The Effects of Expanding Pell Grant Eligibility for Short Occupational Training Programs: New Results on Employment and Earnings from the Experimental Sites Initiative

Institute of Education Sciences

Appendix

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The Effects of Expanding Pell Grant Eligibility for Short Occupational Training Programs: New Results on Employment and Earnings from the Experimental Sites Initiative

APPENDIX

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INTRODUCTION

This appendix volume supplements report NCEE 2024-001, describing the effects of two experimental Pell Grant expansions: the first allowed income-eligible students with a bachelor's degree to obtain this form of federal financial aid for short-term occupational training programs and the second allowed income-eligible students to obtain this aid for very short-term programs lasting as little as eight weeks. The report updated earlier results from a rigorous evaluation of the experiments conducted by the U.S. Department of Education's (ED's) Institute of Education Sciences, adding new information about the experiments' effects on employment and earnings outcomes.

This appendix volume similarly updates the evaluation's previous published appendix to detail the steps taken to assess these effects. The volume first describes the Pell Grant experiments as overseen by ED's Office of Federal Student Aid, including information about the schools offering the experimental Pell Grants. The next sections document how the study was conducted, including the research questions asked and the approach used to answer the research questions, additional details supporting the key findings of the study, and additional analyses to assess the sensitivity of the key findings.

APPENDIX A. IMPLEMENTATION OF THE 2011 PELL GRANT EXPERIMENTS

This appendix provides additional details about the 2011 Pell Grant experiments described on page 2 of the report. In particular, the appendix describes the process for approving schools and programs to be included in the experiments, how schools implemented the experiments, the characteristics of study schools and eligible programs, and the amount of experimental Pell Grant funds disbursed over the study period. This information may help policymakers and others interpret the evaluation results and identify issues policymakers might consider if they make the experimental waivers of Pell Grant eligibility rules universally available.

A.1   Approving schools and programs to be included in the experiments

The Office of Federal Student Aid (FSA) announced the 2011 Pell Grant experiments to the public postsecondary institutions potentially eligible for the experiments on October 27, 2011.[1] Schools had to complete a series of steps to be approved to participate in any experiment under the Experimental Sites Initiative (Exhibit A.1). These steps are as follows:

- Submit a letter of application to FSA indicating an intent to participate and the ability to report required data (**Step 1**).

- Undergo screening for past compliance, to ensure the schools are in good standing in administering federal aid under Title IV Student Assistance programs (**Step 2**).

- If invited to participate (**Step 3**), send a signed Program Participation Agreement (PPA) amendment back to FSA (**Step 4**). The PPA identifies the specific waivers being granted under the experiment and the reporting requirements for participation. Only after FSA approves and countersigns the form are schools officially approved to participate in an experiment.

- If interested in participating in Experiment 2, submit additional documentation. FSA had to approve each of the very short-term programs that schools wanted to make eligible for a Pell Grant under the experiment. Schools had to submit a Program Approval Form along with documentation that the program itself had been approved by the school's accrediting body, by its state agency, or both. Programs were expected to align with local or regional industry needs, but FSA did not factor this expectation into the program approval decision (**Step 5**). See Appendix A.3 for more details about the eligible programs.

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[1] https://ifap.ed.gov/sites/default/files/attachments/fregisters/FR102711ExperimentalSitesInitiative.pdf.

Exhibit A.1. School and program approval process

School approval Experiments 1 and 2				Program approval Experiment 2 only
1 School submits letter of interest/ application to FSA	**2** School screened for past compliance	**3** School sent invitation to participate from FSA	**4** School submits a signed PPA to the FSA's School Participation Division	**5** School submits the Approval of Short Term Programs Form with supporting documentation
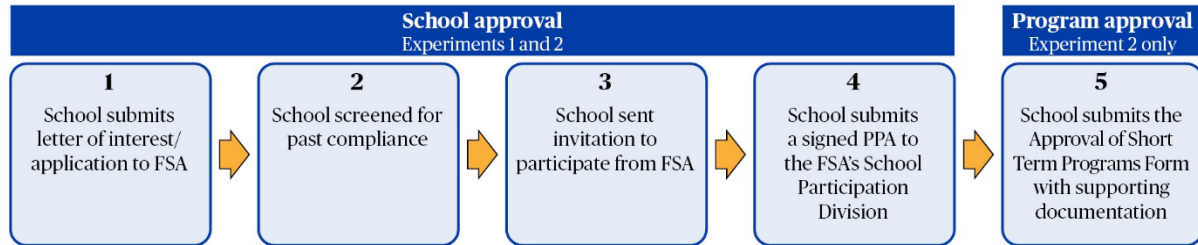
FSA = Office of Federal Student Aid, PPA = Program Participation Agreement.

After the initial call for applications, FSA directly emailed financial aid professionals three times (in January, February, and August 2013) because schools were initially slow to apply.[2] Despite the multistep process, 84 schools sought and obtained approval to participate in one or both experiments between the initial announcement and March 31, 2017, when the experiments were closed to new schools. Most were approved in 2013 (Exhibit A.2). However, among the schools that were approved for Experiment 2, only 35 schools went on to have a very short-term program approved by FSA. The number of schools suggests possible challenges in identifying programs or obtaining additional approvals or accreditation required for these programs to participate in the experiment.

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[2] The initial announcement (https://www.federalregister.gov/documents/2011/10/27/2011-27880/postsecondary-educational-institutions-invited-to-participate-in-experiments-under-the-experimental) specified that schools that applied by December 12, 2011, would receive priority to be considered for participation. An electronic communication to financial aid professionals in January 2013 extended the deadline to February 28, 2013. A February 2013 electronic communication further extended the deadline to April 30, 2013. Finally, an August 2013 electronic communication reopened the application process without a closing date.

Exhibit A.2. Number of schools approved for Experiments 1 and 2, by year
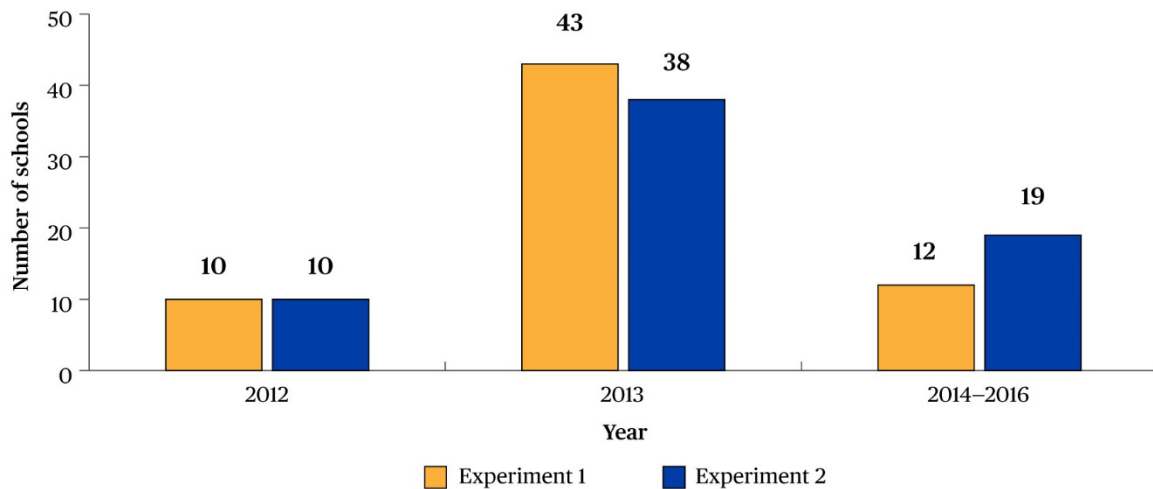
Notes: Sixty-eight schools were approved (submitted a signed Program Participation Agreement amendment) for each experiment by March 31, 2017; four schools were omitted because of missing data on the year in which they were approved. Because of the small number of schools approved in 2014-2016, the exhibit combines these years to protect respondent confidentiality, in accordance with National Center for Education Statistics statistical standards.

Source: Office of Federal Student Aid random assignment system.

A.2   School implementation of the 2011 Pell Grant experiments

After obtaining FSA approval, school financial aid offices were responsible for recruiting students and determining their eligibility for the experiments. Because the experiments targeted students not ordinarily eligible for Pell Grants, schools had to develop their own procedures to find and flag them for the experiments rather than process their aid packages in the usual manner. Students eligible for the experiments were those who met these criteria:

- Met all other Pell Grant eligibility criteria (for example, demonstrating financial need or being a U.S. citizen or eligible noncitizen)[3]
- Were un- or underemployed[4]
- Expressed interest in an eligible occupational training program
- Were entering the program for the first time
- Had, for Experiment 1, already obtained a bachelor's degree

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[3] https://studentaid.gov/understand-aid/eligibility/requirements.

[4] The Office of Federal Student Aid did not offer additional guidance to schools on how to determine whether students were un- or underemployed.

In addition, schools were encouraged to engage local workforce partners to advertise the availability of the experimental Pell Grants for short occupational training and to recruit new students. However, they were not given supplemental funds to cover the additional costs associated with carrying out this or any other aspect of the experiments.

Exhibit A.3. Number of approved schools and study schools

Experiment	Number of approved schools[a]	Number of study schools[b]
Experiment 1	68	35
Experiment 2	68	28
Both experiments	52	17
Total	84	46

Note: The sum of Experiment 1 and Experiment 2 schools does not equal the total number of schools, because some schools were in both experiments and included in the counts for each experiment separately.

Source: Office of Federal Student Aid.

[a] Approved schools are those approved by FSA for participation in Experiment 1 or 2 or both that submitted a signed Program Participation Agreement amendment.

[b] Study schools are those approved to participate that identified at least one eligible participant.

Between November 2012 and March 2017, only about half of the schools approved by FSA went on to identify eligible students for the study (Exhibit A.3). On average, schools spent nearly nine months from approval to identify their first eligible student and begin participating in either experiment (Exhibit A.4). Schools found it challenging to recruit new students because financial aid offices had little to no experience doing so. In addition, schools found it difficult to identify students not traditionally eligible for Title IV aid. Both challenges may have contributed to delays in schools' participating or in their decision to ultimately not participate in the experiments.

Exhibit A.4. Time between school approval by FSA and beginning of schools' participation in the experiments
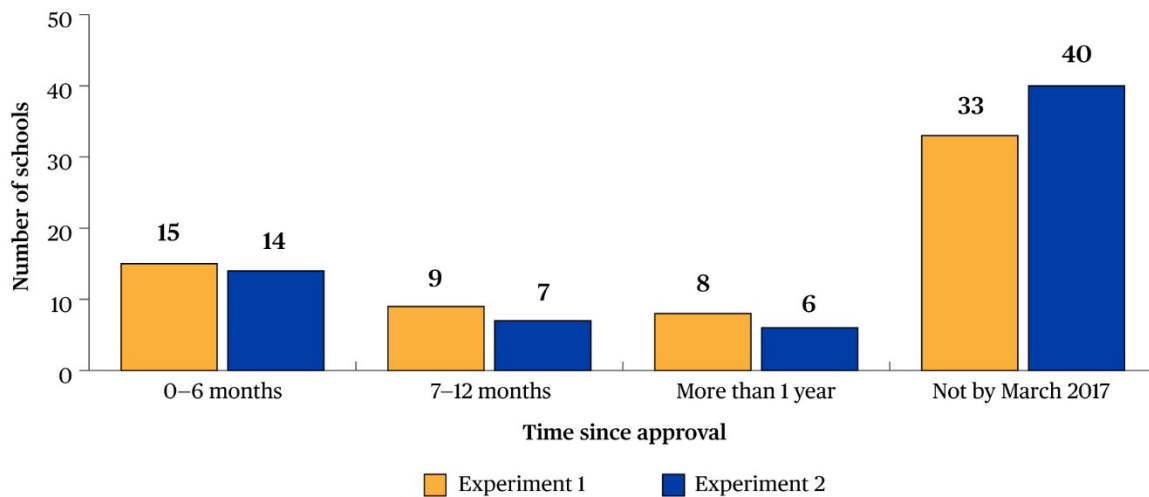
Notes: The time elapsed between school approval and a school's participation is calculated as the number of months between when the school's Program Participation Agreement amendment was entered into FSA's Postsecondary Education Participants System and when they identified (and randomly assigned) their first eligible student for Experiment 1 or 2. Of the 68 schools approved for Experiment 1, 32 schools had begun participating by March 31, 2017; three schools are omitted because of missing data on the year in which they were approved. Of the 68 schools approved for Experiment 2, 27 schools had begun participating by March 31, 2017; one school is omitted because of missing data on the year in which it was approved. On average, 8.75 months elapsed between approval and when schools began participating in Experiment 1, and 8.85 months elapsed between approval and when schools began participating in Experiment 2. For Experiment 2, 3 of the 40 schools that did not identify an eligible student and begin participating in the experiment had a very short-term program approved by the Office of Federal Student Aid.

