ESTIMATE[a]
Total financial aid received					
Arizona	1,028	3 terms	8,202	6,602	1,601***
Florida[b]	1,075	3 terms	12,907	11,372	1,535***
New Mexico	1,081	4 terms	20,487	18,576	1,911***
New York[c]	1,502	2 terms	8,048	5,839	2,209***
Ohio	2,285	2 terms	7,947	7,445	502***
Total performance-based scholarship received					
Arizona	1,028	3 terms	1,977	5	1,972***
Florida	1,075	3 terms	790	0	790***
New Mexico	1,081	4 terms	2,597	0	2,597***
New York	1,502	2 terms	2,002	0	2,002***
Ohio	2,285	2 terms	765	-1	766***
Total loans received					
Arizona	1,028	3 terms	1,218	1,570	-352**
Florida	1,075	3 terms	4,696	4,564	133
New Mexico	1,081	4 terms	2,415	3,021	-606**
New York	1,502	2 terms	1,042	1,033	10
Ohio	2,285	2 terms	2,853	3,187	-334***

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

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

Rounding may cause slight discrepancies in sums and differences.

Estimates are adjusted by site and research cohort.

[a]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

[b]Financial aid data for Florida were available only for full academic years. The outcomes for Florida compare two full years of data. For the two cohorts randomly assigned in the fall, the data contain an extra term after the program ended. For the cohort randomly assigned in the spring, the data contain an extra term before the program began.

[c]The financial aid outcomes for the New York study represent financial aid awarded, which is distinct from financial aid received. The financial aid outcomes for the other studies shown represent financial aid received.

Academic Outcomes

To estimate the programs' average impacts on students' academic outcomes over time, data are pooled across the programs, using as much follow-up data as possible from each program. Consequently, the analyses can detect much smaller impacts over a longer follow-up period than in previous reports. Each program is given equal weight for the pooled estimates in order to estimate the average impact of the programs, rather than weighing by students and giving studies with larger sample sizes more influence on the findings. Impacts on academic outcomes are estimated by comparing the weighted average outcomes for the students in the program and control groups.[34] Appendix A provides additional technical details about the analyses, as well as state-level impact estimates and other supplementary analyses.

As discussed above, the follow-up data collected for each program range from three to five years following random assignment, so in the fourth and fifth years, outcomes from fewer programs are included in the pooled data. Consequently, the findings discussed here become somewhat less generalizable as the duration of the follow-up period grows longer. As shown below, however, the findings are fairly consistent across the programs and over time.

> "BEING PART OF [THE PROGRAM] WAS A STRESS-RELIEVER — IT MADE ME FEEL BETTER ABOUT STUDYING, ABOUT GOING TO CLASS, AND ABOUT DOING THINGS OUTSIDE OF CLASS THAT I NEED TO DO."
>
> —A STUDENT IN NEW MEXICO

Finally, two of the programs included four-year colleges. In New Mexico, the PBS program was conducted at a four-year university, the University of New Mexico (see Box 2 for a description of the New Mexico program), and many students in the California study attended four-year colleges. For students who attended four-year colleges, evidence of impacts on outcomes, such as degree completion, may take longer to materialize.

- **The programs increased enrollment by a small amount, on average.**

Table 4 presents pooled impact estimates on enrollment for each year of follow-up, measured by whether a student enrolled in college at any time during the given year. Enrolling and staying enrolled in college is a key step toward graduation. The impact estimates in Table 4 suggest that, on average, the PBS programs had a small impact on enrollment, which was evident soon after the pro-

34. The analyses reported here do not adjust the standard errors for clustering, because individuals were randomly assigned at every site in the demonstration and the program was administered to students at the individual level. Sensitivity analyses in which standard errors were adjusted for clustering at the cohort level on each campus were also performed. The sensitivity analyses lead to the same conclusions reported in this section. Results are reported in Appendix A.

BOX 2

A Performance-Based Scholarship Program at a Four-Year Institution

The performance-based scholarship program in New Mexico was the only program evaluated exclusively at a four-year institution, the University of New Mexico (UNM). The other programs in the PBS Demonstration operated at community colleges, with the exception of the California program, which operated at the state level and allowed students to take their scholarship to any accredited school, whether it was a two-year or a four-year institution. The structure and impacts of a performance-based scholarship program within the baccalaureate context are described below.

The UNM program, called Vision Inspired Scholarship Through Academic Achievement (VISTA), targeted Pell-eligible first-year students, a very traditional college-going population.* The goal of the UNM program was to create a scholarship that would provide incentives for students to stay on track to graduate with a bachelor's degree after four years. Specifically, the benchmark was for students to complete 12 credits in their first semester and 15 credits in their subsequent three semesters with a "C" grade or higher in each — the number of credits students would need in order to graduate in four years. The scholarship offered students up to $1,000 per semester for four semesters, or a total of $4,000 across two years.

Students in the VISTA group were significantly more likely than students in the control group to attempt 15 credits or more in the second semester, the minimum needed to earn the scholarship. The program was also estimated to increase the percentage of students who earned 30 credits or more by the end of their first year by 8.8 percentage points, improving the likelihood that they would be on track for an on-time graduation. The VISTA program also reduced students' loans by an estimated $600 over the four semesters during which students could earn scholarships — about 20 percent of the average loan amounts of students in the control group.

There is also evidence that the VISTA program had an impact on degree receipt after five years: The estimated impact of the program is 4.4 percentage points (as shown in Appendix Table A.5). Although this estimate is not statistically significant, it is close (p-value = 0.13), and when pooled with the two other sites for which five years of data are available, the pooled estimate of 3.3 percentage points is statistically significant (p-value = 0.02). The students at UNM were seeking bachelor's, not associate's, degrees, and no impacts on degree receipt were found in the first three years after random assignment — results that are not surprising since bachelor's degrees typically take at least four years to earn. However, these findings show that performance-based scholarships can improve student outcomes in four-year institutions as well as in two-year institutions, and the five-year results suggest that they can also have an impact on graduation rates for students seeking bachelor's degrees.

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* More information about the VISTA program is available in Miller, Binder, Harris, and Krause (2011) and Binder, Krause, Miller, and Cerna (2015).

TABLE 4 Impacts on Enrollment, Pooled

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YEAR[a]	SAMPLE SIZE	PERCENTAGE ENROLLED		IMPACT ESTIMATE[b]	STANDARD ERROR	P-VALUE
		PROGRAM GROUP	CONTROL GROUP			
1	11,613	95.6	94.4	1.2***	0.32	0.00
2	11,613	79.3	77.8	1.5*	0.77	0.05
3	11,613	67.8	67.0	0.8	0.86	0.38
4	9,510	63.2	61.7	1.5	0.96	0.12
5	4,868	42.9	41.5	1.4	1.38	0.30

SOURCES: MDRC calculations using transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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.

Enrollment measures whether a student enrolled at any point in a given year.

Rounding may cause slight discrepancies in sums and differences.

Estimates are adjusted by site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

[a]Years 1, 2, and 3 each include Arizona, California, Florida, New Mexico, New York, and Ohio. Year 4 includes California, New Mexico, New York, and Ohio. Year 5 includes New Mexico, New York, and Ohio.

[b]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

grams started.[35] In Year 1, for example, an estimated 95.6 percent of students in the program group enrolled in college, compared with 94.4 percent of students in the control group, for a statistically significant impact estimate of 1.2 percentage points. In each subsequent year, the estimated impact on enrollment is positive. In Year 2, the estimated impact of 1.5 percentage points is statistically significant and constitutes about a 2 percent gain over the control group enrollment rate of about 78 percent. In Year 4, the estimate is also 1.5 percentage points, but it is not statistically significant at the 0.1 level (with a p-value of 0.12).

Although the performance-based scholarship programs in the PBS Demonstration appear to be helping a small number of additional students enroll in college, these estimates are considerably smaller than in the evaluation of the Opening Doors Louisiana performance-based scholarship program. That program increased enrollment in the second semester by an estimated 15 percentage points

35. The impact in Year 1 was primarily due to the California program (see following), which was not the case in subsequent years.

over the control group enrollment rate of about 50 percent, and by an estimated 12 percentage points over the control group rate of about 38 percent in the third semester.[36] However, long-term follow-up was disrupted. It is not clear why the gains in Louisiana were larger, but they may have been due to a number of factors, including differences in student characteristics; economic conditions, including low unemployment rates; and lower overall enrollment rates (with only about half of the students in the control group enrolled in the second semester).

- **The results from the study in California suggest that targeting high school seniors can have an impact on first-year enrollment.**

The California program was the only program to target high school seniors, and it drove most of the pooled impact estimate in the first year: Only the California program produced a statistically significant impact estimate on first-year enrollment — about 4 percentage points over the control group enrollment rate of about 89 percent. The impacts on first-year enrollment in California were also concentrated among students who attended community colleges. Community colleges generally allow students to make later decisions about enrollment than four-year institutions do. This difference may have been an important factor that contributed to higher enrollment rates at community colleges but not four-year institutions, since the California students were notified of their scholarship eligibility in June.[37] The other PBS programs were unlikely to affect first-year enrollment since they targeted students who had already enrolled in college. Appendix Table A.2 provides the state-level impact estimates for each year of the study. The table also provides evidence that the impact on first-year enrollment in California differed from that in the other states.

- **The programs produced modest, positive impacts on credit accumulation.**

Despite the relatively small impact estimates on enrollment, previous studies of the PBS Demonstration programs reported encouraging results in terms of meeting academic benchmarks, outcomes on which the performance-based scholarship programs were most likely to have an impact in the short-term. The academic benchmarks that students needed to meet in order to earn the scholarships typically consisted of earning a "C" or better in a minimum number of credits. Students in almost all of the program groups were more likely than those in the control groups to meet their scholarships' end-of-term benchmarks in at least one term.[38] Consequently, the programs may also have had an effect on longer-term outcomes like overall credit accumulation.

Table 5 presents pooled impact estimates on cumulative credits earned by the end of each year of follow-up, measured by the total number of credits students earned each year, for both developmental and college-level courses. The estimates in Table 5 suggest that PBS had a consistently positive impact on credit accumulation. In each year of follow-up, the impact estimates are positive

36. Richburg-Hayes et al. (2009). The second semester outcomes are for all cohorts at Delgado Community College and Louisiana Technical College. The third semester outcomes are for the first two cohorts only at Delgado Community College and Louisiana Technical College.

37. Richburg-Hayes et al. (2015).

38. The program in New York was the single exception. See the appendix to Patel, Richburg-Hayes, de la Campa, and Rudd (2013) for estimated impacts on end-of-term benchmarks.

TABLE 5 Impacts on Cumulative Credits Earned, Pooled

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YEAR[a]	SAMPLE SIZE	CUMULATIVE CREDITS EARNED: PROGRAM GROUP	CUMULATIVE CREDITS EARNED: CONTROL GROUP	IMPACT ESTIMATE[b]	STANDARD ERROR	P-VALUE
1	6,938	17.5	16.2	1.2***	0.24	0.00
2	6,938	28.6	26.7	1.9***	0.46	0.00
3	6,938	36.4	34.6	1.8***	0.64	0.00
4	4,835	47.2	45.1	2.1**	1.04	0.05

SOURCES: MDRC calculations using transcript data from Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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 site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

[a]Years 1, 2, and 3 each include Arizona, Florida, New Mexico, New York, and Ohio. Year 4 includes New Mexico, New York, and Ohio.