Source: Office of Federal Student Aid random assignment system.

Schools that ended up participating in either experiment, which this report refers to as study schools, tended to identify relatively low numbers of students. Study schools identified 13 students for Experiment 1 and 83 students for Experiment 2, on average, but most schools identified fewer than 10 students for Experiment 1 and fewer than 50 students for Experiment 2 (Exhibits A.5 and A.6). Overall, study schools identified 2,914 eligible students (not shown).

Exhibit A.5. Number of students identified for Experiment 1, per study school
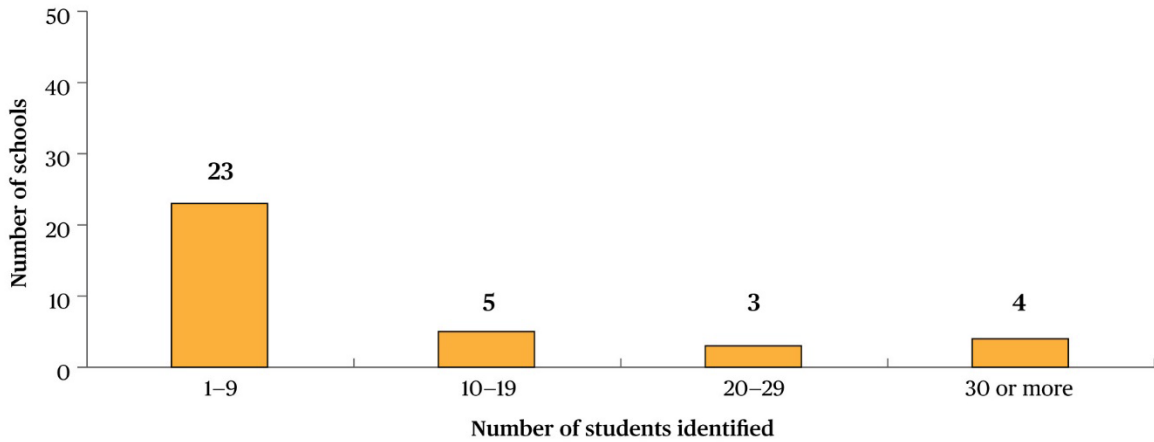
Note: This exhibit contains information from the 35 schools that identified eligible students for Experiment 1 only between the time each school began participating in the experiment by March 31, 2017.

Source: Office of Federal Student Aid random assignment system.

Exhibit A.6. Number of students identified for Experiment 2, per study school
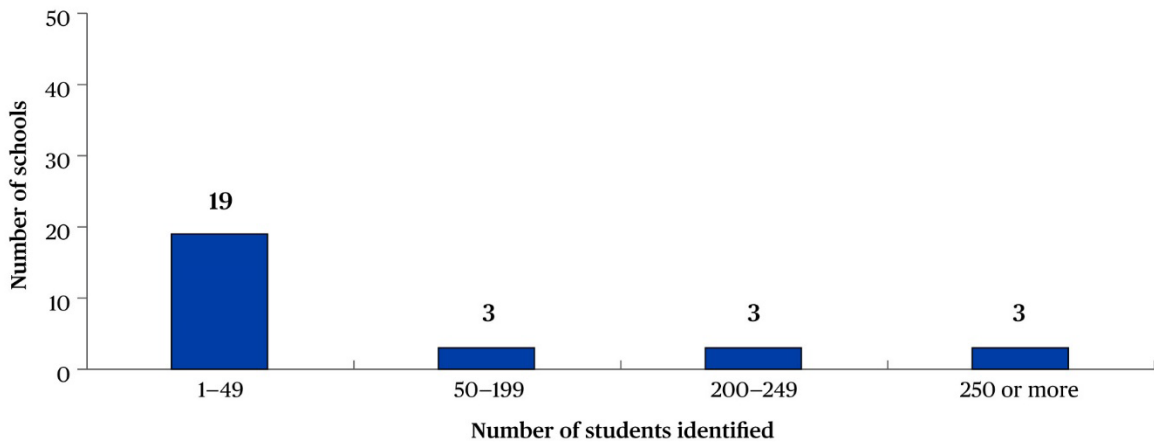
Note: This exhibit contains information from the 28 schools that identified eligible students for Experiment 2 only between the time each school began participating in the experiment by March 31, 2017.

Source: Office of Federal Student Aid random assignment system.

Because FSA had a limited amount of experimental Pell Grant funds available, schools used a lottery-like process to allocate them. Eligible students were randomly assigned to be offered experimental Pell Grants (treatment group) or to not be offered experimental Pell Grants (control group). Schools wanted to be able to determine in real time (with little delay) and on a rolling basis whether students would be offered experimental Pell Grant funds or not, consistent with how they otherwise prepared students' financial aid awards. In addition, they wanted to award experimental Pell Grants to as many students as possible. To accommodate those school preferences, the study had financial aid staff enter minimal information about each eligible student into a secure web-based random assignment system. The system then selected a student for the offer of experimental Pell Grants 60 percent of the time and immediately responded with information about the group to which the student was assigned. See Appendix B for more details about the random assignment process.

A.3   Characteristics of study schools and eligible programs

A.3.1   Study schools

The more the study schools look like schools nationally, the more relevant the study's findings are to what could happen if the experiments become permanent federal aid policy. The study's 46 schools were not representative of all postsecondary schools in the United States (Exhibit A.7), suggesting that the study's findings may not hold if the experiments become permanent policy. The majority of participating schools (72 percent) were public, two-year institutions, but only 16 percent of U.S. postsecondary schools overall are in this category. This difference is consistent with the experiments' focus on short-term and very short-term occupational training programs. However, participating schools were also more concentrated in the southeast region of the United States and more likely to be located in urban centers.

Exhibit A.7. Characteristics of study schools compared with all postsecondary schools in the United States

Characteristic	Study schools[a]	All U.S. postsecondary schools[b]
Type of school		
Public, two-year	72%	16%
Public, less than two-year	13%	4%
Other	15%	80%
Regional location		
Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV)	46%	25%
Great Lakes (IL, IN, MI, OH, WI)	17%	15%
Far West (AK, CA, HI, NV, OR, WA)	15%	14%
Mideast (DE, DC, MD, NJ, NY, PA)	13%	17%
Southwest (AZ, NM, OK, TX)	9%	11%

Characteristic	Study schools[a]	All U.S. postsecondary schools[b]
Plains (IA, KS, MN, MO, NE, ND, SD)	0%	9%
New England (CT, ME, MA, NH, RI, VT)	0%	6%
Rocky Mountains (CO, ID, MT, UT, WY)	0%	3%
Urbanicity		
Urban	57%	48%
Suburban	22%	30%
Rural	13%	9%
Town	9%	14%
Total number of schools	**46**	**6,319**

Note: "Other" includes public four-year schools and private for-profit and not-for-profit schools.

Source: Integrated Postsecondary Education Data System 2018.

[a] Study schools are those approved by FSA to participate in Experiment 1 or Experiment 2 or both that identified at least one eligible participant by March 31, 2017.

[b] All U.S. postsecondary schools refers to Title IV institutions, which are those with a written agreement with ED that allows the institution to participate in any of the Title IV federal student financial assistance programs.

Beyond location, the participating schools stand out in terms of size, outcomes, and whom they serve. Even relative to similar schools in their states, study schools tended to be either smaller or larger (Exhibit A.8), have similar graduation rates (Exhibit A.9), and have a higher percentage of Pell Grant recipients (Exhibit A.10).

Exhibit A.8. Study schools' total enrollment as a share of the average total enrollment for similar schools in the state
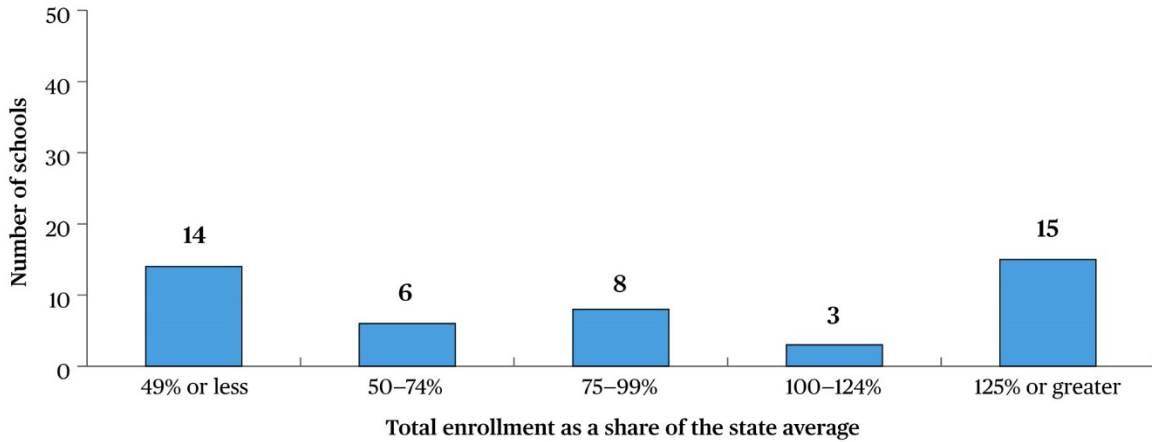
Notes: This exhibit includes all 46 study schools (those approved to participate in Experiment 1 or Experiment 2 or both by FSA that identified at least one eligible participant by March 31, 2017). Each study school is compared to the state average for similar schools (that is, public two-year schools are compared to the statewide average for public two-year schools and so on). The average total enrollment for schools in the 20 states in which these 46 schools operated was 7,635 students. The average total enrollment of the 46 study schools is 9,940. These data reflect enrollment rates for the 2014-2015 academic year.

Source: Integrated Postsecondary Education Data System 2014.

Exhibit A.9. Study schools' graduation rate as a share of the average graduation rate for similar schools in the state
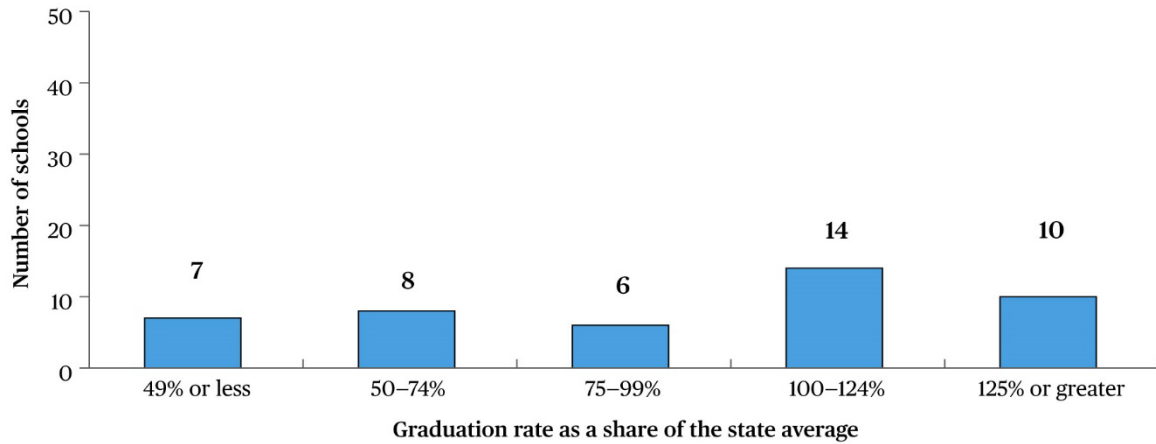
Notes: This exhibit includes 45 study schools (those approved to participate by FSA that identified at least one eligible participant by March 31, 2017); one study school is omitted because of missing graduation rate data. Each participating school is compared to its state average for similar schools (that is, public two-year schools are compared to the statewide average for public two-year schools and so on). The average graduation rate for schools in the 20 states in which the participating schools operated was 36 percent. The average graduation rate for the 45 participating schools is 37 percent. These data reflect graduation rates for the 2014-2015 academic year.

Source: Integrated Postsecondary Education Data System 2014.