[b]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

and statistically significant. During Year 1, for example, when all students in the program groups could receive scholarships from the PBS program, they earned an estimated 17.5 credits on average, compared with 16.2 credits for students in the control group, for a statistically significant impact estimate of 1.2 credits — a 7.4 percent gain over the control group. This positive short-term finding coincides with the encouraging findings for each program for the end-of-term benchmarks. By the end of Year 4, at least two years after each PBS program had ended, the estimated impact on credits earned increased to 2.1 credits — a 4.7 percent gain.

Earning credits is a key marker of students' progress toward a degree, and the estimates in Table 5 show that the PBS programs supported students in this regard. Many classes are worth about 3 credits, so a 2.1 credit impact suggests that, on average, the performance-based scholarship helped many students attempt and pass just under one additional course than they would have without the program. (See Appendix Table A.3 for state-level estimates for credits earned.) It is also notable that the estimated impacts for credits earned correspond closely to the estimated impacts on credits attempted: The estimated impacts on credits earned are generally 0.2 or 0.3 credits larger than the estimates for credits attempted. (See Appendix Table A.4 for estimates on credits attempted.) The PBS programs appear to have encouraged students to take and earn additional credits. However,

the estimated impacts on credits earned are larger than those on credits attempted in every year, suggesting that the programs also helped students pass a higher proportion of their classes.

- **The programs produced modest, positive impacts on degree attainment.**

Table 6 presents pooled impact estimates on the percentage of students who earned a degree for each year of follow-up, measured by whether students earned a certificate, an associate's degree, or a four-year degree at any college. Earning a credential is a critical outcome for students and a key goal for college programs because it improves students' employment and earning prospects. Table 6 shows, however, that by the end of Year 4, only about 26 percent of students in the control group had earned a two- or four-year degree. By the end of Year 5, the percentage rises to just about 35 percent.

Table 6 suggests that the PBS programs had a modest impact on the proportion of students earning a degree and helped some students graduate. By the end of Year 2, for example, an estimated 8.3 percent of students in the program group had earned a degree, compared with 7.4 percent of students in the control group, a statistically significant impact estimate of 0.9 percentage points — or a 12.1 percent gain over the control group. The impact estimates are positive in each year of follow-up and are statistically significant in Year 2, Year 3, and Year 5. By the end of Year 5, the impact estimate grows to 3.3 percentage points — a 9.4 percent gain over the control group completion rate of 35.1 percent. Recall, however, that the sample analyzed changes in later years of follow-up. While students from all programs are included in the Year 1, Year 2, and Year 3 estimates, students from the studies at Pima Community College in Arizona and Hillsborough Community College in Florida are not included after Year 3, and students in the California study are not included after Year 4. Notably, the impact estimates for degree receipt in the Florida program are positive and statistically significant (at the 0.1 level) in both Year 2 and Year 3 (as shown in Appendix Table A.5), despite the relatively modest findings for other short-term outcomes.[39] Although the pooled findings in Year 5 apply to fewer colleges, they nonetheless suggest that the programs positively affected degree receipt.

- **There is little evidence that impacts differed across programs.**

For each outcome — enrollment, credits earned, and degrees earned — and for each year of follow-up, statistical tests were used to examine whether state-level impact estimates were different.[40] Only 2 out of these 14 tests suggest that the impact estimates differed at statistically significant levels across states.[41]

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39. Sommo et al. (2014).

40. A joint F-test was used to assess impact variation among the states. This test measures whether any predictive power is gained by including indicators in the model that identify participants' state and treatment condition, compared with just including a treatment indicator. Appendix A provides impact estimates and additional details about the F-test.

41. Two tests produced p-values below the 0.1 level. As discussed above, one of these tests suggests that California is driving the Year 1 enrollment estimates (p-value = 0.01). The other test for statistically significant differences is for degree outcomes in Year 2. The programs in Ohio and Florida were the only programs that produced statistically significant impact estimates on degree outcomes in Year 2, and similarly for Year 3. It is possible that those programs are driving the shorter-term degree impact estimates. (The test for differences produces a p-value of 0.06 in Year 2 and a p-value of 0.17 in Year 3. See Appendix Table A.5.)

TABLE 6 Impacts on Degrees Earned, Pooled

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YEAR[a]	SAMPLE SIZE	PERCENTAGE WHO EARNED A DEGREE		IMPACT ESTIMATE[b]	STANDARD ERROR	P-VALUE
		PROGRAM GROUP	CONTROL GROUP			
1	11,613	2.9	2.8	0.2	0.3	0.61
2	11,613	8.3	7.4	0.9*	0.5	0.07
3	11,613	14.9	13.6	1.4**	0.7	0.04
4	9,510	26.4	25.7	0.7	0.9	0.44
5	4,868	38.3	35.1	3.3**	1.4	0.02

SOURCES: MDRC calculations using transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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 site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

[a]Years 1, 2, and 3 each include Arizona, California, Florida, New Mexico, New York, and Ohio. Year 4 includes California, New Mexico, New York, and Ohio. Year 5 includes New Mexico, New York, and Ohio.

[b]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

- **There is little evidence that the impacts varied with program characteristics, but the demonstration was not designed to determine the relative effectiveness of different program characteristics.**

The programs in Arizona, Florida, and New Mexico included services in addition to the scholarship, whereas programs in other states did not.[42] Impact estimates for programs that provided services were compared with the estimates for programs that provided only scholarships. These analyses do not provide evidence that the impacts were different for programs that required students to use additional support services, when compared with programs that did not include such requirements.[43] The demonstration, however, was not designed to determine whether including services made the programs more effective. Other factors — including characteristics of the student populations and

42. In Louisiana, not included in the analyses for this report, the services were more limited and involved only meeting with an adviser.

43. The only significant difference is in enrollment in the first year, but again, this may be driven by the design of the scholarship programs in California.

contextual features at the colleges themselves — varied as well, and cannot be untangled from the effects of services. It may be that the additional services did not improve student outcomes, but it is also possible that the services did help students to do better than they would have otherwise. When program designers included these services, moreover, they did so because they believed the services would help students overcome barriers that inhibited academic progress. Appendix Table A.6 shows the full results of the analyses.

> **"I PROBABLY WOULDN'T HAVE KNOWN ABOUT THE MATH LAB IF NOT FOR MAPS [HILLSBOROUGH'S PBS PROGRAM]. . . . BEFORE THIS PROGRAM, I TOOK . . . THREE YEARS OFF, AND I TRIED AN ONLINE COURSE AND I WAS ON MY OWN WITHOUT THE MATH LAB."**
>
> **—A STUDENT IN FLORIDA**

In California, the evaluation was designed to test whether scholarships that varied by duration and amount produced different impacts. Five different performance-based scholarship types were tested against a control condition in which students did not receive a scholarship and against a $1,000 scholarship in one semester that was not performance-based. The performance-based scholarships ranged from a potential maximum award of $1,000 to $4,000 and lasted between one semester and four semesters. Analyses of these scholarship types also provide little evidence that the different scholarships produced different impacts, but the analyses had limitations. For one, students could take the scholarship to any college, but for a large portion of the sample, transcript data were not available. Consequently, evidence of different impacts on credit accumulation — the outcome where PBS programs have shown the most consistent evidence of effects — could not be examined for the full sample. The California study was also designed to detect differences between scholarship types that are larger than the pooled impact estimates for enrollment and graduation reported above. To detect differences due to duration, for example, scholarships that last for two years would need to produce a gain of at least 6 percentage points over scholarships that last for one year or less. Increasing the sample size to detect smaller impacts, however, was cost-prohibitive. Consequently, it is possible that differences in duration and amount could produce meaningful differences in impacts.[44]

Appendix Tables A.7 (enrollment) and A.8 (degrees earned) show impact estimates for each scholarship type and the p-values for the F-tests for each year.

- **The impacts do not appear to differ across different subgroups of students.**

In each year of follow-up, for each of the three outcomes, statistical tests examined whether impacts were different for student subgroups defined by gender, whether the students were Latino, whether the students were parents, whether the students were younger than 20 years old, whether they were the first in their family to attend college, and whether they were employed at the beginning of the

44. For more information about the California program and evaluation, see Richburg-Hayes et al. (2015).

program. These analyses provide little evidence of variation in impacts and suggest that the programs were similarly effective across different groups of students.[45] Notably, the estimated impacts on credits earned are positive and statistically significant for all student subgroups in each of the first two years. Appendix Tables A.9 (enrollment), A.10 (credits earned), and A.11 (degrees earned) provide more detail.

In many cases, particular groups of students were expressly targeted by the programs. Consequently, these subgroups are correlated with the programs themselves, so the relationships between subgroups and outcomes are difficult to untangle from other factors that vary, such as context and program characteristics.

Summary

These findings suggest that the performance-based scholarship programs generally worked as designed. The analyses also detected little variation in the impact estimates, although the evaluation was not designed to determine whether some program configurations were more effective than others. Instead, program designers had flexibility to create scholarship programs to meet the needs of their student populations. It is possible that programs that included services may have been more effective because of those services. The implementation data discussed previously, for example, suggest that students used additional services when they were included as program components.

The programs' scholarships covered a relatively small proportion of students' full cost of college during the program, and even less when considering the full follow-up period during which students continued to attend college. However, the analyses presented here provide evidence that the performance-based scholarships helped students make greater academic progress toward their degrees and modestly improved degree receipt. This impact appears to have occurred because the PBS programs encouraged students to take additional classes, but also because students passed more of the classes they took. The scholarships provided financial support, and in some cases the programs required students to use additional services that were intended to provide academic support, successfully increasing students' participation in those services. In three cases, the programs reduced students' debt, a growing issue in national conversations about the costs of college. Notably, the analyses described here also suggest that the performance-based scholarship programs were similarly effective across the states and for different student subgroups.

COSTS AND COST-EFFECTIVENESS

Financial data were used to estimate the cost of the programs in the Performance-Based Scholarship Demonstration and to examine how the programs affected the average total cost of each degree that students earned. The average direct cost of a performance-based scholarship program was $2,345

45. A small number of differences between subgroups were statistically significant — about the same number that would be expected to occur by chance. The differences also were not consistent across outcomes. Less than 4 percent of subgroup comparisons were statistically significant at the 5 percent level, and about 8 percent were statistically significant at the 10 percent level.

per student over the life of the scholarship offer. Most of this investment (71.5 percent) was associated with payments to students, while about one-fourth (26.1 percent) was associated with program administration. After five years of follow-up, the cost per degree was nearly equal for students in the program group and the control group. (The average cost per degree was about 0.8 percent less for the program group.) The increase in the proportion of program group members earning a degree (an average increase of 9.3 percent over the control group) was proportionally similar to the group's increase in costs (an average increase of 8.4 percent over the control group).

Methodology

All costs have been adjusted to 2014 dollars for this analysis.[46] The analysis aims to illustrate the cost of steady-state operation for an average college that offered performance-based scholarships. As a result, this analysis excludes start-up and evaluation costs.[47] Costs are estimated using college financial data. Since all funds (such as tuition paid by students; subsidies from the local, state, and federal governments; and private donations) are funneled through the college, this approach provides a good estimate of the total investment made in these students.

The direct cost of the performance-based scholarship programs is estimated using program expenditure reports and informed by staff interviews to ensure that all of the resources required to operate the program were accounted for in the analysis. The cost of college services is estimated for students in the program and the control groups separately. The cost of college services is based on the average cost per credit attempted, multiplied by the number of credits attempted by the respective group.[48] This analysis presumes that additional credits attempted by students in the program group, above and beyond the level attempted by students in the control group, have zero marginal cost.[49] Finally, in order to calculate cost-per-graduate values, the direct cost and the cost of college

46. This analysis used the Higher Education Price Index (HEPI) for all public two-year colleges to adjust all costs to constant 2014 dollars.

47. If start-up and evaluation costs were included, the total cost estimate would increase by 4.9 percent ($115 per sample member). If start-up costs were included but evaluation costs excluded, the total cost estimate would increase by less than 1 percent ($17 per program group member).

48. The average cost per credit attempted is estimated for the individual institutions by dividing the college's annual expenditures by the total number of credits attempted by students at the college during the year of interest, as reported in the Integrated Postsecondary Education Data System (IPEDS). For credits attempted throughout the follow-up period, an average cost per credit across sites is calculated using data from Pima Community College in Arizona; Hillsborough Community College in Florida; the University of New Mexico; Borough of Manhattan Community College and Hostos Community College in New York; and Lorain County Community College, Owens Community College, and Sinclair Community College in Ohio. Data on credits attempted were not available for the entire sample in California. The notes to Appendix Table A.12 include more detail about how the number of credits attempted was estimated.

49. The base case assumes zero marginal cost, which means the college is presumed to be able to fully absorb the cost by leveraging existing resources — for instance, by having students in the program group attempt more credits by taking courses where seats were previously empty. If a college does not absorb the cost of additional credits attempted by students in the program group, then the cost of the college experience for students in the program group will be higher. As a result, a sensitivity adjustment is included in this analysis to illustrate how results would change if the analysis assigned a cost to additional credits attempted by program group members beyond the number of credits attempted in the control group.

services are added for each group, and then divided by the total number of graduates in that group. This calculation yields a cost-per-graduate value for students in both the program and control groups. Comparing these values shows whether the PBS program was more efficient or less efficient at producing graduates in comparison with the usual college services.

Direct Cost of Performance-Based Scholarships

The direct cost of performance-based scholarship programs includes the cost of scholarship payments, administration, and support services. Figure 2 shows the cost per PBS program group member. The height of each bar in Figure 2 shows the full per-student average cost. Each bar is also disaggregated into categories: scholarship payments, administration, and student services. The first bar in Figure 2 shows that the average cost of a performance-based scholarship program was $2,345 per student. As discussed earlier in this report, programs varied in their duration, amount offered, benchmarks required, and actual amount paid, all of which affect the direct cost. The average cost ranged from a per-student cost of $1,150 at the Ohio colleges (averaged across the three colleges) to $3,828 at the University of New Mexico.[50] Figure 2 also shows that scholarship payments accounted for the majority of the cost of implementing performance-based scholarship programs. On average, an estimated $1,678, or 71.5 percent of the total cost, was paid to students as performance-based scholarships. Scholarship costs varied across the sites; the Ohio colleges paid the average student $816 in scholarships, while the University of New Mexico paid $3,002. The percentage of total costs associated with scholarship payments ranged from 62.9 percent at Hillsborough Community College in Florida to 78.4 percent at the University of New Mexico.

The second largest component of program cost was administration. On average, colleges spent $612 per student (26.1 percent of the total cost, shown in the first bar of Figure 2) on administration.[51] Administrative costs ranged from $334 per student at the Ohio colleges to nearly one thousand dollars ($958) at the New York colleges. The percentage of program costs spent on administration ranged from 19.2 percent at the University of New Mexico to 29.8 percent at the New York colleges.

The smallest expenditure category was student services. When all programs are included, the programs spent an average of $55 per student for student support services (or 2.4 percent of the total cost). Among only the three programs that included additional student services (at Pima Community College in Arizona, Hillsborough Community College in Florida, and the University of New Mexico),

50. In California, where there were five different scholarship types (with varied durations and offer amounts), the scholarship costs ranged from $903 to $2,518 across the scholarship types.

51. In other higher education cost analyses, MDRC has observed that administrative costs for innovative programs operating at a fairly small scale (for instance, serving a fraction of students at a handful of schools) often account for around 20 percent of total program costs. For instance, in a multisite demonstration of learning communities, 17 percent of costs were associated with administration (Visher et al., 2012). Similarly, an evaluation of the City University of New York's Accelerated Study in Associate Programs (ASAP) estimated the cost of administration as 23 percent of total costs (Scrivener et al., 2015). Performance-based scholarships have higher administrative costs because adding conditionality simultaneously lowers the amount of payments and increases the cost of administration, which makes administrative costs a larger fraction of the total program cost. If a program increased scholarship amounts or the number of participating students, or if the program were in operation longer, the share of total costs dedicated to administration would likely decrease.

FIGURE 2 Cost of PBS Program per Program Group Member

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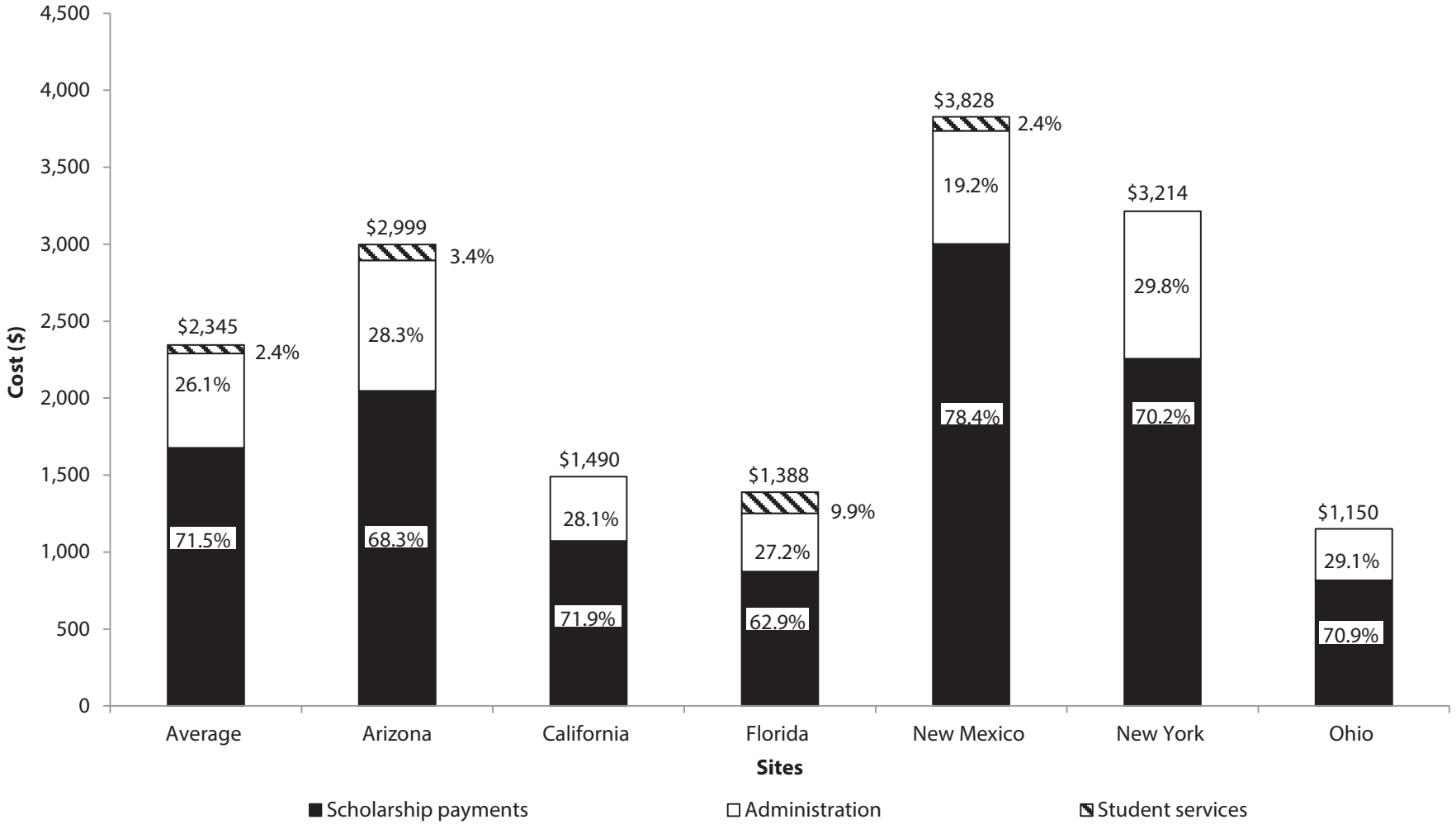

(continued)

FIGURE 2 (continued)

SOURCES: MDRC calculations based on each site's expenditure data for its performance-based scholarship program, financial aid and scholarship impact data, and the Higher Education Price Index.

NOTES: All costs have been adjusted to constant 2014 dollars.

Program costs are based on a steady state of operation that excludes external research and start-up costs. If start-up and evaluation costs were included, the total cost estimate would increase by 4.9 percent ($115 per sample member). If start-up costs were included but evaluation costs excluded, the total cost estimate would increase by less than 1 percent ($17 per sample member).

California's analysis includes five different types of performance-based scholarships. A sixth scholarship type, which was not performance-based, has been excluded, as in the impact analysis.

In New York, colleges offered scholarships of up to $2,600 per student to 377 students and offered PBS Plus Summer scholarships of up to $3,600 per student to 378 students.

California, New York, and Ohio did not offer additional student services to students in PBS programs and as such did not incur any costs related to student services.

Tests of statistical significance were not performed.

Rounding may cause slight discrepancies in sums and differences.

the average cost of student services was $111, or 4.0 percent of the total cost. Overall, the cost of student services appears small in comparison with the cost of administering payments. This small investment, however, leveraged existing student services (to provide students in the program group with more services than they otherwise would have received).[52]

Cost-Effectiveness Analysis

Figure 3 illustrates the cost-effectiveness of the PBS program. In the first panel, the black portion of the bars shows the cumulative average cost of college services. This analysis assumes that the cost of college services for students in both the program group and the control group is the same, meaning that additional credits attempted are assumed to have zero marginal cost. Below, a sensitivity adjustment explores an alternate assumption, wherein the cost of college is not the same for both groups, and additional credits attempted do produce an additional cost. The white bars in the first panel show the average additional cost for the PBS program. The relative cost of the performance-based scholarships becomes smaller over time as students take additional classes, thus incurring larger costs for college services, which steadily account for a larger proportion of the total cost. For example, in Year 1, the cumulative average additional cost for the program group was $2,345 (shown in Figure 2), a 25.6 percent increase over the $9,160 invested in the average control group member. Over time, the cost of the PBS program becomes proportionally smaller when compared with the cumulative average cost of college services for the control group. By Year 5, the cost of the PBS program represents an increase of only 8.4 percent.