Exhibit A.10. Study schools' regular Pell Grant recipient rate as a share of the average Pell Grant recipient rate for similar schools in the state
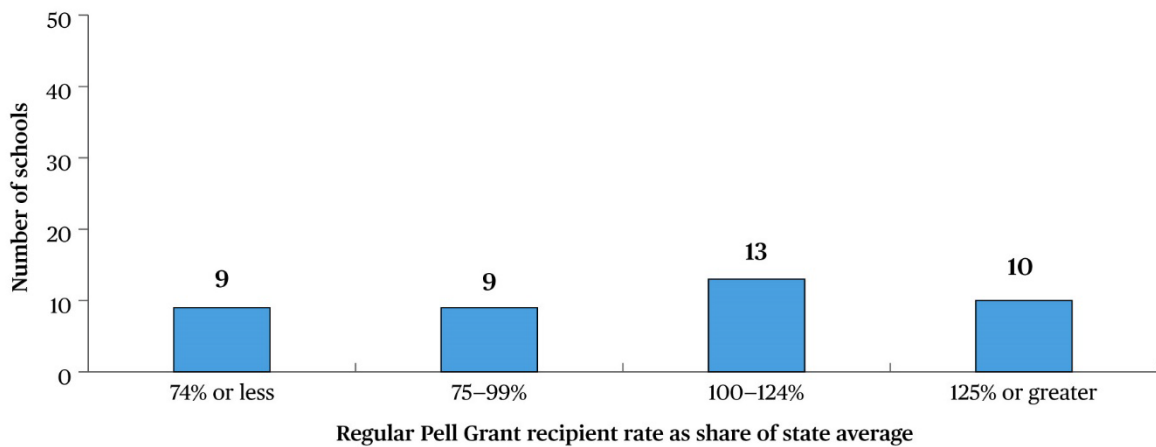
Notes: This exhibit includes 45 study schools (those approved by FSA to participate that identified at least one eligible participant by March 31, 2017); four schools are omitted because of missing Pell Grant recipient rate data. Each participating school is compared to its state average for similar schools (that is, public two-year schools are compared to the statewide average for public two-year schools and so on). The average Pell Grant recipient rate (percentage of students receiving Pell Grant funds) for the 20 states in which the participating schools operated is 44 percent. The average Pell Grant recipient for the 45 participating schools is 48 percent. These data reflect regular Pell Grant recipient rates for the 2014-2015 academic year.

Source: Integrated Postsecondary Education Data System 2014.

Eligible programs

The key goal for the experiments was to train more un- and underemployed individuals for careers in high-demand occupations, as the stepping stone to higher employment and earnings. Programs eligible under the experiments were expected to meet a local or regional workforce need, but schools had complete discretion over how to make that determination. For Experiment 1, eligible students could enroll in a wide range of programs lasting up to one year that were already eligible for Pell Grants at each approved school. However, for Experiment 2, FSA approved only specific programs to provide very short-term training options.

As part of the process to determine student eligibility, students indicated the program of study that they wanted to enter. Almost 50 percent of Experiment 2 students indicated an intention to enroll in transportation and materials moving programs; 35 percent intended to enroll in programs to prepare them for health professions and careers in related clinical sciences (Exhibit A.11). On average, the duration of programs in which Experiment 2 students intended to enroll was 11.4 weeks (not shown).[5]

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[5] Because the programs in which Experiment 1 students intended to enroll were not subject to FSA approval, schools did not report data on these programs consistently. Because of the large amount of missing data for Experiment 1 programs, the study does not report on the type or duration of these programs.

Because schools did not report how they determined whether programs met a local or regional workforce need, the study examined the proportion of programs associated with high-demand occupations, as opposed to occupations with few openings and little expected growth. In both experiments, more than half of study participants intended to enroll in a program in a high-demand occupation in their state: 53 percent of Experiment 1 students and 58 percent of Experiment 2 students (not shown). Appendix B describes the methods the study used to determine whether a program was associated with an occupation in high demand.

Exhibit A.11. Percentage of students in Experiment 2 who expressed interest in FSA-approved very short-term occupational training programs, by field
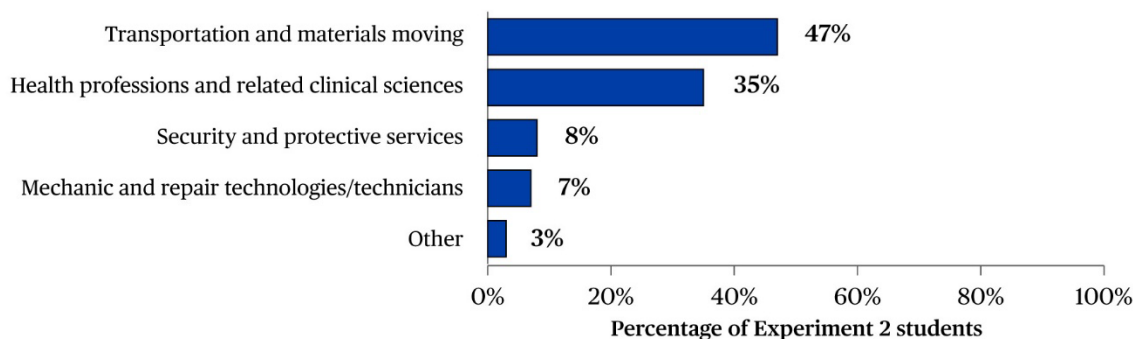
Notes: This exhibit contains information for the 2,270 students in the Experiment 2 analysis sample (see Appendix B for information on the formation of the analysis sample). Information on the intended program is missing for 14 students. The exhibit reports two-digit Classification of Instructional Program codes associated with the FSA-approved programs in which Experiment 2 students expressed interest at the time of random assignment. These programs were two to four months (8-15 weeks) in duration.

Source: Office of Federal Student Aid random assignment system.

A.4   Amount of Pell Grants disbursed under the 2011 Pell Grant experiments

Study schools determined the amount of experimental Pell Grant funds a student could receive based on the schools' cost of attendance, the student's expected family financial contribution, and enrollment status (the number of credit or clock hours for which the student enrolled)–a process similar to determining the amounts awarded for regular Pell Grants. For example, for the 2014–2015 award year, the maximum Pell Grant available was $5,730.[6] This amount could be lower for students with a lower cost of attendance, a higher expected family financial contribution, or less than full time enrollment.[7]

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[6] See "Information for Financial Aid Professionals Dear Colleague Letter GEN-14-01." Available at https://ifap.ed.gov/dear-colleague-letters/01-31-2014-gen-14-01-subject-2014-2015-federal-pell-grant-payment-and.

[7] See https://fsapartners.ed.gov/sites/default/files/2021-02/2014-2015%20Volume%203%20-%20Calculating%20Awards%20%26%20Packaging%20Master%20File.pdf.

Schools participating in Experiment 2 prorated the amount of experimental Pell Grants awarded based on the duration of very short programs.

The 2011 Pell Grant experiments cost approximately $1.5 million ($1,752 per student), on average, over six years (2012-2018; Exhibit A.12).[8] The share of students who were offered experimental Pell Grants and went on to use ("take up") the grants offered was 55 percent overall (68 percent among Experiment 1 students and 53 percent among Experiment 2 students; Exhibit A.12).[9] On average, Experiment 1 students who did use the grants received $3,556, and Experiment 2 students who used the grants received $1,315 (Exhibit A.12). These amounts were reported by study schools and could cover more than one program and award year.

Exhibit A.12. Experimental Pell Grant take-up rates and disbursement amounts

Usage Overview of Experimental Pell Grants	Experiment 1	Experiment 2	Overall
Number of students offered experimental Pell Grant	254	1,363	1,617
Number of students offered experimental Pell Grant who used it	170	705	875
Total amount of experimental Pell Grants disbursed	$608,009	$924,648	$1,532,657
Take-up rate (number of students who used the grant divided by the number of students offered experimental Pell Grants)	67%	52%	54%
Average experimental Pell Grant amount disbursed (total amount disbursed divided by the number of students who used the experimental Pell Grant)	$3,577	$1,312	$1,752

Source: School records.

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[8] Students were identified on a rolling basis between November 2012 and March 2017. The last program completion date observed in school records was August 2018.

[9] Analyses exploring which types of students were likely to take up the offer of an experimental Pell Grant are described in Appendix B, and findings are reported in Appendix C.

APPENDIX B. STUDY DESIGN AND ANALYTIC APPROACH

This appendix provides additional details on the study design for those interested in the research methods used to assess the experiments' implementation and effects. The appendix describes the research questions and logic model underlying the study, the random assignment process that determined who was offered an experimental Pell Grant, how the analytic sample was identified, and the outcome measures and data sources used. In addition, it provides technical details on the analytic approaches used to estimate the effects of the experiments.

B.1   Research questions

This study was designed to provide evidence on the effects of making Pell Grants available to individuals who had already earned a bachelor's degree (Experiment 1) and individuals interested in very short-term occupational training programs (Experiment 2). The research questions focused on assessing the experiments' effects on program enrollment, program completion, employment, and earnings and describing the use of experimental Pell Grant funds. Specifically, the study asked the following primary analysis questions:

1. *Did offering experimental Pell Grants increase enrollment in and completion of postsecondary programs in study schools?* Because experimental Pell Grants could only be used in schools approved to participate in the experiments, the study focused on enrollment and completion in these study schools only. The study's focus was enrollment in any program because students could have entered other programs in these schools that might also be beneficial to them.

2. *What percentage of students who were offered experimental Pell Grants used them?* Understanding the share of students who actually used the experimental Pell Grants offered to them is important for policymakers considering permanently broadening access to Pell Grants.

3. *Did offering experimental Pell Grants increase employment and earnings?* Because the long-term goal of the experiments was to improve individuals' success in the labor market, the study focused on measuring their employment and earnings.

The study also analyzed additional exploratory questions to better understand the effects of the experiments. These exploratory analyses aimed to answer the following questions:

1. *Would the effects on enrollment and completion be different if the analysis were extended beyond the study schools or beyond the study's completion window?* Enrollment and completion in a broader set of schools may better capture the behavior of students who were not offered Pell Grants. For example, the offer of experimental Pell Grants could lead students to enroll in and complete programs at the study schools; conversely, students who were not offered experimental Pell Grants might enroll in and complete programs at other, less expensive colleges. The study also explored whether the effects on enrollment and completion could be affected by the study's completion window (for example, students not offered experimental Pell Grants could have enrolled in longer programs that would have taken longer to complete).

2. *Did offering experimental Pell Grants affect the types of programs that students enrolled in or completed?* Exploring whether offering experimental Pell Grants moved students into short programs associated with high-demand occupations or away from longer programs, such as an associate's degree, would give insight into the potential employment benefits of extending Pell Grant eligibility in this way.

3. *Did offering experimental Pell Grants affect students' use of federal student loans?* Understanding how having access to experimental Pell grants affected students' needs for additional financial aid is important for policymakers considering whether to make the experimental waivers permanent.

4. *Did offering experimental Pell Grants affect the duration of students' employment and their reliance on unemployment insurance benefits?* Duration of employment and receipt of unemployment insurance benefits are alternative ways to measure labor market outcomes that could help tell a more complete story about the extent to which the experimental Pell Grants affected labor market experiences.

5. *Would the effects on employment and earnings be different if the analysis examined employment and earnings in a labor market less affected by the COVID-19 pandemic?* This study examined employment and earnings during a period that overlapped with the pandemic-induced recession–the third quarter of 2020 to the fourth quarter of 2021. The study considers the alternative of examining employment and earnings in the fourth quarter of 2021 to assess if the effects are different because unemployment had returned close to pre-pandemic levels by the fourth quarter of 2021.

B.2   Random assignment and identification of the analytic sample

Random assignment was used to determine which students would be offered experimental Pell Grants. Random assignment ensures that students who are offered experimental Pell Grants are statistically equivalent to students who did not receive an offer, so that any differences in their later outcomes can be interpreted as the result of being offered an experimental Pell Grant. It is the most rigorous study design available. Random assignment also provided a fair way to determine who was offered the experimental Pell Grants because limited funds were available to support students interested in the experiment.

The web-based random assignment system (RAS) developed for the study assigned students randomly to either be offered experimental Pell Grants (treatment group) or not offered the grants (control group), with a 60 percent probability that a student would be assigned to receive an offer. Students were randomly assigned within each experiment for which they were eligible[10] and within their study school and occupational training program of interest. This type of random assignment (known as stratified random assignment) ensured that the study schools and programs were proportionally represented in each experiment.

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[10] Students participating in both Experiment 1 and Experiment 2 were treated as if they were part of a third experiment. To minimize crossover, they were randomly assigned to either receive experimental Pell Grant funds or not for both experiments.

Study schools identified and randomly assigned 2,914 eligible students for the experiments between November 2012 and March 2017: 437 students for Experiment 1, 2,399 for Experiment 2, and 78 students who were interested in and eligible for both experiments (Exhibit B.1). After random assignment, the RAS automatically emailed study participants, informing them of their inclusion in the study and telling them how to revoke consent if they did not want to be part of the study.[11]

Some of the students who were randomly assigned had to be excluded from the analytic samples used to answer the study's research questions. Students were excluded from the analytic samples if they (1) revoked consent (4 people), (2) were determined by the schools to be ineligible for the study after random assignment (4 people),[12] or (3) were subject to a technical problem in the random assignment process (151 people).[13] Some 159 students were randomly assigned but excluded from analyses: 23 in Experiment 1, 129 in Experiment 2, and 7 students who participated in both experiments (Exhibit B.1). Students were further excluded from the analytic sample for estimating effects on employment and earnings if (4) the combination of their name and Social Security number (SSN) could not be validated when matched to the National Directory of New Hires (NDNH), the database used to measure these outcomes.[14] This process resulted in the exclusion of 63 more students from the analysis of employment and earnings: 8 more students in Experiment 1 and 55 more students in Experiment 2 (Exhibit B.1).