52. The average college in the study devoted 8.3 percent and 10.7 percent of total yearly expenses to academic support and student services, respectively (estimates based on data reported to IPEDS).

FIGURE 3 Cost-Effectiveness of PBS Program

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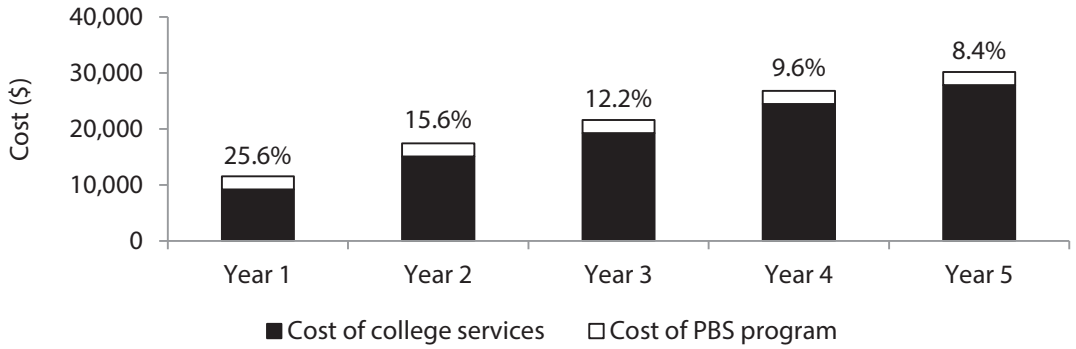
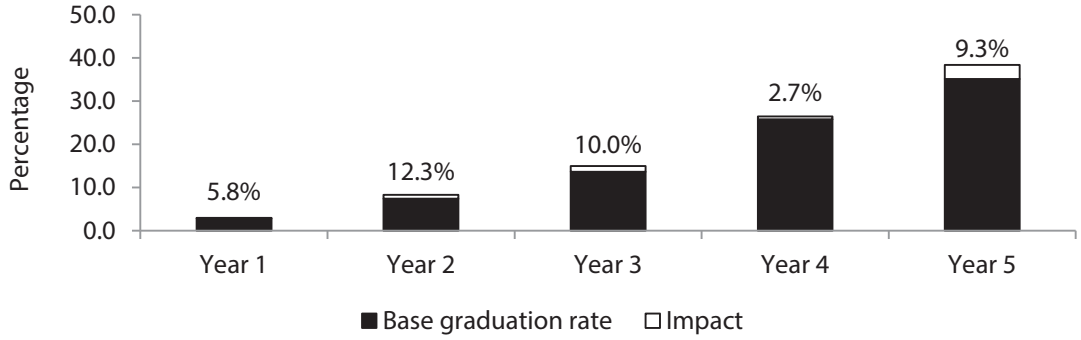
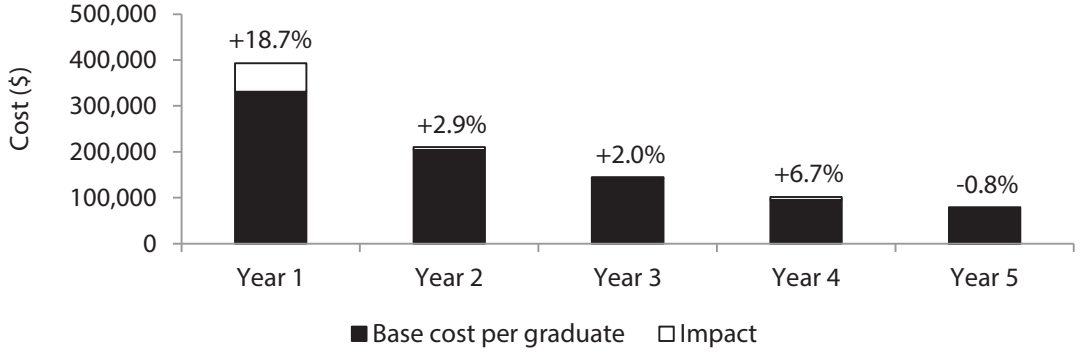
Total cumulative cost ($): The relative increase in investment from PBS decreases over time as the cost of college services increases.



Earned a degree (%): Over time more students graduate and the program impact changes.



Program cost per degree[a] ($): Over time the cost per degree in the program group decreases and becomes more similar to the cost per degree in the control group.



(continued)

FIGURE 3 (continued)

SOURCES: MDRC calculations using transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, and the Ohio Board of Regents, as well as program-specific budget data and financial and enrollment data from the Integrated Postsecondary Education Data System and the Higher Education Price Index.

NOTES: Program costs are based on a steady state of operation that excludes external research and start-up costs; the cost would increase by 0.7 percent if start-up costs were included and by 4.0 percent if research costs were included.

All costs were adjusted into constant 2014 dollars.

Rounding may cause slight discrepancies in sums and differences.

The cumulative cost of college services is estimated based on credits attempted. For additional detail about how the cumulative cost of college services is estimated by year, see Appendix Table A.12.

[a]The cost per degree for both students in the program and students in the control group is calculated by adding the cost of usual college services to the direct cost of the average PBS program and dividing by the estimated effect on earning a degree. For example, to calculate the 5-year cost per degree for the average program student, the 5-year cost of college services ($27,809) is added to the direct cost of the average PBS program ($2,345) for a total of $30,154 ($27,809 + $2,345 = $30,154). This total cost is then divided by the estimated percentage of program students who earned a degree after Year 5 (38.3 percent) for a cost per degree of $78,672 ($30,154 / [38.3 / 100] = $78,672). Discrepancies in calculations are due to rounding of impact estimates and costs.

The second panel of Figure 3 shows the percentage of students who earned a degree, by year. Over time, more students in the program and control groups graduated. The estimated program impact changes from year to year. The black portion of the bars in the figure illustrates the base graduation rate without the PBS program, or the graduation rate of the students in the control group. The white portion of the bars illustrates the estimated impact (the difference between the program group and the control group) on graduation due to the program. For example, after the first year, 2.8 percent of the control group had graduated, and the estimated impact due to the PBS program was 0.2 percentage points (not statistically significant at the 10 percent level), representing a 5.8 percent increase in the graduation rate. In Year 5, the final year of follow-up, 35.1 percent of students in the control group graduated, and the estimated impact due to the PBS program was 3.3 percentage points (statistically significant at the 5 percent level), representing a 9.3 percent increase in the graduation rate.

The black bars in the third panel of Figure 3 show the cost per degree for students in the control group, by year. The cost per degree is large in the early years because few students earned a degree during that time frame. Over time, the cost per degree decreases as more students earn degrees. The white bars illustrate the estimated impact on cost per degree due to the PBS program. The labels over the black and white bars indicate the percentage change in the cost of earned degrees between students in the program group and the control group. Over time, the cost per degree for the two groups generally became more similar. In Year 1, the cost per degree in the control group was approximately $331,000, while it was 18.7 percent more expensive (approximately $393,000) for students in the program group. By Year 5, the cost per degree in the control group was $79,310, and for those receiving performance-

based scholarships it was 0.8 percent lower, or $78,672.[53] The estimated impact on degrees earned was slightly larger, proportionately, than the estimated increase in investment associated with the scholarships. Specifically, the program improved graduation rates by an estimated 9.3 percent while it increased the level of investment in program students by an estimated 8.4 percent. Appendix Table A.12 shows detailed values for the cost-effectiveness of performance-based scholarships.

Sensitivity Adjustment

The main analysis assumes that the marginal cost of additional credits attempted is zero. The sensitivity analysis described here assumes the marginal cost of an additional credit attempt is equal to the average full cost of a credit attempt.[54]

Under this assumption, if the colleges were unable to absorb the cost of the additional credits attempted by students in a PBS program, then after five years the colleges would have needed resources to cover the cost of each student offered a performance-based scholarship attempting about 1.4 more credits on average. The average cost of college services for these students would then be $28,347, compared with the average cost of $27,809 in the control group, an additional cost of $539. As a result, after five years, the cost per degree for students in the program group would increase to $80,077, approximately 1.0 percent higher than the control group cost of $79,310. Even under this assumption, the PBS programs would still have produced more graduates for a cost that is very similar to the cost of graduates in the control group.

CONCLUSIONS

The national Performance-Based Scholarship Demonstration provides evidence that performance-based scholarships modestly improve both short- and long-term academic outcomes. The analyses in this report use data from six randomized controlled trials of scholarship programs, including over 12,000 low-income students who attended two- and four-year institutions, to evaluate the effectiveness of these scholarships for a diverse set of student populations. Overall, the analyses show the following:

53. Research suggests that a cost of about $80,000 per associate's degree is well below the economic value of an associate's degree. For example, Levin and Garcia (2013) estimate the after-tax benefit of an associate's degree in New York City to be $160,000 to the student (from increased lifetime earnings) and $200,000 to taxpayers. Abel and Deitz (2014) estimate the benefit of an associate's degree to be $325,000, based on estimated increases in lifetime earnings.

54. The cost per additional credit attempted may vary in other ways. For instance, it could be greater or less than the average cost per credit, depending on the college. Some colleges may have extra capacity to absorb the additional credits attempted. Other institutions may have less excess capacity and require more resources to absorb the additional credits attempted. After five years of follow-up, the average student in a performance-based scholarship program attempted a projected 71.2 credits, while students in the control group attempted a projected 69.9 credits, a difference of 1.4 credits attempted. For additional detail on how the credits attempted in Year 5 were projected, see the notes to Appendix Table A.12.

- **Performance-based scholarships can be implemented at the college level or state level, in order to meet the goals of individual institutions or intermediaries.** Each of the sites in the six states across the demonstration integrated the scholarship into their existing systems. In California in particular, the program was implemented as part of a statewide effort to improve academic outcomes for college-going high school students.

- **In sites where student services accompanied the performance-based scholarship, service use increased markedly as a result of the program.** At Pima Community College in Arizona, Hillsborough Community College in Florida, and the University of New Mexico, student services such as tutoring, advising, and workshops were integrated in various ways with the award. The use of these services increased as a result of the program incentives associated with the scholarship.[55]

- **Offering performance-based scholarships to students increases their total financial aid, even when helping to reduce their dependency on loans.** The PBS program consistently increased the amount of financial aid that students in the program group received, ranging from around $500 at the Ohio colleges to $2,200 at the New York colleges. Additionally, in three of the six states, the program decreased students' loans during the time that they were offered a scholarship, ranging from reductions of about $330 to $600.

- **The programs have a positive impact on short-term outcomes and produce positive, modest impacts on longer-term outcomes.** Performance-based scholarships improved enrollment between 1 and 2 percentage points in the first two years of follow-up, on average. Almost all of the programs also increased the percentage of students meeting the end-of-term benchmarks — generally receiving a "C" or better in a minimum number of credits — in at least one term.[56] By the end of the fourth year, students in the program groups had earned an estimated average 2.1 credits more than students in the control groups.

- **The programs modestly increased degree completion.** After five years, the estimated impact on degree completion is 3.3 percentage points, over a completion rate of 35.1 percent in the control group.

- **While the scholarship program varied at each site (in terms of target population, amount awarded, duration, and other details), there is little evidence that the impacts from the programs varied.** This finding holds even when looking across a variety of dimensions: PBS programs appear to work in various scholarship programs, with varying scholarship designs, in different state and academic settings, and for diverse student populations, including younger and older students, men and women, and Hispanic and non-Hispanic students.

- **Evidence from the study in California suggests that offering students a scholarship in their senior year of high school increases enrollment in the first year of college.** The program in

55. Binder, Krause, Miller, and Cerna (2015).

56. New York was the single exception.

California was the only site to offer scholarships to high school students. It was also the primary contributor to increased enrollment in the first year of college.

- **The scholarships cost additional money but do not increase the average cost per degree.** After five years of follow-up, the cost per degree is about the same for students in the program group and the control group.

Although the Opening Doors performance-based scholarship program in Louisiana produced sizeable impacts on enrollment in several terms after random assignment, these large impacts were not found in the PBS Demonstration sites. In part, this outcome may be due to high rates of persistence among students in the control groups of the PBS Demonstration sites, yielding a bar that is difficult to surpass, or it may have occurred for other reasons. The economic contexts, for example, were also different, which may have given students different work incentives and options: The Louisiana program took place during an economic boom (2004 to 2005), but the PBS programs began during a period of economic downturn (2008 to 2010).[57] Many of the programs studied in the PBS Demonstration were in states that had more generous financial aid options for low-income students compared with Louisiana at the time of the Opening Doors study, potentially making the scholarship more valuable in Louisiana.[58]

While the long-term impact findings in this report are modest, the amounts of performance-based scholarships that students earned were also modest relative to students' overall financial aid packages. For example, students received an average of $765 in performance-based scholarships at the Ohio colleges during the program year, compared with $7,947 in total financial aid in the same year. At the University of New Mexico, students received an average of $2,597 in performance-based scholarships, compared with $20,487 in average total financial aid received during the program. These dollar amounts account for less and less of students' total financial aid, as they continue in college after the programs end. Yet these scholarships still improved academic outcomes in the long term. These results are also promising in the context of existing research on financial aid, which generally finds small positive impacts or no evidence of impacts for enrollment or credit accumulation, and less frequently finds impacts on graduation.[59]

57. In 2004 the unemployment rate was 5.1 percent, and in 2005 it was 5.5 percent. From 2008 to 2010, the unemployment rate increased from 5.8 percent to 9.6 percent (Bureau of Labor Statistics, 2015).

58. For example, in the 2004-2005 academic year, Louisiana provided an estimated $8.17 per student in need-based grants to undergraduate students (NASSGAP, *36th Annual NASSGAP Survey Report*, n.d.), while in the 2008-2009 academic year, estimated need-based grants ranged from $54.20 per undergraduate student to nearly $980 per undergraduate student in the six states in the PBS Demonstration (NASSGAP, *40th Annual NASSGAP Survey Report*, n.d.). In the 2009-2010 academic year, estimated need-based grants ranged from $30.84 per undergraduate student to $1,027.23 per undergraduate student in those states (NASSGAP, *41st Annual NASSGAP Survey Report*, n.d.).

59. See, for example, Angrist, Lang, and Oreopoulos (2009); Binder, Krause, Miller, and Cerna (2015); Goldrick-Rab, Harris, Kelchen, and Benson (2012); and Scott-Clayton (2011). Ford, Grekou, Kwakye, and Nicholson (2014) provide an example of a related program that shows evidence of graduation impacts in Canada.

Lessons from the Demonstration

This evaluation suggests that the performance-based scholarship programs accomplished the two main goals for the demonstration: helping low-income students both pay for college and make greater academic progress toward their degrees. A key lesson for scholarship providers and policymakers at the federal, state, and local levels is that these programs did not depend on rigid adherence to a particular scholarship structure, but instead were guided by three core principles:

1. Scholarship payments made during a semester were associated with short-term academic behaviors, such as enrollment in a certain number of credits and maintaining that course load over the semester.

2. Scholarship payments at the end of a semester were tied to important benchmarks necessary for graduation (such as receiving a minimum grade in a certain number of credits over the semester), while providing funds to support students' education in the next semester.

3. When program designers perceived that their targeted student population would benefit from additional student services (such as advising or tutoring), the programs required that students use these services in order to earn the scholarships. This requirement improved the participation in these services substantially.

The program design in each state was created collaboratively with key stakeholders. These stakeholders provided valuable insight related to the target populations for the scholarships, the benchmarks, and the student services, if any, that should be incorporated into the design. The flexible nature of the programs makes it possible for any scholarship provider — at the state or local level, public or private — to adapt the design to its own priorities.[60]

Implications

Several states have used existing funds in creative ways to encourage greater academic progress through college for low-income populations. Both the original performance-based scholarship program launched in Louisiana as part of the Opening Doors Demonstration and the Ohio PBS program described in this report used state Temporary Assistance for Needy Families (TANF) funds to offer these scholarships to low-income parents who were attending college. More recently, new legislation in Indiana includes provisions to give financial bonuses to some low-income students if they meet established academic benchmarks. Students in the Frank O'Bannon program, for example — a need-based financial aid program — can earn an additional $1,300 in aid if they earn 39 credits annually.[61] The California state legislature is currently considering a similar program.[62] States seeking to improve outcomes for low-income students may find similar opportunities in existing

60. For more information, see Welbeck, Ware, Cerna, and Valenzuela (2014) on how performance-based scholarships can be adapted to local contexts and implemented.

61. Indiana Commission for Higher Education (2015).

62. The California state senate bill is SB 15. See California State Senate Majority Caucus (2014).

funds, and they can look to performance-based scholarships as an important tool in their efforts to improve graduation rates.

Despite the positive findings of these programs, however, this study does not suggest that all financial aid should be restructured to promote performance — especially in regard to the federal Pell Grant program. In some ways, the Pell Grant program is already tied to performance; students remain eligible for their Pell Grants by meeting Satisfactory Academic Progress (SAP) requirements. The exact criteria vary by institution, but in most cases SAP means maintaining a grade point average of at least 2.0.

In addition, the Pell Grant is generally the foundation of a student's aid package and is much larger than the scholarship programs studied here. Performance-based scholarships in this study are also paid on top of Pell dollars and any other financial aid. Changing disbursement criteria for Pell could alter behavior in ways very different from the PBS Demonstration results. It could also negatively affect enrollment, since Pell is typically paid at the beginning of the semester and students may anticipate having those funds at the time they enroll in school. Providing students with less financial aid up front could reduce their ability to cover tuition and fees at many colleges.[63]

State and private donors contribute more than $20.1 billion in scholarships to undergraduate students, however, and some of this aid may be more effectively restructured as performance-based scholarships.[64] For the 2012-2013 academic year, 19 percent of all state-sponsored aid was reported as merit-based — typically for students' high school performance, not their college performance.[65] Students who receive this aid, however, may be likely to succeed in college without it.[66] Reallocating merit-based aid to low-income students through performance-based scholarship programs could be an effective strategy to help these students make greater academic progress. It could also help programs offer money to more students or increase the size of scholarships; students in the programs were offered the opportunity to earn more scholarships, but not all students did, so the programs did not pay out the full amount that was offered. Identifying specific students who will benefit from a scholarship program is challenging, but performance-based scholarships are designed to reach more of the students likely to benefit, because they are structured to pay only students who meet academic benchmarks during the program. Consequently, performance-based scholarships provide an opportunity to offer aid to more students without increasing the total amount of aid distributed. The evidence suggests that the cost per degree also does not increase, even after accounting for administrative costs.

63. In 2010-2011, the median tuition and fees for all public institutions was $4,632. For all public four-year institutions it was $6,780, and for all public two-year institutions it was $2,537. These figures represent tuition and fees over a full year. See National Center for Education Statistics (2011).

64. Baum, Cardenas Elliott, and Ma (2014).

65. NASSGAP, *44th Annual NASSGAP Survey Report* (n.d.).

66. Baum et al. (2012).

Looking Ahead

While the PBS Demonstration answered a number of significant questions regarding the efficacy of performance-based scholarships, some remain. Key among these is identifying the best scholarship structure to influence student outcomes. As discussed earlier, there is little evidence that the impacts from the PBS programs varied across states, even though the program differed in each state. There is also little evidence that the impacts from the programs varied across different subgroups.

These results raise two crucial questions: Why not provide the least expensive scholarship option studied here — for example, the scholarship offered at the Ohio colleges? And, should additional services be included? The answers are not simple. Although the scholarship amounts varied across the programs, so did the costs of college. The students, their academic contexts, and the larger environments also varied. The colleges and organizations involved in the studies played a large role in structuring these scholarships to meet the specific needs of student populations that they believed could benefit from performance-based scholarship programs. These individuals knew the student populations well, researched the existing academic outcomes and obstacles for these populations, and thoughtfully structured scholarships based on that information and existing services at the colleges. Differently designed scholarships may have different impacts for the same students in the same colleges. The PBS Demonstration as a whole, moreover, was designed to evaluate whether performance-based scholarships could be effective in different conditions and for different student populations. It was not intended to identify the ideal structure of a performance-based scholarship program or to disentangle the effectiveness of individual program components, which remain open questions.

The results presented here demonstrate that performance-based scholarship programs have helped students make greater academic progress than they would have without the programs. The programs provide a flexible design that can be implemented widely, and they can be structured to meet the needs of diverse student populations. The programs studied here consistently improved students' academic progress. This evaluation shows that performance-based scholarships are an important tool for colleges, states, and scholarship providers who work to improve outcomes for low-income students.

APPENDIX

A

Technical Details for the Pooled and Site-Level Estimates

This technical appendix provides additional information about the statistical analyses used in this report.

DESIGN

Multiple colleges participated in this study, and several colleges had multiple campuses. In California, students were recruited from four geographic areas throughout the state but could attend any college.[1] Multiple cohorts of students were also recruited into the study. A cohort refers to a group of students entering at the beginning of a specific semester (for example, Borough of Manhattan Community College had a fall 2008 cohort, spring 2009 cohort, and fall 2009 cohort). In total, there were 45 unique cohort combinations by college/campus and geographic region. Individual students were randomly assigned to the program or control groups, and this random assignment was conducted separately for each unique combination of cohorts and campuses, or cohorts and geographic regions.

WEIGHTING

Weights were used in the pooled impact model so that each state contributed equally to the impact estimates. The weights account for the different sample sizes across states and for the varying random assignment ratios within each state. Weights were created for program and control group students in each state by calculating the program and control group ratios across all states and dividing these by the total number of states (six). These values were then divided by the percentage of program and control group students in each state.

As described in Table 2 in the main report, for the outcomes in this report, different follow-up periods are available for the states included. For some of the outcomes, data are available only for Years 1 through 3 for some of the states, while data are available through Year 4 or Year 5 for other states. A different set of weights was calculated for the states included in each pooled outcome.

Equation A.1 shows an example of the formula that was used to calculate the weights. In this example, the weights for program group students in one state are calculated. Equivalent calculations were done for control group students in each state.