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[11] If the eligible student was determined to be a minor, the RAS required contact information for a parent or guardian, who was then notified about participation in the study and how to opt out.

[12] Schools determined these four students to be ineligible because they either already had a bachelor's degree but were assigned to Experiment 2 only or were never provided verification for eligibility.

[13] Two types of errors occurred. First, the RAS program had built-in code so that once the number of participants assigned to the control group within a school reached a certain threshold, all subsequent participants at that school would be assigned to the treatment group. This rule was created for studies where this option was desired, which was not the case in this study. As a result, the threshold was supposed to be set to 1,000 so that in practice it would never be reached and the rule would not be triggered. By mistake, this threshold was not set for three participating schools, resulting in all study participants at these schools being assigned to the treatment group ($N = 144$). Second, when the SSN or an alternate ID for a potential new study participant was entered into the system, the system checked whether that information matched that of an existing study participant. If it did, the student was assigned to the experimental group to which the existing study participant was assigned, assuming they were the same person. This rule made sense when using SSNs because SSNs are unique. However, participating schools did not always use the alternate as a unique identifier, which meant that multiple individuals could share the same ID. Eight participants in seven schools were affected by this error, one of whom was also subject to the first error. Of the 151 participants with a random assignment error, 7 were in both experiments.

[14] Staff at the Office of Child Support Enforcement (OCSE) conducted the match of students in the study to the NDNH database. As part of this process, OCSE staff verified each SSN and name combination in the study data with the Social Security Administration. If an SSN and name combination in the study data could not be validated in the Social Security Administration's records, that study participant could not be matched to the NDNH.

Exhibit B.1. Number of students randomly assigned and included in the analytic samples, by experiment

Experiment	Number of students randomly assigned			Number of students in the enrollment and completion analytic sample			Number of students in the employment and earnings analytic sample		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Total	Offered experimental Pell Grant	Not offered experimental Pell Grant	Total	Offered experimental Pell Grant	Not offered experimental Pell Grant	Total
Experiment 1	277	160	437	254	160	414	250	156	406
Experiment 2	1,488	911	2,399	1,363	907	2,270	1,335	880	2,215
Both experiments	54	24	78	47	24	71	47	24	71
Total	**1,819**	**1,095**	**2,914**	**1,664**	**1,091**	**2,755**	**1,632**	**1,060**	**2,692**

Note: A sensitivity analysis (described in detail in Appendix D) includes the 71 students who participated in both experiments.

Source: Office of Federal Student Aid random assignment system.

To estimate the effect of each specific type of Pell Grant eligibility waiver on educational outcomes, the study team analyzed each experiment separately and the main analysis sample was restricted to the 414 students who participated in Experiment 1 only and the 2,270 students who participated in Experiment 2 only (Exhibit B.1). Similarly, the main analysis sample included 406 students who participated in Experiment 1 only and 2,215 who participated in Experiment 2 only to estimate effect of each waiver on employment and earnings. Although the 71 students who participated in both experiments were excluded from the main analyses, sensitivity analyses that added them back into each experiment led to the same findings described in the report. (See Appendix D for more about the sensitivity analyses.) Because the random assignment process grouped students eligible for both experiments into a separate experiment (or stratum) before conducting random assignment, excluding them does not violate random assignment and does not contribute to sample attrition.

B.2.1   Attrition

Sample attrition occurs when an analytic sample excludes study participants that were already randomly assigned to an experiment. Some of the reasons for exclusion include, for example, whether participants revoked consent after random assignment, were subject to a random assignment error, or were missing outcome data. Attrition can introduce bias in study findings if different types of students are more likely than others to be excluded from the analytic sample, therefore making the treatment and control groups dissimilar. To determine whether attrition represented a threat to the validity of findings, the study assessed the level of attrition overall and the difference between the treatment and control groups (known as the differential attrition rate) for each experiment and analytic sample (Exhibit B.2).[15] The combination of overall and differential attrition in each experiment represents tolerable levels based on What Works Clearinghouse standards that are not expected to bias the study's results.[16]

Exhibit B.2. Overall and differential attrition rates for Experiment 1 and Experiment 2

Experiment	Attrition rate in offered experimental Pell Grant group	Attrition rate in not offered experimental Pell Grant group	Differential attrition rate	Overall attrition rate
Program enrollment and completion analytic sample				
Experiment 1	8.3%	0.0%	8.3%	5.3%
Experiment 2	8.4%	0.4%	8.0%	5.4%
Employment and earnings analytic sample				
Experiment 1	9.7%	2.5%	7.2%	7.1%
Experiment 2	10.3%	3.4%	6.9%	7.7%

Note: Participants with a random assignment error are the reason attrition rates are much larger among participants offered an experimental Pell Grant than among participants who were not offered an experimental Pell Grant in both experiments (see footnote 13).

Source: Office of Federal Student Aid random assignment system.

Another way to assess the potential threat of attrition to the study's validity is to determine whether the students excluded from the analysis were different from the rest of the sample. As shown in Exhibit B.3, the analytic samples were similar to the full sample for each experiment.

The study also compared the demographic characteristics of students in the analytic sample to those of all postsecondary students in the United States to understand how representative the study's findings

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[15] Students were further excluded from the analytic sample on employment and earnings outcomes if they could not be matched to these data, as described earlier.

[16] The study evaluated the potential bias of these attrition rates using the U.S. Department of Education's What Works Clearinghouse Standards Version 4.0 guidelines for interventions to support postsecondary success.

might be if experimental Pell Grants were made available nationwide. Students in Experiment 1 were similar to all postsecondary students in the United States, on average, in terms of gender: the majority were female, and approximately 35 percent were male. Experiment 2 students, on the other hand, were more likely to be male than all postsecondary students nationally. Students in both experiments tended to be older than all postsecondary students nationally (Exhibit B.3).[17]

Exhibit B.3. Characteristics of all postsecondary students in the United States and students in the study's full and analytic sample for program enrollment and completion outcomes

Characteristic	Experiment 1		Experiment 2		All postsecondary students in the United States
	Full sample (*N* = 437)	Analytic sample (*N* = 414)	Full sample (*N* = 2,399)	Analytic sample (*N* = 2,270)	
Gender					
Male	34%	35%	63%	63%	42%
Female	63%	62%	36%	36%	58%
Missing	3%	3%	1%	1%	0%
Age					
21 and under	2%	2%	17%	17%	51%
22–24	17%	17%	15%	15%	15%
25–29	26%	25%	20%	20%	13%
30–39	22%	22%	26%	25%	12%
40 and older	34%	35%	23%	22%	9%
Missing	0%	0%	0%	0%	<1%

Notes: This exhibit shows the gender and age of the full sample and analytic sample for each experiment, as well as for all postsecondary students in the United States. For the full and analytic samples for Experiment 1, data on gender are missing for 14 students. For the full sample for Experiment 2, data on age are missing for six students. Data on gender are missing for 23 students for both the full and analytic samples in Experiment 2. Percentages may not add up to 100 percent because of rounding. IPEDS data are the Fall Enrollment Survey data.

Sources: Integrated Postsecondary Education Data System (IPEDS) 2021, Office of Federal Student Aid random assignment system, school records.

B.2.2   Baseline equivalence

Students offered and not offered experimental Pell Grants in the analytic samples had similar characteristics at the time of random assignment. Within each experiment, the characteristics of the two experimental groups were very similar in the program enrollment and completion analytic sample (Exhibit B.4a). In Experiment 2, one of the 18 characteristics available (percentage of female students) differed, about what would be expected by chance. The two experimental groups in the employment

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[17] These comparisons are consistent among the employment and earnings analytic sample for each experiment (not shown).

and earnings sample also had very similar characteristics (Exhibit B.4b). These comparisons of students' characteristics suggest the random assignment for each experiment created two statistically equivalent groups of students, even after sample attrition, so that any differences in their later outcomes are the result of being offered an experimental Pell Grant.

Exhibit B.4a. Characteristics of students offered and not offered experimental Pell Grants at baseline for the program enrollment and completion analytic sample, by experiment

Characteristic	Experiment 1				Experiment 2			
	Offered experimental Pell Grant	**Not offered experimental Pell Grant**	**Difference**	**Overall**	**Offered experimental Pell Grant**	**Not offered experimental Pell Grant**	**Difference**	**Overall**
Covariates used to measure impacts (percentages unless otherwise noted)								
Age (years)	36.0	35.9	1.1	36.2	31.7	31.4	0.3	31.6
Female	62.8	70.0	-7.2	64.0	37.7	34.0	3.7*	36.3
High school graduate	97.8	97.0	0.8	97.3	98.6	98.0	0.6	98.4
Prior postsecondary experience	97.1[a]	99.0[a]	-1.9	96.8	53.6	52.0	1.6	52.5
Expected family contribution[b] (index)	1,490.7	1,606.4	-115.6	1,583.9	841.0	1,109.1	-268.1	972.0
Expected family contribution = 0	42.5	43.0	-0.5	42.4	25.4	26.0	-0.6	26.1
Dislocated worker[c]	22.8	26.0	-3.2	25.4	23.4	22.0	1.4	22.7
Other characteristics (percentages unless otherwise noted)								
Adjusted gross income ($)	21,956	18,186	3,771	20,670	21,610	23,425	-1,814	22,451
Married	24.7	30.0	-5.3	28.4	21.4	23.0	-1.6	22.1
Household size (persons)	2.1	2.0	0.1	2.1	2.6	2.7	-0.1	2.6
Veteran	3.6	2.0	1.6	4.4	4.6	3.0	1.6	4.0
At risk of homelessness[d]	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.5
Independent status[e]	90.6	94.0	-3.4	92.8	84.8	83.0	1.8	84.5
Average Pell Grant funds disbursed prior to study period ($)	5,877	6,074	-198	5,597	2,974	2,743	231	2,879

Characteristic	Experiment 1				Experiment 2			
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Difference	Overall	Offered experimental Pell Grant	Not offered experimental Pell Grant	Difference	Overall
Average federal student loans disbursed prior to study period ($)	6,942	8,024	-1,082	7,116	1,054	1,124	-70	1,081
Intended program in high demand	51.6	52.0	-0.4	53.0	57.2	58.0	-0.8	57.5
Duration of intended program (weeks)	NA	NA	NA	NA	11.4	11.5	-0.1	11.4
Enrolled at study school prior to study period	27.7	24.0	3.7	24.4	14.0	14.0	0.0	13.8

Notes: This exhibit contains information for the analysis samples for Experiment 1 (*N* = 414) and Experiment 2 (*N* = 2,270). The "Overall" columns (5 and 9) contain the unadjusted means for each student characteristic for the analytic sample for each experiment. To test whether the differences reported in the "Difference" columns (4 and 8) are statistically significantly different from zero, the study used regression models with each characteristic of interest as the dependent variable, an indicator that the student was offered experimental Pell Grant funds as the independent variable, and school and program fixed effects. The difference reported in columns 4 and 8 are the coefficients on the "offered experimental Pell Grant funds" indicator. The exhibit is divided into two panels. The upper panel includes information on the characteristics, measured at baseline, that the study included in regression models to estimate impacts of the experiments. The bottom panel includes additional characteristics for which the study assessed baseline equivalence (that is, whether students offered Experimental Pell Grant funds and students not offered the funds were similar in terms of characteristics measured at the outset of the experiments).

Sources: Office of Federal Student Aid random assignment system, school records.

[a] All participants in Experiment 1 were required to have a bachelor's degree, but a small percentage of these individuals was not reported as having some college in the school data or in FSA data. For every record that could be verified after the study had been completed, schools confirmed that this individual did, in fact, have a bachelor's degree, meaning the reported data on this indicator had been in error.

[b] The expected family contribution (EFC), a measure of a family's financial strength, is an index score calculated based on taxed and untaxed income, assets, and benefits (see https://studentaid.gov/help-center/answers/article/what-is-efc). The EFC considers whether students are financially dependent on their parents, marital status, and family size, in addition to income, assets, and benefits. See formulas here: https://ifap.ed.gov/sites/default/files/attachments/2019-10/2021EFCFormulaGuideOct2019UpdateAttach.pdf. Because the EFC takes these characteristics into account, the study included EFC and an indicator for EFC = 0 as a proxy for these characteristics in regression models to estimate impacts of the experiments (see Exhibit B.7).

[c] An individual may qualify as a dislocated worker if they meet one of the following conditions: has lost job; has been laid off or received a layoff notice; is receiving unemployment benefits because of being laid off or losing a job and is unlikely to return to a previous occupation; is self-employed but unemployed because of economic conditions or a natural disaster; is the spouse of an active duty member of the Armed Forces and is unemployed or underemployed and is experiencing difficulty in obtaining or upgrading employment; or is a displaced homemaker (a person who previously provided unpaid services to the family, is no longer supported by the spouse, is unemployed or underemployed, and is having trouble finding or upgrading employment) (see https://studentaid.gov/2324/help/student-dislocated-worker).