Equation A.1

$$Weight_{psm} = \frac{\left(\frac{1}{N_m} * \frac{N_{ps}}{N_s}\right)}{\left(\frac{N_{psm}}{N_{sm}}\right)}$$

where:

[1] See Figure 1 in Ware and Patel (2012), 5.

$Weight_{psm}$ = the weight for students in the program group (ps) in state m

N_m = the count of states (m) included in the outcome

N_{ps} = the count of students in the program groups (ps) across all states included in the outcome

N_s = the count of total students (s) across all states included in the outcome

N_{psm} = the count of students in the program group (ps) in state m

N_{sm} = the count of total students (s) in state m

THE POOLED IMPACT MODEL

The pooled model produces estimates of the average effect of the opportunity to participate in the performance-based scholarship programs. The equation in the model specifies an outcome measure (for example, total credits earned) as a function of indicator variables that identify each campus-cohort combination and a single treatment indicator that distinguishes between sample members randomly assigned to the program group and control group.

As noted above, random assignment was conducted separately for each cohort of students at each campus or geographic region within the study. The campus-cohort indicators identify each unique campus-cohort combination. In total, there are 45 campus-cohort dummies.

Equation A.2

$$y = \sum_k \sum_l \alpha_{kl} Campus\_x\_Cohort_{kl} + \beta_0 t + e$$

where:

y = an outcome for a student

$Campus\_x\_Cohort_{kl}$ = a campus-cohort dummy indicator equal to 1 if the student is from campus k and cohort l, and 0 otherwise[2]

t = a treatment indicator equal to 1 if the student was randomly assigned to the program group and 0 otherwise

[2]There are 45 unique campus-cohort dummy variables.

The estimated value of the treatment indicator coefficient (β_0) is the estimated average effect of the opportunity to earn a performance-based scholarship. Tables and figures in this report present the least squares means for students in the program and control groups.[3]

Sensitivity analyses were conducted using cluster-robust standard errors at the campus-cohort level to check whether estimates and variance could be more similar within these groups than across the pooled sample. If clustering were an issue, it could result in smaller standard errors for the pooled impact estimates and lower p-values.[4] These checks were done for each of the primary pooled outcomes to determine whether there was a significant difference in the findings when the adjustments were made. Appendix Tables A.13, A.14, and A.15 show the results of those analyses. The adjustments for clustering do not affect the findings presented under "Impacts on Financial Aid and Student Outcomes" in this report.

ESTIMATING VARIATION IN IMPACTS

The previous section described the model used to obtain the pooled program effect. Described here are the models used to determine whether there is evidence of variation in impact estimates across states.

Impact Variation by State

Equation A.3 describes a model that produces estimates of the average effect of the opportunity to earn a performance-based scholarship in each state.

Equation A.3

$$y = \sum_{l}\sum_{k} \alpha_{kl} Campus\_x\_Cohort_{kl} + \sum_{m} \beta_m (t * State_m) + e$$

where:

$State_m$ = a dummy indicator equal to 1 if the student was randomly assigned in state m, and 0 otherwise, where there are six states

The estimated value of the treatment indicator coefficient (β_m) is the estimated average effect of the opportunity to earn a performance-based scholarship for state m's sample. In order to test for impact variation among the states, a joint F-test is used. The null hypothesis is that each β_m is the same. More formally:

[3]For more details, refer to SAS Institute Inc. (2010).
[4]Cameron and Miller (2015).

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6$$

If the null hypothesis is rejected, it means that there is evidence that the impacts vary across the states.[5]

[5]The joint F-test is essentially testing to determine whether any predictive power is gained by including indicators in the model that identify participants' state and treatment condition, compared with just including a single treatment indicator, as in Equation A.2.

APPENDIX TABLE A.1 Selected Characteristics of Sample Members at Baseline, by Program

Final Report on the Performance-Based Scholarship Demonstration

Characteristic	Arizona	California	Florida	New Mexico	New York	Ohio
Gender (%)						
Male	100.0	39.8	33.7	39.2	30.9	13.6
Female[a]	0.0	60.2	66.3	60.8	69.1	86.4
Average age (years)	24.3	17.6	27.0	18.0	26.5	29.9
Race/ethnicity[b] (%)						
Hispanic/Latino	99.7	60.7	30.7	60.6	44.3	8.6
White	0.1	20.3	30.5	21.8	6.1	54.6
Black	0.0	3.8	33.1	2.7	37.2	31.4
Asian or Pacific Islander	0.0	11.2	1.2	3.5	9.7	0.6
Other	0.2	3.9	4.4	11.3	2.7	4.8
Have any children (%)	24.6	NA	44.1	1.8	47.8	99.7
Household receiving any government benefits[c] (%)	37.5	NA	38.0	NA	37.9	65.8
Missing	12.4	NA	12.6	NA	12.0	4.0
Currently employed (%)	44.9	NA	50.8	49.0	56.0	48.8
First person in family to attend college (%)	36.7	53.7	33.3	32.8	32.9	30.0
Sample size (total = 11,613)	1,028	4,642	1,075	1,081	1,502	2,285

SOURCE: MDRC calculations using Baseline Information Form (BIF) data.

NOTES: NA = Not available because question was not asked on BIF for this site.

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

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

[c]Benefits include unemployment/dislocated worker benefits, Supplemental Security Income (SSI) or disability benefits, cash assistance or welfare, food stamps, and Section 8 or public housing.

APPENDIX TABLE A.2 Impacts on Enrollment in Years 1-5, by State

Final Report on the Performance-Based Scholarship Demonstration

	Arizona		California		Florida		New Mexico		New York		Ohio		
Year	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	F-Test P-Value
1	98.08	0.78	88.88	3.91 ***	96.75	0.89	100.00	-0.94	97.73	1.21	96.18	1.04	0.01
		(1.38)		(0.7)		(1.37)		(1.32)		(1.12)		(0.93)	
2	68.19	1.31	82.54	3.05 **	70.05	0.60	90.45	-0.14	74.74	2.70	71.11	1.47	0.85
		(2.56)		(1.3)		(2.54)		(2.45)		(2.08)		(1.72)	
3	49.93	3.07	76.44	1.45	56.53	-4.41	82.19	2.15	60.29	3.77	57.46	-1.54	0.18
		(2.88)		(1.46)		(2.86)		(2.76)		(2.34)		(1.93)	
4	–	–	71.11	2.88 *	–	–	77.98	-0.55	49.48	2.23	41.90	1.38	0.73
				(1.49)				(2.81)		(2.38)		(1.97)	
5	–	–	–	–	–	–	66.23	-1.67	34.77	5.26 **	34.01	0.73	0.16
								(2.91)		(2.46)		(2.04)	
Sample size		1,028		4,642		1,075		1,081		1,502		2,285	

SOURCES: MDRC calculations using transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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.
A joint F-test was used to assess impact variation across states. The p-value for each test is shown.
Standard errors are shown in parentheses below each estimate.
Estimates are adjusted by site and research cohort.
Estimates may vary slightly from state-level reports due to the exclusion of state-specific covariates.
Enrollment measures whether a student enrolled at any point in a given year.
[a]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

APPENDIX TABLE A.3 Impacts on Total Credits Earned by the End of Years 1-4, by State

Final Report on the Performance-Based Scholarship Demonstration

	Arizona		Florida		New Mexico		New York		Ohio		
Year	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	F-Test P-Value
1	14.49	1.81 ***	13.95	1.00	25.19	0.79	15.89	0.89 *	13.94	1.69 ***	0.53
		(0.64)		(0.64)		(0.61)		(0.53)		(0.43)	
2	21.87	2.61 **	22.12	1.24	45.32	1.96 *	26.54	1.24	22.37	2.38 ***	0.80
		(1.19)		(1.18)		(1.13)		(0.97)		(0.8)	
3	25.55	2.68	27.81	0.24	63.48	1.90	34.06	1.91	28.43	2.40 **	0.82
		(1.65)		(1.63)		(1.58)		(1.35)		(1.1)	
4	–	–	–	–	79.91	1.94	39.42	1.95	32.20	2.32	0.98
						(2.06)		(1.77)		(1.45)	
Sample size		1,028		1,075		1,081		1,469		2,285	

SOURCES: MDRC calculations using transcript data from Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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.

A joint F-test was used to assess impact variation across states. The p-value for each test is shown.

Standard errors are shown in parentheses below each estimate.

Estimates are adjusted by site and research cohort.

Estimates may vary slightly from state-level reports due to the exclusion of state-specific covariates.

[a]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

APPENDIX TABLE A.4 Impacts on Cumulative Credits Attempted, Pooled

Final Report on the Performance-Based Scholarship Demonstration

Year[a]	Sample Size	Cumulative Credits Attempted: Program Group	Cumulative Credits Attempted: Control Group	Impact Estimate[b]	Standard Error	P-Value
1	6,938	23.9	23.0	0.9 ***	0.21	0.00
2	6,938	39.5	37.8	1.7 ***	0.45	0.00
3	6,938	50.1	48.4	1.7 ***	0.65	0.01
4	4,835	63.4	61.4	1.9 *	1.08	0.07
5	1,081	109.3	109.3	0.0	3.38	0.99

SOURCES: MDRC calculations using transcript data from Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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 site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

[a]Years 1, 2, and 3 each include Arizona, Florida, New Mexico, New York, and Ohio. Year 4 includes New Mexico, New York, and Ohio. Year 5 includes New Mexico.

[b]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

APPENDIX TABLE A.5 Impacts on Degrees Earned by the End of Years 1-5, by State

Final Report on the Performance-Based Scholarship Demonstration

	Arizona		California		Florida		New Mexico		New York		Ohio			
Year	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]	Control Group (%)	Impact Estimate[a]		F-Test P-Value
1	4.86	-0.32	0.55	0.04	0.24	1.10	0.37	-0.37	2.94	-0.55	8.47	1.06		0.65
		(1.04)		(0.53)		(1.03)		(0.99)		(0.84)		(0.7)		
2	11.38	1.47	2.93	-0.14	4.47	2.81 *	0.73	-0.36	10.56	-1.54	17.40	3.20	***	0.06
		(1.66)		(0.84)		(1.65)		(1.59)		(1.35)		(1.11)		
3	19.79	1.40	7.68	-0.56	13.93	3.90 *	2.57	-0.33	19.65	-0.03	24.73	3.75	***	0.17
		(2.16)		(1.09)		(2.14)		(2.07)		(1.75)		(1.45)		
4	–	–	22.95	0.40	–	–	17.61	1.23	28.88	-0.62	33.15	1.80		0.88
				(1.4)				(2.64)		(2.24)		(1.85)		
5	–	–	–	–	–	–	40.74	4.41	31.68	2.41	34.76	2.99		0.86
								(2.92)		(2.47)		(2.04)		
Sample size		1,028		4,642		1,075		1,081		1,502		2,285		

SOURCES: MDRC calculations using transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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.

A joint F-test was used to assess impact variation across states. The p-value for each test is shown.

Standard errors are shown in parentheses below each estimate.

Estimates are adjusted by site and research cohort.

Estimates may vary slightly from state-level reports due to the exclusion of state-specific covariates.

[a]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

APPENDIX TABLE A.6 Services Versus No Services, by Registration, Credits Earned, and Degrees Earned, Years 1-3

Final Report on the Performance-Based Scholarship Demonstration

Subgroup	Sample Size	Percentage: Program Group	Percentage: Control Group	Impact Estimate[a]	Standard Error	Difference Between Subgroup Impacts (P-Value)
Year 1						
Registration						0.01 †††
Services	3,184	98.5	98.3	0.2	0.4	
No services	8,429	94.8	92.7	2.1 ***	0.5	
Credits earned						0.84
Services	3,184	19.1	17.9	1.2 ***	0.4	
No services	3,754	16.0	14.8	1.3 ***	0.3	
Degrees earned						0.95
Services	3,184	1.9	1.8	0.1	0.5	
No services	8,429	3.3	3.1	0.2	0.4	
Year 2						
Registration						0.29
Services	3,184	77.0	76.4	0.6	1.5	
No services	8,429	80.5	78.1	2.4 ***	0.9	
Credits earned						0.89
Services	3,184	31.8	29.9	1.9 ***	0.7	
No services	3,754	25.9	24.1	1.8 ***	0.6	
Degrees earned						0.44
Services	3,184	6.7	5.4	1.3	0.8	
No services	8,429	8.7	8.2	0.5	0.7	
Year 3						
Registration						0.63
Services	3,184	63.4	63.1	0.3	1.6	
No services	8,429	69.6	68.3	1.2	1.0	
Credits earned						0.66
Services	3,184	40.8	39.2	1.6 *	1.0	
No services	3,754	32.8	30.7	2.2 ***	0.8	
Degrees earned						0.67
Services	3,184	13.6	12.0	1.7	1.2	
No services	8,429	15.3	14.3	1.0	0.8	

(continued)

APPENDIX TABLE A.6 (continued)

SOURCES: For "Registration" and "Degrees earned," "Services" is based on transcript data from the National Student Clearinghouse, Arizona, Florida, and New Mexico, and "No services" is based on transcript data from the National Student Clearinghouse, New York, and Ohio. For "Credits earned," "Services" is based on transcript data from Arizona, Florida, and New Mexico, and "No services" is based on transcript data from New York and Ohio.

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

A two-tailed t-test was applied to differences in 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 site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

Enrollment measures whether a student enrolled at any point in a given year.

[a]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

APPENDIX TABLE A.7 Impacts on Enrollment, by California Scholarship Type

Final Report on the Performance-Based Scholarship Demonstration

Outcome	Control Group Mean	Scholarship Type 1	2	3	4	5	6	F-Test P-Value
Performance-based scholarship		No	Yes	Yes	Yes	Yes	Yes	
Amount of scholarship per semester ($)		1,000	1,000	500	1,000	500	1,000	
Duration of scholarship		1 semester	1 semester	2 semesters	2 semesters	4 semesters	4 semesters	
		Enrollment Impact over Control Group Mean (%)						
Year								
1	88.9	3.7 **	2.7	3.9 **	3.9 **	5.1 ***	4.0 **	1.0
		(1.8)	(1.9)	(1.9)	(1.8)	(1.8)	(1.9)	
2	82.5	1.8	2.9	4.4 *	1.2	4.1 *	2.6	0.9
		(2.3)	(2.3)	(2.3)	(2.3)	(2.3)	(2.3)	
3	76.4	-3.2	2.6	-0.5	1.5	2.6	1.0	0.5
		(2.6)	(2.7)	(2.6)	(2.6)	(2.6)	(2.6)	
4	71.1	-0.7	1.0	1.6	3.3	4.0	4.5	0.7
		(2.8)	(2.8)	(2.8)	(2.8)	(2.8)	(2.8)	
Sample size (n = 4,921)	3,281	279	264	273	276	276	272	

(continued)

APPENDIX TABLE A.7 (continued)

SOURCE: MDRC calculations using National Student Clearinghouse data.

NOTES: A joint F-test was used to assess impact variation across programs. The p-value for each test is shown. For each of the program years, the test yielded a p-value on the F-statistic that was not significant. This finding suggests that the differences in each program year are likely to have occurred by chance.

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.

Impact estimates are adjusted by site and research cohort.

Standard errors are reported in parentheses under impact estimates.

National Student Clearinghouse data were not found for 228 students (4.6 percent of the sample).

The PBS California scholarship types had varying designs. Type 1 was not performance-based and offered $1,000 over one term with no performance incentive. Types 2-6 were performance-based as follows: Type 2 offered $1,000 over one term; Type 3 offered $1,000 over one year; Type 4 offered $2,000 over one year; Type 5 offered $2,000 over two years; and Type 6 offered $4,000 over two years. For more details see Richburg-Hayes et al. (2015).

APPENDIX TABLE A.8 Impacts on Degrees Earned, by California Scholarship Type

Final Report on the Performance-Based Scholarship Demonstration

Outcome	Control Group Mean	Scholarship Type 1	2	3	4	5	6	F-Test P-Value
Performance-based scholarship		No	Yes	Yes	Yes	Yes	Yes	
Amount of scholarship per semester ($)		1,000	1,000	500	1,000	500	1,000	
Duration of scholarship		1 semester	1 semester	2 semesters	2 semesters	4 semesters	4 semesters	
		Degree Impact over Control Group Mean (%)						
Year								
1	0.5	-0.5	0.2	0.2	-0.5	-0.2	0.5	0.4
		(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	
2	2.9	-0.1	0.1	0.4	-0.4	-1.8 *	1.1	0.4
		(1.0)	(1.1)	(1.1)	(1.0)	(1.0)	(1.1)	
3	7.7	0.2	-1.6	1.1	-1.9	-1.8	1.5	0.4
		(1.6)	(1.7)	(1.7)	(1.6)	(1.6)	(1.7)	
4	23.0	-3.9	-0.3	1.3	-2.3	2.9	0.4	0.4
		(2.6)	(2.7)	(2.6)	(2.6)	(2.6)	(2.6)	
Sample size (n = 4,921)	3,281	279	264	273	276	276	272	

(continued)

APPENDIX TABLE A.8 (continued)

SOURCE: MDRC calculations using National Student Clearinghouse data.

NOTES: A joint F-test was used to assess impact variation across programs. The p-value for each test is shown. For each of the program years, the test yielded a p-value on the F-statistic that was not significant. This finding suggests that the differences in each program year are likely to have occurred by chance.

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.

Impact estimates are adjusted by site and research cohort.

Standard errors are reported in parentheses under impact estimates.

National Student Clearinghouse data were not found for 228 students (4.6 percent of the sample).

The PBS California scholarship types had varying designs. Type 1 was not performance-based and offered $1,000 over one term with no performance incentive. Types 2-6 were performance-based as follows: Type 2 offered $1,000 over one term; Type 3 offered $1,000 over one year; Type 4 offered $2,000 over one year; Type 5 offered $2,000 over two years; and Type 6 offered $4,000 over two years. For more details see Richburg-Hayes et al. (2015).

APPENDIX TABLE A.9 Impacts on Enrollment in Years 1-5, by Subgroup

Final Report on the Performance-Based Scholarship Demonstration

	Year 1		Year 2		Year 3		Year 4		Year 5	
Characteristic	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error
Gender						††				
Male	1.53 ***	0.5	2.45 *	1.3	3.19 **	1.4	0.84	1.7	-0.63	2.8
Female	0.89 **	0.4	1.09	0.9	-0.85	1.1	1.60	1.2	1.88	1.6
Hispanic/Latino										
Yes	1.54 ***	0.5	1.44	1.1	1.81	1.2	3.20 **	1.4	1.72	2.4
No	0.75 *	0.4	1.53	1.1	-0.25	1.2	0.09	1.3	1.23	1.7
Parent[b]										
Yes	1.07 **	0.5	0.16	1.5	-0.97	1.6	1.88	1.8	2.06	1.7
No	0.23	0.4	1.54	1.4	1.34	1.6	0.10	2.1	0.59	2.3
Younger than 20 years old										
Yes	0.86 *	0.5	1.05	0.9	0.78	1.1	1.19	1.1	-1.80	2.8
No	1.40 ***	0.4	1.72	1.3	0.34	1.4	1.79	1.7	3.09 *	1.6
First in family to attend college										
Yes	1.66 ***	0.6	1.14	1.2	0.56	1.4	2.54 *	1.5	2.38	2.5
No	0.80 **	0.4	1.87 *	1.0	0.68	1.1	0.50	1.3	0.59	1.7
Employed at the beginning of the program[b]							†			
Yes	1.06 **	0.5	-0.20	1.4	0.02	1.6	3.31 *	1.9	3.33 *	2.0
No	0.31	0.5	2.38	1.5	0.80	1.6	-1.64	2.0	-0.75	2.0

(continued)

APPENDIX TABLE A.9 (continued)

SOURCES: MDRC calculations using Baseline Information Form (BIF) data and transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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.

A two-tailed t-test was applied to differences in 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 site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

Years 1, 2, and 3 each include Arizona, California, Florida, New Mexico, New York, and Ohio. Year 4 includes California, New Mexico, New York, and Ohio. Year 5 includes New Mexico, New York, and Ohio.

[a]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

[b]Data on parental status and employment were not collected for California students.

APPENDIX TABLE A.10 Impacts on Credits Earned in Years 1-4, by Subgroup

Final Report on the Performance-Based Scholarship Demonstration

	Year 1		Year 2		Year 3		Year 4	
Characteristic	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error
Gender	†							
Male	1.77 ***	0.4	2.41 ***	0.8	2.31 **	1.0	2.26	2.3
Female	0.83 ***	0.3	1.54 ***	0.6	1.54 *	0.8	2.02 *	1.2
Hispanic/Latino								
Yes	1.05 ***	0.4	1.57 **	0.7	1.63	1.0	2.18	2.1
No	1.45 ***	0.3	2.23 ***	0.6	2.03 **	0.8	1.98 *	1.2
Parent								
Yes	1.20 ***	0.3	2.08 ***	0.6	2.32 ***	0.8	3.05 ***	1.1
No	1.20 ***	0.4	1.55 **	0.7	1.14	1.0	0.94	2.0
Younger than 20 years old								
Yes	0.86 *	0.5	1.63 *	1.0	1.33	1.4	2.46	2.7
No	1.38 ***	0.3	1.95 ***	0.5	1.95 ***	0.7	1.82 *	1.0
First in family to attend college								
Yes	1.55 ***	0.4	2.27 ***	0.8	2.32 **	1.2	3.14	2.0
No	1.02 ***	0.3	1.68 ***	0.6	1.51 *	0.8	1.23	1.3
Employed at the beginning of the program								
Yes	1.38 ***	0.3	2.02 ***	0.6	1.97 **	0.9	3.47 **	1.5
No	1.15 ***	0.4	1.87 ***	0.7	1.79 *	0.9	0.48	1.5

(continued)

APPENDIX TABLE A.10 (continued)

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

A two-tailed t-test was applied to differences in 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 site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

Years 1, 2, and 3 each include Arizona, Florida, New Mexico, New York, and Ohio. Year 4 includes New Mexico, New York, and Ohio.