Exhibit B.4b. Characteristics of students offered and not offered experimental Pell Grants at baseline for the employment and earnings analytic sample, by experiment

Characteristic	Experiment 1				Experiment 2			
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Difference	Overall	Offered experimental Pell Grant	Not offered experimental Pell Grant	Difference	Overall
Covariates used to measure impacts (percentages unless otherwise noted)								
Age (years)	35.9	35.8	0.0	36.2	31.7	31.4	0.3	31.6
Female	63.3	70.2	-6.9	64.0	37.8	34.1	3.6*	36.4
High school graduate	98.0	98.0	0.0	97.5	98.6	98.0	0.6	98.4
Prior postsecondary experience	96.7[a]	98.7[a]	-2.0	96.7	53.2	51.8	1.4	52.6
Expected family contribution[b] (index)	1,494.3	1,619.1	-124.8	1,602.6	848.1	1,042.9	-194.8	944.6
Expected family contribution = 0	42.3	42.9	-0.5	42.6	25.9	26.5	-0.6	26.2
Dislocated worker[c]	22.9	26.2	-3.3	25.4	23.2	22.2	1.0	22.7
Other characteristics (percentages unless otherwise noted)								
Adjusted gross income ($)	21,753	18,331	3,422	20,641	21,694	23,211	-1,517	22,429
Married	24.5	30.0	-5.5	28.4	21.8	23.7	-1.9	22.4
Household size (persons)	3.9	2.0	2.0	2.0	5.4	2.7	2.7	2.7
Veteran	D	D	2.6	D	4.8	3.2	1.5	4.1
At risk of homelessness[d]	0.0	0.0	0.0	0.0	0.4	0.6	-0.2	0.5
Independent status[e]	91.1	94.4	-3.3	92.7	85.3	83.7	1.5	84.6
Average Pell Grant funds disbursed prior to study period ($)	5,794	6,230	-436	5,626	2,961	2,752	209	2,882

Characteristic	Experiment 1				Experiment 2			
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Difference	Overall	Offered experimental Pell Grant	Not offered experimental Pell Grant	Difference	Overall
Average federal student loans disbursed prior to study period ($)	6,980	8,230	-1,250	7,171	1,053	1,107	-54	1,078
Intended program in high demand	52.6	51.9	0.6	52.8	57.3	58.1	-0.8	57.5
Duration of intended program (weeks)	15.0	14.4	0.6	14.7	11.4	11.4	-0.1	11.4
Enrolled at study school prior to study period	27.3	23.7	3.6	24.1	13.8	14.2	-0.4	14.0

Notes: This exhibit contains information for the analysis samples for Experiment 1 (N = 406) and Experiment 2 (N = 2,215). The "Overall" columns (5 and 9) contain the unadjusted means for each student characteristic for the analytic sample for each experiment. To test whether the differences reported in the "Difference" columns (4 and 8) are statistically significantly different from zero, the study used regression models with each characteristic of interest as the dependent variable, an indicator that the student was offered experimental Pell Grant funds as the independent variable, and school and program fixed effects. The difference reported in columns 4 and 8 are the coefficients on the "offered experimental Pell Grant funds" indicator. The exhibit is divided into two panels. The upper panel includes information on the characteristics, measured at baseline, that the study included in regression models to estimate impacts of the experiments. The bottom panel includes additional characteristics for which the study assessed baseline equivalence (that is, whether students offered Experimental Pell Grant funds and students not offered the funds were similar in terms of characteristics measured at the outset of the experiments). D is used to denote suppressed cells.

Sources: Office of Federal Student Aid random assignment system, school records.

[a] All participants in Experiment 1 were required to have a bachelor's degree, but a small percentage of these individuals were not reported as having some college in the school data or in FSA data. For every record that could be verified after the study had been completed, schools confirmed that this individual did, in fact, have a bachelor's degree, meaning the reported data on this indicator had been in error on this indicator.

[b] The EFC, a measure of a family's financial strength, is an index score calculated based on taxed and untaxed income, assets, and benefits (see https://studentaid.gov/help-center/answers/article/what-is-efc). The EFC considers whether students are financially dependent on their parents, marital status, and family size, in addition to income, assets, and benefits. See formulas here: https://ifap.ed.gov/sites/default/files/attachments/2019-10/2021EFCFormulaGuideOct2019UpdateAttach.pdf. Because the EFC takes these characteristics into account, the study included EFC and an indicator for EFC = 0 as a proxy for these characteristics in regression models to estimate impacts of the experiments (see Exhibit B.7).

[c] An individual may qualify as a dislocated worker if they meet one of the following conditions: has lost job; has been laid off or received a layoff notice; is receiving unemployment benefits due to being laid off or losing a job and is unlikely to return to a previous occupation; is self-employed but unemployed because of economic conditions or a natural disaster; is the spouse of an active duty member of the Armed Forces and is unemployed or underemployed and is experiencing difficulty in obtaining or upgrading employment; or is a displaced homemaker (a person who previously provided unpaid services to the family, is no longer supported by the spouse, is unemployed or underemployed, and is having trouble finding or upgrading employment) (see https://studentaid.gov/2324/help/student-dislocated-worker).

[d] A student who is at risk of homelessness is an unaccompanied youth who is homeless or in danger of becoming homeless. Determinations are made on a case-by-case basis (see https://studentaid.gov/2425/help/unaccompanied-homeless).

[e] To be declared an independent, a student must meet at least one of the following criteria: 24 years of age or older, married, a graduate or professional student, a veteran or active duty member of the armed forces, an orphan or ward of the court, someone with legal dependents other than a spouse, an emancipated minor, or someone who is homeless or at risk of becoming homeless (https://www.thebalance.com/requirements-to-apply-as-a-fafsa-independent-student-4174305).

* Values differ significantly between the groups offered experimental Pell Grants and not offered experimental Pell Grant, 0.05 level, two-tailed test.

B.3   Measures and data sources used in the study

B.3.1   Outcome measures

As described in the research questions, the study initially examined whether expanding Pell Grant eligibility improved enrollment in and completion of any postsecondary programs in study schools as well as whether students offered experimental Pell Grants used them. A follow-up analysis examined whether the Pell Grant eligibility expansions improved employment and earnings. The primary outcomes used to answer these research questions are summarized in Exhibit B.5. Study schools provided the data on the primary enrollment and Pell Grant disbursement outcomes. The study used NDNH data to measure the primary employment and earnings outcomes.

Exhibit B.5. Primary outcomes

Outcome	Definition	Data source	Timing[a]	Response rate[b]
Research question 1: Did offering experimental Pell Grants increase enrollment in and completion of postsecondary programs in study schools?				
Enrolled in the study school	Whether the student was enrolled at a study school	School records	12 months after RA (Experiment 1) 8 months after RA (Experiment 2)	100%
Completed a program at the study school	Whether the student completed a program at a study school	School records	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%
Research question 2: What percentage of students who were offered experimental Pell Grants used them?				
Used experimental Pell Grant funds (descriptive)	Proportion of students offered experimental Pell Grants that were disbursed experimental Pell Grant funds	School records	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%
Experimental Pell Grant disbursement amount (descriptive)	Amount of experimental Pell Grants disbursed per student	School records	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%

Outcome	Definition	Data source	Timing[a]	Response rate[b]
Research question 3: Did offering experimental Pell Grants increase employment and earnings?				
Ever employed	Whether the individual was employed in any quarter for which labor market outcomes are measured (2020 Q3 through 2021 Q4)	NDNH	42 to 93 months after RA (Both experiments)	98%
Average quarterly earnings	Average quarterly wage earnings from employment across quarters for which labor market outcomes are measured (2020 Q3 through 2021 Q4)	NDNH	42 to 93 months after RA (Both experiments)	98%

[a] The follow-up periods for Experiments 1 and 2 in the analysis of program enrollment and completion are based on the period for which eligible students could use the experimental Pell Grant funds. Eligible occupational training programs for Experiment 1 could take up to one year to complete (or up to two years part-time). Eligible FSA-approved programs for Experiment 2 were two to four months (8-15 weeks) in duration. The follow-up periods for Experiments 1 and 2 in the analysis of employment and earnings vary across students. Students' employment and earnings were measured during the third quarter of 2020 through the fourth quarter of 2021. Because students were randomly assigned on a rolling basis from November 2012 to March 2017, the amount of time between when students were randomly assigned and when the study observed their labor market outcomes differed across students.

[b] Response rates are calculated among the 2,755 students eligible for the analysis, defined as those who (1) did not revoke consent, (2) were not determined by the schools to be ineligible for the study after random assignment, and (3) were not subject to a technical problem in the random assignment process.

FSA = Office of Federal Student Aid; NDNH = National Directory of New Hires; Q = quarter; RA = random assignment.

The study examined several exploratory outcomes to address the research questions (see Exhibit B.6). Because the exploratory research questions look beyond the study schools to understand the effects of offering experimental Pell Grants, some of these measures were created from multiple data sources, described in further detail below.

Exhibit B.6. Exploratory outcomes

Outcome	Definition	Data source	Timing[a]	Response rate[b]
Exploratory research question 1: Would the effects on enrollment and completion be different if the analysis were extended beyond the study schools or beyond the study's completion window?				
Enrolled in any school	Whether the student was enrolled at any school (including the study school)	School records, NSC	12 months after RA (Experiment 1) 8 months after RA (Experiment 2)	100%
Completed a program at any school	Whether the student completed a program at any school (including the study school)	School records, NSC	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%

Outcome	Definition	Data source	Timing[a]	Response rate[b]
Completed a program or still enrolled at the study school	Whether the student completed a program or was still enrolled at the study school	School records	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%
Completed a program or still enrolled at any school	Whether the student completed a program or was still enrolled at any school (including the study school)	School records, NSC	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%
Exploratory research question 2: Did offering experimental Pell Grants affect the types of programs that students enrolled in or completed?				
Enrolled in a high-demand program at the study school	Whether the student was enrolled in a program associated with a high-demand occupation in the state it was offered	School records, DOL	12 months after RA (Experiment 1) 8 months after RA (Experiment 2)	98%
Completed a high-demand program at the study school	Whether the student completed a program associated with a high-demand occupation in the state it was offered	School records, DOL	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	99%
Completed a certificate program at the study school	Whether the student completed a certificate program at the study school	School records	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	93%
Enrolled in a certificate program at any school[c]	Whether the student was enrolled in a certificate program at any school (including the study school)	School records, NSC	12 months after RA (Experiment 1) 8 months after RA (Experiment 2)	100%
Completed a certificate program at any school	Whether the student completed a certificate program at any school (including the study school)	School records, NSC	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%
Completed an associate's degree program at the study school	Whether the student completed an associate's degree program at the study school	School records	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	93%

Outcome	Definition	Data source	Timing[a]	Response rate[b]
Enrolled in an associate's degree program at any school[c]	Whether the student was enrolled in an associate's degree program at any school (including the study school)	School records, NSC	12 months after RA (Experiment 1) 8 months after RA (Experiment 2)	100%
Completed an associate's degree program at any school	Whether the student completed an associate's degree program at any school (including the study school)	School records, NSC	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%
Exploratory research question 3: Did offering experimental Pell Grants impact students' use of federal student loans?				
Federal student loan take-up	Whether the student took out federal student loans (that is, whether the student had a positive dollar amount of federal student loans disbursed)	FSA	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%
Federal student loans disbursed at any school (descriptive)	Amount of federal student loans disbursed per student	FSA	30 months after RA (Experiment 1) 10 months after RA (Experiment 2)	100%
Exploratory research question 4: Would the effects on employment and earnings be different if the analysis examined alternative measures of participation in the labor force?				
Duration of employment	Count of calendar quarters employed (2020 Q3 through 2021 Q4), where the maximum possible count is 6	NDNH	42 to 93 months after RA (Both experiments)	98%
Ever received unemployment insurance benefits	Whether the student received unemployment insurance benefits in any quarter for which labor market outcomes are measured (2020 Q3 through 2021 Q4)	NDNH	42 to 93 months after RA (Both experiments)	98%

Outcome	Definition	Data source	Timing[a]	Response rate[b]
Average quarterly unemployment insurance benefits amount	Average quarterly unemployment insurance benefits across quarters for which labor market outcomes are measured (2020 Q3 through 2021 Q4)	NDNH	42 to 93 months after RA (Both experiments)	98%
Duration of receiving unemployment insurance benefits	Count of calendar quarters with unemployment insurance benefits received (2020 Q3 through 2021 Q4) , where the maximum is 6	NDNH	42 to 93 months after RA (Both experiments)	98%
Exploratory research question 5: Would the effects on employment and earnings be different if the analysis examined employment and earnings in a labor market less affected by the COVID-19 pandemic?				
Ever employed in the fourth quarter of 2021	Whether the student was employed in 2021 Q4	NDNH	57 to 108 months after RA (Both experiments)	98%
Average quarterly earnings in the fourth quarter of 2021	Average quarterly wage for 2021 Q4	NDNH	57 to 108 months after RA (Both experiments)	98%

[a] The follow-up periods for Experiments 1 and 2 in the analysis of program enrollment and completion are based on the period for which eligible students could use the experimental Pell Grant funds. Eligible occupational training programs for Experiment 1 could take up to one year to complete (or up to two years part-time). Eligible FSA-approved programs for Experiment 2 were two to four months (8-15 weeks) in duration. The follow-up periods for Experiments 1 and 2 in the analysis of employment and earnings vary across students. Students' employment and earnings were measured during the third quarter of 2020 through the fourth quarter of 2021. Because students were randomly assigned on a rolling basis from November 2012 to March 2017, the amount of time between when students were randomly assigned and when the study observed their labor market outcomes differed across students.

[b] Missingness rates are calculated among the respective analytic samples. There are missing data on whether the program a student completed was in high demand; the study was unable to determine whether some programs were in high demand because of missing Classification of Industrial Program codes. There are also missing data on the type of degree or credential associated with programs enrolled in or completed at study schools–some schools did not provide this information for all students in the study sample.

[c] Because of a large amount of missing data in school records, the study is not able to examine impacts on enrollment in different credential or degree programs at study schools.

DOL = U.S. Department of Labor; FSA = Office of Federal Student Aid; NDNH = National Directory of New Hires; NSC = National Student Clearinghouse; RA = random assignment.

Two of the exploratory outcomes–enrollment in and completion of a high-demand program in a study school–required several steps to create. To determine whether a program was in a high-demand occupation in its state, the study adapted criteria established by the U.S. Department of Labor's Occupational Information Network (O*NET) for "Bright Outlook" occupations that were expected to grow rapidly or have large numbers of job openings between 2014 and 2016, midway through the study period when schools were offering experimental Pell Grants.[18] High-demand occupations needed to meet at least one of the following three criteria:

1. *Projected to grow rapidly.* These occupations were projected to grow much faster than average (employment increase greater than one standard deviation from the mean growth rate in that state) over the period 2014-2016.

2. *Projected to have large numbers of openings.* These occupations were projected to have a high number of openings relative to other occupations in that state (occupations with an average annual number of openings that is greater than one standard deviation from the mean of average annual openings for all occupations in that state).

3. *New and emerging occupations.* New workforce requirements, including changes in technology, society, law, or business practices, constantly lead to new and emerging occupations in the United States. Such occupations were identified within high-growth industries, as described in the *New and Emerging (N&E) Occupations Methodology Development Report*.[19]

The process for determining whether a program was associated with a high-demand occupation involved three steps:

1. The study associated programs with specific occupations using crosswalks from the Department's National Center for Education Statistics.[20]

2. The study obtained labor market information on those occupations in the state where the associated program was offered from the Projections Central State Occupational Projections database.[21,22]

3. Labor market information for each occupation was analyzed against O*NET Bright Occupations criteria. For a given program, if the associated occupations met any of the three criteria within the state where the program was located, then the program was determined to be in a high-demand occupation.

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[18] See https://www.onetonline.org/find/bright.

[19] https://www.onetcenter.org/reports/NewEmerging.html.

[20] https://nces.ed.gov/ipeds/cipcode/resources.aspx?y=55.

[21] http://www.projectionscentral.com/Projections/ShortTerm.

[22] There were no data for Washington for this period, so the study obtained those data directly from the state of Washington.

The programs associated with a high-demand occupation can change over time in response to different labor market conditions, so that a program that was in high demand when a student was first offered experimental Pell may not still be in high demand when the study measured employment and earnings years later. Thus, the study also identified whether a program was associated with a high-demand occupation in its state between 2020 and 2022 using the same (O*NET) for "Bright Outlook" occupations criteria to align more closely to when employment and earnings were measured and better reflect employer demand during the follow-up period for these outcomes.

B.3.2   Background characteristics

In addition to measuring the primary and exploratory outcomes, the study examined background characteristics of students to understand and account for any differences between students offered experimental Pell Grants and those who did not receive the offer. The study also sought to understand the characteristics of the students who used the experimental Pell Grant funds they were offered. The student characteristics included in the analysis to estimate impacts are summarized in Exhibit B.7.

Exhibit B.7. Background characteristics included in the analysis

Student characteristic	Definition	Data source	Rationale	Response rate[a]
Age	Students' age at time of random assignment (calculated as date of assignment minus date of birth/365.25)	RAS	Increased access to financial aid has had a significant effect on the enrollment of older, nontraditional students[b]	100%
Gender	Binary variable with 1 indicating the participant is female and 0 indicating male	FSA, school records	Although the majority of postsecondary students are female, enrollment of both males and females has dropped in recent years, with a slightly larger drop for female students[c]	99%
High school diploma or equivalent	Binary variable with 1 indicating the participant holds a high school diploma or GED/state certificate at the time of FAFSA completion and 0 indicating the participant does not	FSA, school records	Research shows a relationship between completing high school and postsecondary enrollment and completion[d]	98%
Prior postsecondary experience (Experiment 2 only)	Binary variable with 1 indicating that the study participant had some college experience prior to participating in the experiment	FSA, school records	Only applies to Experiment 2 because all Experiment 1 participants already had a bachelor's degree	98%

Student characteristic	Definition	Data source	Rationale	Response rate[a]
Expected family contribution (EFC)[e]	Continuous variable denoting the student's or the student's family's ability to pay the cost of school attendance	FSA	To encompass income, assets, benefits, and family size, which affect students' need for financial aid	89%
Indicator for EFC = 0	Indicator equals 1 if EFC = 0, 0 if EFC > 0	FSA	To capture nonlinearities at EFC = 0 (because students with an EFC = 0 may respond differently to the offer of experimental Pell Grants)	89%
Dislocated worker[f]	Binary variable with 1 indicating the participant is a dislocated worker and 0 indicating the participant is not a dislocated worker	FSA	To capture employment status of study participants	89%

[a] There are no missing data for age; the RAS contains the date of birth for each student in the study sample. The study obtained data on gender, high school diploma or equivalent, and prior postsecondary experience from FSA and school records. For students who were missing information from FSA on these variables, the study used school records. The study obtained information on expected family contribution and dislocated worker status from FSA. FSA records were available for 89 percent of the study sample.

[b] Seftor & Turner (2002).

[c] See https://nces.ed.gov/fastfacts/display.asp?id=98.

[d] See, for example, Engberg, & Wolniak (2010).

[e] The EFC, a measure of a family's financial strength, is an index score calculated based on taxed and untaxed income, assets, and benefits (see https://studentaid.gov/help-center/answers/article/what-is-efc).

[f] An individual may qualify as a dislocated worker if they meet one of the following conditions: has lost a job; has been laid off or received a layoff notice; is receiving unemployment benefits due to being laid off or losing a job and is unlikely to return to a previous occupation; is self-employed but unemployed because of economic conditions or a natural disaster; is the spouse of an active duty member of the Armed Forces and is unemployed or underemployed and is experiencing difficulty in obtaining or upgrading employment; or is a displaced homemaker (a person who previously provided unpaid services to the family, is no longer supported by the spouse, is unemployed or underemployed, and is having trouble finding or upgrading employment) (see https://studentaid.gov/2324/help/student-dislocated-worker).

FAFSA = Free Application for Federal Student Aid; FSA = Office of Federal Student Aid; GED = General Equivalency Diploma; RAS = random assignment system.

B.3.3   Data sources

The study obtained data from the RAS used for the lottery, student records from study schools, data from FSA and other sources to create the variables and outcome measures used in analyses (Exhibit B.8). To reduce the burden on study schools, the study asked that they provide a limited number of data items in the RAS and either extract student records in whatever format available or provide student data in an Excel spreadsheet with prespecified fields. Data entered into the RAS primarily served to identify the study participants and keep track of which experiment and group they were assigned to; schools also entered students' dates of birth into the RAS. Study schools then provided records on students' program enrollment, completion, and experimental Pell Grant receipt as well as

information on students' high school graduation status and prior postsecondary experience. FSA provided data from students' Free Applications for Federal Student Aid on high school graduation status, prior postsecondary experience, expected family contribution, and dislocated worker status. FSA also provided information on federal student aid received. Data from the National Student Clearinghouse were used to explore enrollment and completion outside of the study schools.[23] The characteristics of schools and programs in the study came from the Integrated Postsecondary Education Data System and the Department of Labor.

Finally, data from the NDNH database provided quarterly information on employment, earnings, and unemployment insurance benefits used in the follow-up analysis. The study measured students' labor market outcomes in each of the six quarters from the third quarter of 2020 through the fourth quarter of 2021.[24] Students who could be matched (that is, those with valid identifying information) but do not

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[23] National Student Clearinghouse (NSC) aims to obtain data from all U.S. postsecondary schools and, in practice, receives these data from most. As of 2017, the schools that reported data to the NSC enrolled approximately 97 percent of all U.S. postsecondary students and 100 percent of the students in public two-year schools (which represent almost three-fourths of the schools in the study). However, some schools do not provide data to NSC. Private for-profit schools in particular are less likely to report to NSC (approximately 25 percent of students enrolled in these types of two-year schools are reported to NSC), and several of the study schools fall into this category as well. Overall, study schools associated with approximately 70 percent of the study sample reported to NSC. Thus, the study only used NSC data to supplement school records and explore enrollment and completion in any postsecondary institution. Their enrollment and completion statuses were defined as whether the student was enrolled or completed a program either according to school records or NSC records.

[24] The NDNH database is a national database of wage and employment information that is maintained by OCSE within the U.S. Department of Health and Human Services. OCSE does not retain records in the NDNH database in perpetuity. The law requires the deletion of all NDNH data from the database 24 months after the date of receipt. This requirement means that data can be requested for the most recent 24-month snapshot of the NDNH data as of the date of the data request. The study requested a snapshot of data on April 12, 2022. Based on the date of the request, the snapshot covered the period from April 12, 2020, through April 12, 2022. The second quarter of 2020 was excluded from the analysis because some records received in early April 2020 had already been deleted from the database at the time of the data request. In addition, the first and second quarters of 2022 were excluded from the analysis because employers have four months from the end of the quarter to report employee information for that quarter, so data from these quarters may not have been complete at the time when the snapshot was received. For these reasons, the analysis focused only on quarters that were expected to have complete information, which corresponded to the third quarter of 2020 to the fourth quarter of 2021.

appear in the NDNH data in a given calendar quarter are assumed to not be employed and to have received zero earnings and unemployment insurance benefits for that quarter.[25,26]

Exhibit B.8. Data sources

Source	Data item	When data obtained	Use in study
Random assignment system	• Experiment type (Experiment 1 or Experiment 2) • Random assignment status (offered or not offered an experimental Pell Grant) • Program of interest • Social Security number • Date of birth	Fall 2012–spring 2017	• Define the study sample • Facilitate obtaining sociodemographic information and college enrollment and financial aid data for study participants from other sources • Create covariate (age) for the analysis • Define subgroup (younger or age 25 or older)

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[25] As noted earlier, in some cases OCSE determined there was an error validating the combination of the student's name and SSN, and thus the student could not be matched to the data. Across both experiments, 63 students were excluded from these analyses because of an error in matching them to the NDNH database.

[26] Some individuals who do not appear in the NDNH may not be in the labor force (that is, they are neither employed nor unemployed because they are not looking for work). Further, because of limitations in the NDNH data, it is possible some students may have been misclassified as not being employed and having zero earnings from employment. The NDNH database covers most wage and salary employment but does not cover all types of jobs and industries. Specifically, NDNH data do not cover self-employed workers, railroad employees, workers in service for relatives, most agricultural laborers, some domestic service workers, and part-time employees of nonprofit organizations (U.S. Departments of Labor, Commerce, Education, and Health and Human Services, 2014). In the past, these sectors have made up about 10 percent of U.S. employment (Hotz & Scholz, 2002; Kornfeld & Bloom, 1999). NDNH data also exclude workers whose employers do not report their earnings to their unemployment insurance agency, even in the formal sector, because of the prevalence of flexible staffing arrangements or illegally neglecting to report (Abraham et al., 2018; Blakemore et al., 1996; Hotz & Scholz, 2002; Katz & Krueger, 2016, 2019). However, the formal, non-casual jobs captured in the NDNH data are arguably the types of jobs training programs intend to help students obtain.