[a]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

APPENDIX TABLE A.11 Impacts on Degrees Earned in Years 1-5, by Subgroup

Final Report on the Performance-Based Scholarship Demonstration

	Year 1		Year 2		Year 3		Year 4		Year 5	
Characteristic	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error	Impact Estimate[a]	Standard Error
Gender										
Male	0.24	0.5	1.37 *	0.8	0.96	1.0	-1.38	1.4	-0.46	2.8
Female	0.07	0.4	0.56	0.7	1.60 *	0.8	1.43	1.1	4.56 ***	1.6
Hispanic/Latino			†						†	
Yes	-0.29	0.4	0.06	0.7	0.32	0.9	0.07	1.3	0.23	2.5
No	0.64	0.5	1.78 **	0.8	2.33 **	1.0	1.23	1.3	5.21 ***	1.7
Parent[b]										
Yes	0.39	0.8	1.96 *	1.1	3.04 **	1.3	1.81	1.7	3.24 *	1.7
No	0.02	0.5	0.35	0.9	0.40	1.2	-0.32	1.9	3.17	2.3
Younger than 20 years old			††		††					
Yes	-0.02	0.2	-0.53	0.4	-0.52	0.6	0.74	1.1	4.14	2.9
No	0.30	0.6	2.06 **	0.9	2.80 **	1.1	0.75	1.5	2.85 *	1.6
First in family to attend college										
Yes	-0.09	0.5	0.49	0.8	1.17	1.0	-0.20	1.4	3.21	2.5
No	0.22	0.4	1.17 *	0.7	1.49 *	0.9	0.79	1.2	2.78	1.7
Employed at the beginning of the program[b]										
Yes	0.37	0.6	0.39	1.0	0.88	1.3	2.08	1.8	3.84 *	2.0
No	0.00	0.6	1.50	0.9	2.41 **	1.2	-0.27	1.8	3.10	2.0

(continued)

APPENDIX TABLE A.11 (continued)

SOURCES: MDRC calculations using Baseline Information Form (BIF) data and transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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.

A two-tailed t-test was applied to differences in 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 site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

Years 1, 2, and 3 each include Arizona, California, Florida, New Mexico, New York, and Ohio. Year 4 includes California, New Mexico, New York, and Ohio. Year 5 includes New Mexico, New York, and Ohio.

[a]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

[b]Data on parental status and employment were not collected for California students.

APPENDIX TABLE A.12 Cost-Effectiveness of PBS Program

Final Report on the Performance-Based Scholarship Demonstration

Outcome	Average Program	Average Control	Impact Estimate[a]
Cost of PBS program ($)	2,345	0	2,345
Total cumulative cost of college services[b, c, d] ($)			
Year 1	9,160	9,160	0
Year 2	15,055	15,055	0
Year 3	19,242	19,242	0
Year 4	24,449	24,449	0
Year 5	27,809	27,809	0
Earned a degree[e, f, g] (%)			
Year 1	2.9	2.8	0.2
Year 2	8.3	7.4	0.9 *
Year 3	14.9	13.6	1.4 **
Year 4	26.4	25.7	0.7
Year 5	38.3	35.1	3.3 **
Cost per degree[e, f, g, h] ($)			
Year 1	392,884	330,934	61,950
Year 2	210,260	204,265	5,996
Year 3	144,542	141,670	2,873
Year 4	101,420	95,047	6,373
Year 5	78,672	79,310	-638

SOURCES: MDRC calculations using transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, and the Ohio Board of Regents, as well as program-specific budget data and financial and enrollment data from the Integrated Postsecondary Education Data System and the Higher Education Price Index.

NOTES: Program costs are based on a steady state of operation that excludes external research and start-up costs; the cost would increase by 0.7 percent if start-up costs were included and by 4.0 percent if research costs were included.

All costs were adjusted into constant 2014 dollars.

A two-tailed t-test was applied to differences between research groups for credits attempted and degrees earned. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent. Tests of statistical significance were not performed for costs.

(continued)

APPENDIX TABLE A.12 (continued)

Rounding may cause slight discrepancies in sums and differences.

The average cost per credit attempted across all the sites over 5 years was $397.90.

[a]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

[b]Years 1, 2, and 3 are based on the average number of credits attempted for Arizona, Florida, New Mexico, New York, and Ohio (excludes California). Over three years, the average control group member across Arizona, Florida, New Mexico, New York, and Ohio attempted 48.4 credits.

[c]Year 4 is based on the average number of credits attempted for New Mexico, New York, and Ohio (excludes Arizona, California, and Florida). Over 4 years, the average control group member across New Mexico, New York, and Ohio attempted 61.4 credits.

[d]Year 5 is based on an estimate of 69.9 credits attempted per control group member. This estimate is based on the average number of credits attempted for: New Mexico, New York, and Ohio over 4 years (61.4), multiplied by the percentage increase in credits attempted from Year 4 to Year 5 as observed in New Mexico (13.7 percent). In Year 4, the typical control group member in New Mexico had attempted 96.1 credits. By Year 5, the typical control group member in New Mexico had attempted 109.3 credits. The Year 5 estimates are derived in this way because Year 5 data are available only for New Mexico. The University of New Mexico, however, offers 4-year degrees, and credit-attempt values were substantially higher compared with the other sites, so Year 5 estimates were derived from the Year 5 data from the University of New Mexico and the Year 4 data from the University of New Mexico, the New York colleges, and the Ohio colleges.

[e]For Years 1, 2, and 3, includes Arizona, California, Florida, New Mexico, New York, and Ohio.

[f]For Year 4, includes California, New Mexico, New York, and Ohio.

[g]For Year 5, includes New Mexico, New York, and Ohio.

[h]The cost per degree for both students in the program groups and students in the control groups is calculated by adding the cost of usual college services to the direct cost of the average PBS program (program group only) and dividing by the estimated effect on earning a degree. For example, to calculate the 5-year cost per degree for the average program student, the 5-year cost of college services ($27,809) is added to the direct cost of the average PBS program ($2,345) for a total of $30,154 ($27,809 + $2,345 = $30,154). This total cost is then divided by the estimated percentage of program students who earned a degree after Year 5 (38.3 percent), for a cost per degree of $78,672 ($30,154 / [38.3/100] = $78,672). Discrepancies in calculations are due to rounding of impact estimates and costs.

APPENDIX TABLE A.13 Sensitivity Check, Clustered Standard Errors (Campus- and Geographic Region-Cohort), Impacts on Enrollment, Pooled

Final Report on the Performance-Based Scholarship Demonstration

Year[a]	Sample Size	Percentage Enrolled: Program Group	Percentage Enrolled: Control Group	Impact Estimate[b]	Standard Error	P-Value
1	11,613	95.6	94.4	1.2 ***	0.42	0.01
2	11,613	79.3	77.8	1.5 **	0.70	0.04
3	11,613	67.8	67.0	0.8	0.82	0.36
4	9,510	63.2	61.7	1.5	0.99	0.15
5	4,868	42.9	41.5	1.4	1.46	0.34

SOURCES: MDRC calculations using transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, and 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.

Enrollment measures whether a student enrolled at any point in a given year.

Rounding may cause slight discrepancies in sums and differences.

Estimates are adjusted by site and research cohort.

Estimates were calculated using clustered standard errors by site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

[a]Years 1, 2, and 3 each include Arizona, California, Florida, New Mexico, New York, and Ohio. Year 4 includes California, New Mexico, New York, and Ohio. Year 5 includes New Mexico, New York, and Ohio.

[b]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

APPENDIX TABLE A.14 Sensitivity Check, Clustered Standard Errors (Campus-Cohort), Impacts on Cumulative Credits Earned, Pooled

Final Report on the Performance-Based Scholarship Demonstration

Year[a]	Sample Size	Cumulative Credits Earned: Program Group	Cumulative Credits Earned: Control Group	Impact Estimate[b]	Standard Error	P-Value
1	6,938	17.5	16.2	1.2 ***	0.30	0.00
2	6,938	28.6	26.7	1.9 ***	0.57	0.00
3	6,938	36.4	34.6	1.8 **	0.68	0.01
4	4,835	47.2	45.1	2.1 *	1.19	0.10

SOURCES: MDRC calculations using transcript data from Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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 site and research cohort.

Estimates were calculated using clustered standard errors by site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

[a]Years 1, 2, and 3 each include Arizona, Florida, New Mexico, New York, and Ohio. Year 4 includes New Mexico, New York, and Ohio.

[b]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

APPENDIX TABLE A.15 Sensitivity Check, Clustered Standard Errors (Campus- and Geographic Region-Cohort), Impacts on Degrees Earned, Pooled

Final Report on the Performance-Based Scholarship Demonstration

Year[a]	Sample Size	Percentage Who Earned a Degree: Program Group	Percentage Who Earned a Degree: Control Group	Impact Estimate[b]	Standard Error	P-Value
1	11,613	2.9	2.8	0.2	0.4	0.65
2	11,613	8.3	7.4	0.9	0.6	0.15
3	11,613	14.9	13.6	1.4 *	0.7	0.05
4	9,510	26.4	25.7	0.7	0.7	0.33
5	4,868	38.3	35.1	3.3 ***	0.8	0.00

SOURCES: MDRC calculations using transcript data from the National Student Clearinghouse, Pima Community College, Hillsborough Community College, the University of New Mexico, the City University of New York, 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 site and research cohort.

Estimates were calculated using clustered standard errors by site and research cohort.

Estimates are weighted to account for the different sample sizes and random assignment ratios in each state.

[a]Years 1, 2, and 3 each include Arizona, California, Florida, New Mexico, New York, and Ohio. Year 4 includes California, New Mexico, New York, and Ohio. Year 5 includes New Mexico, New York, and Ohio.

[b]The impact estimate is the estimated change in outcomes caused by the program, measured by the difference between the program and control group outcomes.

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Founded in 1974 and located in New York City and Oakland, California, MDRC is best known for mounting rigorous, large-scale, real-world tests of new and existing policies and programs. Its projects are a mix of demonstrations (field tests of promising new program approaches) and evaluations of ongoing government and community initiatives. MDRC's staff bring an unusual combination of research and organizational experience to their work, providing expertise on the latest in qualitative and quantitative methods and on program design, development, implementation, and management. MDRC seeks to learn not just whether a program is effective but also how and why the program's effects occur. In addition, it tries to place each project's findings in the broader context of related research — in order to build knowledge about what works across the social and education policy fields. MDRC's findings, lessons, and best practices are proactively shared with a broad audience in the policy and practitioner community as well as with the general public and the media.

Over the years, MDRC has brought its unique approach to an ever-growing range of policy areas and target populations. Once known primarily for evaluations of state welfare-to-work programs, today MDRC is also studying public school reforms, employment programs for ex-offenders and people with disabilities, and programs to help low-income students succeed in college. MDRC's projects are organized into five areas:

- Promoting Family Well-Being and Children's Development
- Improving Public Education
- Raising Academic Achievement and Persistence in College
- Supporting Low-Wage Workers and Communities
- Overcoming Barriers to Employment

Working in almost every state, all of the nation's largest cities, and Canada and the United Kingdom, MDRC conducts its projects in partnership with national, state, and local governments, public school systems, community organizations, and numerous private philanthropies.