Source	Data item	When data obtained	Use in study
Study schools' student records	- Program enrollment and exit dates - Program of study - Program completion - Credential attainment - Experimental Pell Grant receipt - Gender - High school completion status - Prior postsecondary experience	Winter 2015- summer 2018	- Measure academic outcomes for study participants at study schools - Measure receipt of experimental Pell Grants - Create covariates for the analysis - Define subgroups - Describe programs attended
Federal Student Aid databases	- High school completion status - Prior postsecondary experience - Expected family contribution - Dislocated worker status - Marital status - Veteran status - At risk of homelessness status - Federal financial aid receipt	Winter 2020	- Measure financial aid outcomes for study participants - Create covariates for the analysis - Define subgroups - Describe other background characteristics for the study sample
National Student Clearinghouse	- Program enrollment at any school - Program completion at any school - Credential attainment at any school	Spring 2018	Measure postsecondary outcomes at schools participants may have attended (in addition to study schools)
Integrated Postsecondary Education Data System	- Type of school (public, private, for-profit, not-for-profit) - Size of school - Graduation rate - Number/percentage of students receiving financial aid - Student age - Student gender	Spring 2018	Compare the characteristics of study schools to those of postsecondary schools more broadly

Source	Data item	When data obtained	Use in study
Department of Labor databases	• High-growth occupations • Industries in high demand	Spring 2018	• Assess the extent to which the approved programs and programs in which eligible students expressed interest were in high-demand occupations within their respective states
National Directory of New Hires	• Quarterly employment status • Quarterly wage earnings • Quarterly unemployment insurance benefits	Spring 2023	• Measure labor market outcomes for study participants

B.3.4   Minimum detectable effects

Studies vary in how reliably they can measure effects of different sizes. Like political polls, studies with larger samples–here, number of eligible students interested in experimental Pell Grants in the analytic sample–are better able to measure smaller differences with certainty than are studies with smaller samples. The minimum detectable effect, or MDE, can be calculated for each outcome to identify the smallest "true" effect the study could reliably detect given its sample size and design. These calculations suggest that the study could reliably detect moderate to large effects of the offer of experimental Pell Grants on enrollment, completion, employment, and earnings but not reliably detect small effects (see Exhibit B.9).[27] For example, for Experiment 1, the minimum detectable effect is 10.7 percentage points for enrollment, 10.3 percentage points for completion, 9.3 percentage points for employment, and $2,497 for quarterly earnings. Because the sample for Experiment 2 is larger, the minimum detectable effects are smaller: 5 percentage points for enrollment, 5.1 percentage points for completion, 4.8 percentage points for employment, and $696 for earnings.

Exhibit B.9. Minimum detectable effects for primary outcomes, by experiment

	Experiment 1		Experiment 2	
Outcomes	*N*	**MDE**	*N*	**MDE**
Enrollment in a study school	414	10.3	2,270	5.0
Completion of a program at a study school	414	10.3	2,270	5.1
Ever employed	406	9.3	2,215	4.8

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[27] We define impacts smaller than 0.05 standard deviations as small, impacts between 0.05 to 0.20 as moderate, and impacts above 0.2 as large based on the effects of prior education interventions synthesized in Kraft (2020).

	Experiment 1		Experiment 2	
Outcomes	*N*	**MDE**	*N*	**MDE**
Average quarterly earnings ($)	406	$2,427	2,215	$696

Note: These calculations were based on the actual sample sizes and data collected for the study. In calculating MDEs, the study used an 80 percent power level and a 5 percent level of statistical significance.

Source: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid, National Directory of New Hires.

MDE = minimum detectable effect.

B.4 Analytic approach

B.4.1 Examining the effects of the experiments

To examine the effect of each experiment to Pell Grant eligibility–allowing students with a bachelor's degree to receive experimental Pell Grant funds in Experiment 1 and allowing students who enrolled in very short-term occupational training programs to receive experimental Pell Grant funds in Experiment 2–the study estimated the effects separately for each experiment using the following ordinary least squares regression model:

(1) $Y_{is} = \beta T_i + X_i'\gamma + \alpha_s + \delta_p + \varepsilon_{is},$

where the terms are as follows:

- Y_{is} is the outcome of individual *i* in school *s* (that is, the school in which random assignment occurred).

- T_i is a treatment indicator that equals 1 if the participant was randomly assigned to receive an offer of experimental Pell Grant funds and 0 otherwise.

- X_i is a vector of baseline individual characteristics (Exhibit B.7).

- α_s is a vector of fixed effects for each school and δ_p is a vector of fixed effects for each program group, based on the program in which study participants expressed interest at the time of random assignment (each program group within a school is a separate stratum).[28]

- ε_{is} is an individual-level random error term.

- β and γ are vectors of parameters to be estimated.

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[28] Program groups were based on Standard Occupational Classification (SOC) codes. In some cases, multiple SOC codes were grouped together to reflect similar types of programs. Some participating schools (19 out of 46) offer only one program. For these schools, the school-level control variables are collinear with the program group indicators.

The model above was used to estimate the effects of offering experimental Pell Grants on each primary and exploratory outcome among the analytic samples described in Section B.2.[29] Because the model estimates the effect of the offer (rather than the actual use) of experimental Pell Grants, the results are intent-to-treat impacts. Understanding the effects of making Pell Grants available was the most policy relevant question for this study because it would provide evidence on what might happen if the eligibility waivers tested in the study were made official policy.

The model included the student characteristics listed in Exhibit B.7, measured at or before the time of random assignment, as covariates to control for potential differences between those offered and those not offered experimental Pell Grants that could influence outcomes. For example, as shown in Exhibit B.4, these groups in Experiment 2 were significantly different in terms of the percentage of female students. Including student characteristics associated with the outcomes can also improve the precision of the estimated effects.[30]

B.4.2   Examining the effects of the experiments for subgroups

For each experiment, the study investigated the effect of offering experimental Pell Grants on the four primary outcomes within subgroups defined by student, program, and local characteristics. The study sought to better understand how different types of students might respond if the eligibility waivers tested in the experiments were made official policy. Exhibit B.10 defines and provides the rationale for examining each subgroup.

Exhibit B.10. Subgroups examined

Subgroup	Rationale
Gender (male/female)	Although the majority of postsecondary students are female, enrollment of both males and females has dropped in recent years, with a slightly larger drop for female students.[a]
Age (younger than age 25/age 25 or older)	Increased access to financial aid has had a significant effect on the enrollment of older, nontraditional students.[b]
Expected family contribution (EFC = 0, EFC > 0)[c]	Individuals with very high financial needs may respond differently to having access to an experimental Pell Grant.

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[29] A multiple-comparisons adjustment was not made to the significance of the estimates because the What Works Clearinghouse standards assign each of the four primary outcomes–program enrollment, program completion, employment, and earnings–to a different outcome domain. The experimental Pell Grants could have affected program enrollment without affecting program completion. Similarly, the grant could have affected employment without having affected earnings.

[30] The study did not account for students' baseline employment and earnings before random assignment because these earlier data were not available in the NDNH database at the time of data collection.

Subgroup	Rationale
Dislocated worker/not a dislocated worker[d]	Individuals who have been dislocated from their previous employment may respond differently to having access to an experimental Pell grant.
Enrolled in study school prior to random assignment/not enrolled in study school prior to random assignment	Some study participants were already enrolled in a program at the time of random assignment, so the study examined whether these students might respond differently to having access to an experimental Pell Grant.
In a high-demand occupation/not in a high-demand occupation[e]	Occupational programs eligible for experimental Pell Grant funds were intended to meet local or regional workforce needs. Therefore, the study examined whether effects differed for students who expressed interest in a high-demand program at the time of random assignment. Because the occupations the study identified as high demand at the time of random assignment might differ between then and the time when employment and earnings were measured, the study also examined whether employment and earnings effects differed for students who expressed interest in a program associated with a high-demand occupation at the time when labor market outcomes were measured.
Annual unemployment rate (county rate above/below national average)	Because enrollment in community colleges has responded to local economic conditions such as unemployment rates,[f] the study examined whether effects differ based on the unemployment rate in the county in which the study school was located.

[a] See https://nces.ed.gov/fastfacts/display.asp?id=98.

[b] Seftor & Turner (2002).

[c] The expected family contribution, a measure of a family's financial strength, is calculated based on taxed and untaxed income, assets, and benefits (see https://studentaid.gov/help-center/answers/article/what-is-efc).

[d] An individual may qualify as a dislocated worker if they meet one of the following conditions: has lost job; has been laid off or received a layoff notice; is receiving unemployment benefits due to being laid off or losing a job and is unlikely to return to a previous occupation; is self-employed but unemployed because of economic conditions or a natural disaster; is the spouse of an active duty member of the Armed Forces and is unemployed or underemployed and is experiencing difficulty in obtaining or upgrading employment; or is a displaced homemaker (a person who previously provided unpaid services to the family, is no longer supported by the spouse, is unemployed or underemployed, and is having trouble finding or upgrading employment) (see https://studentaid.gov/2324/help/student-dislocated-worker).

[e] Section B.3 describes how the study determined whether an occupation was in high demand.

[f] Hillman & Orians (2013).

For each subgroup of interest, the study estimated the effects of offering experimental Pell Grants under each of the two experiments using the following regression model, which adds an interaction term to the benchmark model in Equation (1):

$$(2) \qquad Y_{is} = \beta_1 T_i + \beta_2 \left(T_i * W_{ips} \right) + X_i' \gamma + \alpha_s + \delta_p + \varepsilon_{is}.$$

Here, W represents the relevant subgroup variable (for example, an indicator for whether the participant is female). All subgroup variables of interest are included in the vector of baseline

individual characteristics X , and therefore Equation (2) also estimates the main effect of W . When W is a binary indicator, the coefficient on the interaction term β_2 represents how the impact for members of that subgroup differs from the impact for others, captured by β_1. Thus, the impact for the subgroup is equal to $\beta_1 + \beta_2$. All other terms are as defined in Equation (1).

B.4.3　Examining student characteristics correlated with use of experimental Pell Grants

To understand whether certain types of students who were offered experimental Pell Grants were more likely to go on to take up the offer–for example, whether these students were more likely to be female, dislocated workers, and so on–the study conducted a supplemental regression analysis comparing the key student characteristics described in Exhibit B.7 between students who received experimental Pell Grant funds and those who did not. First, the study created an indicator to denote whether a student received a positive dollar amount of experimental Pell Grant funds. The study then regressed this indicator on the vector of baseline individual characteristics X_i , as defined in Equations (1) and (2), and examined the coefficient on each characteristic variable, given by the vector γ as defined in Equations (1) and (2).

B.4.4　Assessing the follow-up period for employment and earnings

Although students were randomly assigned to receive an experimental Pell Grant offer (or not) on a rolling basis, the study measured labor market outcomes at the same time for all students: the third quarter of 2020 through the fourth quarter of 2021. As a result, the employment and earnings follow-up period, or the length of time between random assignment and when the study measured labor market outcomes, varies across students. For Experiments 1 and 2, the average length of this follow-up period was similar between students offered an experimental Pell Grant and students not offered an experimental Pell Grant.[31] Employment and earnings were measured far enough out from the time of random assignment that a small difference in the lengths of the follow-up period would likely have a minimal effect on the results of the analysis.

B.4.5　Treatment of missing data

The study sought to match all students to outcome data. Students who were not found in schools' enrollment and completion records were assumed to not have enrolled or completed a program. Similarly, if FSA records showed that a student who was offered an experimental Pell Grant had no

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[31] For Experiment 1, the average length of this follow-up period was 69 months for students offered an experimental Pell Grant and 66 months for students who were not offered an experimental Pell Grant, although the difference between the two groups was not statistically significant. For Experiment 2, the average length of the follow-up period was 69 months for both students offered and not offered an experimental Pell Grant.

disbursement amount, that student received a value of 0 for the Pell Grant disbursement amount variable, and the student was assumed not to have used experimental Pell Grant funds. For the employment and earnings outcomes, if a student did not appear in the NDNH database and no error occurred in the process of matching them to the database, the student was assumed to not be employed and to have no earnings during the quarter covered by the data. As mentioned earlier, students who could not be matched to the NDNH database (that is, those with invalid identifying information) were not included in analyses.

Students with missing covariate data were included in the analyses. For each missing covariate, analyses replaced missing values with a placeholder value (0) and included an indicator for whether the student originally had a missing value for that covariate in the regression model. Simulations suggest that this approach leads to limited bias under the conditions that are likely to apply in this study.[32] Appendix D describes the results of a sensitivity analysis that used casewise deletion to account for missing covariate data.

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[32] Puma et al. (2009).

APPENDIX C. SUPPORTING DETAILS FOR KEY FINDINGS

Appendix B described *how* study analyses were conducted, but this appendix provides additional information on the results of the analyses. It first presents details supporting the main and exploratory findings shown in the report, including the effects of the experiments on key subgroups of students and schools. The appendix then describes the different types of programs that students in each experiment expressed interested in, enrolled in, and completed. In this way, the appendix expands descriptions noted only briefly in the body of the report.

C.1　Additional information supporting estimates of the experiments' effects

As described in the report, the study found large positive and statistically significant impacts on enrollment and completion at study schools for both experimental expansions to Pell Grant eligibility. The study found that despite the boost to program enrollment and completion, neither of the experimental expansions to Pell Grant eligibility increased employment or earnings in the medium to long term. To help readers better understand the results for each experiment, this section presents the findings for exploratory outcomes (see Exhibit B.6 in Appendix B).

The exploratory analyses for Experiment 1, summarized in Exhibit C.1, suggest the following:

- *The findings were consistent when examining enrollment and completion at any school or examining continued enrollment, in addition to completion.* Because students not offered experimental Pell Grants at the study schools might be more likely than those offered grants to participate in occupational programs elsewhere, it was important to examine impacts on enrollment in and completion of a program *at any school*. The impacts on these outcomes were very similar in both magnitude and statistical significance to the impacts on enrollment and completion measured at study schools. Students not offered experimental Pell Grant funds may also have opted for more traditional programs, which typically take longer to complete than the study's data collection period was able to capture. To address this, the study explored the impacts on whether students completed *or were still enrolled* at the end of the study's follow-up window; this impact was also similar to the primary completion impact reported previously. Together these results suggest that compared to students offered experimental Pell Grants, those not offered grants did not choose to pursue longer programs or programs at other schools at rates high enough to affect the study's main findings.

- *Offering experimental Pell Grants led to higher rates of completion of high-demand programs and programs yielding certificates.* Students who were offered experimental Pell Grants were about 11 percentage points more likely to complete a high-demand program at study schools, compared with students not offered experimental Pell Grant funds. Moreover, students who were offered experimental Pell Grants were 19 percentage points more likely to complete a certificate program at study schools or at any school. Few students completed associate's degree programs at study schools or any school; however, the percentage of students offered experimental Pell Grants who completed an associate's degree program at any school was slightly lower than the percentage of

students not offered experimental Pell Grants who completed such a program. Because this difference is small and not statistically significant at the conventional 5 percent level, this finding does not provide convincing evidence that the offer of experimental Pell Grant funds reduced the rate of associate's degree completion.

- *Offering experimental Pell Grants had no impact on students' use of federal student loans.* The share of students who were offered experimental Pell Grant funds and used federal student loans was similar to the share of students not offered experimental Pell Grant funds who used federal loans. The federal student loan amounts disbursed during the study period were also similar between these two groups.

- *Offering experimental Pell Grants did not affect how long individuals were employed nor whether they received unemployment insurance benefits.* Being offered an experimental Pell Grant could have led students to have longer spells of employment without affecting the likelihood that they were employed at all during the period when the study measured labor market outcomes. However, like the findings on employment status and earnings, being offered an experimental Pell Grant did not increase the average duration of employment. Because unemployment insurance typically considers prior earnings and there is a delay between filing and receiving unemployment insurance benefits, examining unemployment insurance benefits could help capture students' earnings during earlier periods of employment before the pandemic-induced recession (and before the study was able to measure employment and earnings using the NDNH). Despite this possibility, the study found no evidence that being offered an experimental Pell Grant reduced the likelihood of receiving unemployment insurance benefits, the average quarterly amount of benefits received, or the duration of receiving these benefits.

- *Offering experimental Pell Grants did not affect whether individuals were employed nor their earnings, even as unemployment rates recovered to pre-pandemic levels.* The study measured employment and earnings from the third quarter of 2020 through the fourth quarter of 2021, a period that overlapped with the pandemic-induced recession and resultant high unemployment. To explore whether offering experimental Pell grants may have improved labor market outcomes during a more typical job market, the study examined employment and earnings in the fourth quarter of 2021, when unemployment had mostly declined to its pre-pandemic level. The study found that individuals offered experimental Pell Grants fared no better than individuals not offered the grants in their employment and earnings outcomes in the fourth quarter of 2021.[33]

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[33] There is a notable decline in reported employment and earnings levels in the fourth quarter of 2021 relative to other quarters in the analysis (see Appendix D, Exhibits D.4 and D.5). This decline reflects the fact that many employers did not report employment data until near the end of the reporting deadline for the fourth quarter of 2021, and therefore the study was not able to obtain complete data for this quarter. Nevertheless, among those employed, there is no reason to expect that the offer of an experimental Pell Grant would influence the timing of employers reporting to the NDNH database and therefore affect the results. Further, the study also found no evidence that offering experimental Pell Grants affected employment and earnings in the third quarter of 2021, the preceding quarter with full employment data from employers.

Exhibit C.1. Primary and exploratory impact estimates for Experiment 1

Outcome (percentages unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	Standard error	*p*-value
	Mean	*N*	Mean	*N*			
Primary							
Enrolled in the study school	77.9	254	51.9	160	26.0	4.0	0.000
Completed a program at the study school	52.4	254	35.6	160	16.7	4.3	0.000
Ever employed	80.6	250	83.0	156	-2.4	3.8	0.527
Average quarterly earnings ($)	8,956	250	10,097	156	-1,141	977	0.244
Exploratory research question 1: Would impacts on enrollment and completion be different if the analysis were extended beyond the study schools offering experimental Pell Grant funds or beyond the study's completion window?							
Enrolled in any school	82.7	254	63.1	160	19.6	3.9	0.000
Completed a program at any school	54.2	254	39.4	160	14.9	4.5	0.001
Completed a program or still enrolled at the study school	54.7	254	38.8	160	15.9	4.3	0.000
Completed a program or still enrolled at any school	64.2	254	48.1	160	16.1	4.5	0.000
Exploratory research question 2: Did offering experimental Pell Grants affect the types of programs students enrolled in or completed?							
Enrolled in a high-demand program at the study school	57.0	229	38.2	144	18.8	4.2	0.000
Completed a high-demand program at the study school[a]	40.1	248	29.5	156	10.6	3.9	0.006
Completed a certificate program at the study school	37.2	254	18.1	160	19.1	4.0	0.000
Enrolled in a certificate program at any school	48.1	254	31.3	160	16.8	4.1	0.000
Completed a certificate program at any school	39.1	254	20.0	160	19.1	4.2	0.000
Completed an associate's degree program at the study school	D	254	2.5	160	D	1.2	0.199
Enrolled in an associate's degree program at any school	4.8	254	5.6	160	-0.9	2.3	0.699
Completed an associate's degree program at any school	3.3	254	6.3	160	-3.0	1.7	0.089

Outcome (percentages unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	Standard error	*p*-value
	Mean	*N*	Mean	*N*			
Exploratory research question 3: Did offering experimental Pell Grants impact students' use of federal student loans?							
Federal student loan use	33.2	254	36.9	160	-3.7	4.3	0.390
Federal student loans disbursed at any school ($)[b]	4,689	254	4,214	160	475	1,193	0.691
Exploratory research question 4: Did offering experimental Pell Grants affect not just whether individuals are employed or their earnings but the duration of their employment and their reliance on unemployment insurance benefits?							
Duration of employment (quarters)	3.9	250	4.0	156	-0.1	0.2	0.762
Ever received unemployment insurance benefits	20.3	250	21.0	156	-0.7	4.1	0.868
Average quarterly unemployment insurance benefits amount ($)	310	250	221	156	89	82	0.277
Duration of receiving unemployment insurance benefits (quarters)	0.6	250	0.5	156	0.1	0.1	0.515
Exploratory research question 5: Would the effects on employment and earnings be different if the analysis examined employment and earnings in a labor market less affected by the COVID-19 pandemic?							
Ever employed in quarter 4 of 2021	36.4	250	34.6	156	1.8	0.039	0.656
Average earnings in quarter 4 of 2021 ($)	5,884	250	5,474	156	410	852	0.631

Notes: Impact estimates were calculated using the approach described in Section B.4 of Appendix B. Exhibit B.6 provides details on the outcomes reported in this exhibit. Column 6 in this exhibit contains impact estimates that are regression adjusted for student socioeconomic characteristics measured before random assignment, as described in Appendix B. The "Offered experimental Pell Grant" group mean (column 2) equals the sum of the unadjusted control group mean (column 4) and the regression-adjusted impact estimate (column 6). Column 3 contains the number of students in the "Offered experimental Pell Grant" group who were included in the analysis, and column 5 contains the number of students in the "Not offered experimental Pell Grant" group. Column 7 reports the standard error of the impact in column 6, and column 8 reports the probability that the impact in column 6 could have been observed by chance, with small p-values indicating a low likelihood that the impact is due to chance and not to the offer of experimental Pell Grant funds. Percentages may not add up to 100 because of rounding. All employment, earnings, and unemployment insurance benefits outcomes were measured from the third quarter of 2020 through the fourth quarter of 2021. As such, measures of duration will have a maximum value of six quarters. D is used to denote suppressed cells.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid, National Student Clearinghouse, National Directory of New Hires.

[a] To determine whether a program was in a high-demand occupation in its state, the study adapted criteria established by the U.S. Department of Labor's Occupational Information Network (O*NET) for "Bright Outlook" occupations that were expected to grow rapidly or have large numbers of job openings between 2014 and 2016, midway through the study period. Additional details on how the study determined whether a program was in high demand are in Section B.3 of Appendix B.

[b] The federal student loan disbursement amounts reported in this table are averages taken over students who did and did not take out student loans (that is, the averages include zeroes). Among the subset of students with positive federal student loan disbursement amounts, the average amount disbursed was $12,335 for Experiment 1 overall: $12,950 for those offered experimental Pell Grant funds, and $11,429 for those not offered experimental Pell Grant funds.

Exploratory findings for Experiment 2 largely mirrored those for Experiment 1. For Experiment 2, Exhibit C.2 suggests the following:

- *The findings were consistent when examining enrollment and completion at any school or examining continued enrollment, in addition to completion.* As with Experiment 1, impacts on enrollment in and completion of a program *at any school* were examined because students not offered experimental Pell Grants might have been more likely than those offered grants at the study schools to participate in occupational programs elsewhere. The impacts on these outcomes were very similar to the impacts on enrollment and completion measured at study schools. These results suggest that compared to students offered experimental Pell Grants, those not offered grants did not choose to pursue programs at other schools at rates high enough to affect the study's main findings. Students not offered experimental Pell Grant funds may also have opted for traditional programs already eligible for Pell grants, which typically take longer to complete than the study's data collection period was able to capture. To address this, the study explored the impacts on whether students completed *or were still enrolled* at the end of the study's follow-up window; this impact was also similar to the primary completion impact. Together, these findings suggest that compared to students offered experimental Pell Grants, those not offered the grants did not pursue longer programs or programs at other schools at rates high enough to affect the study's main findings.

- *Offering experimental Pell Grants led to higher rates of completion of FSA-approved and high-demand programs as well as programs yielding certificates.* Students who were offered experimental Pell Grants were far more likely than those not offered the grants to complete an FSA-approved program at study schools, with an impact of almost 40 percentage points. In addition, students offered experimental Pell Grants were about 8 percentage points more likely to complete a high-demand program at study schools and about 6 percentage points more likely to complete a certificate program. As with Experiment 1, though few students completed associate's degree programs overall, the percentage of students offered experimental Pell Grants who completed an associate's degree program at any school was slightly lower than the percentage of students not offered experimental Pell who completed such a program. Because this difference is small and not statistically significant at the conventional 5 percent level, this finding does not provide convincing evidence that the offer of experimental Pell Grant funds reduced the rate of associate degree completion.

- *Offering experimental Pell Grants had no impact on students' use of federal student loans.* As with Experiment 1, the share of students offered experimental Pell Grant funds who used federal student loans was similar to the share of students not offered experimental Pell Grant funds who used federal loans. The federal student loan amounts disbursed during the study period were also similar between these two groups.

- *Offering experimental Pell Grants did not affect how long individuals were employed nor whether they received unemployment insurance benefits.* Similar to the findings on employment and earnings, being offered an experimental Pell Grant did not increase the average duration of employment for students. The study also found no evidence that the experimental Pell Grants reduced the likelihood of receiving unemployment insurance benefits, the average quarterly amount of benefits received, or the duration of receiving these benefits.

- *Offering experimental Pell Grants did not affect whether individuals were employed nor their earnings even as unemployment rates recovered to pre-pandemic levels.* Individuals offered experimental Pell Grants fared no better than individuals not offered the grants in their employment and earnings outcomes in the fourth quarter of 2021, when unemployment had mostly declined to its pre-pandemic level. [34]

Exhibit C.2. Primary and exploratory impact estimates for Experiment 2

Outcome (percentage unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	Standard error	*p*-value
	Mean	N	Mean	N			
Primary							
Enrolled in the study school	66.4	1,363	51.8	907	14.6	1.8	0.000
Completed a program at the study school	47.0	1,363	37.7	907	9.3	1.9	0.000
Ever employed	77.6	1,335	79.0	880	-1.4	1.8	0.424
Average quarterly earnings ($)	5,993	1,335	6,276	880	-283	251	0.260
Exploratory research question 1: Would impacts on enrollment and completion be different if the analysis were extended beyond the study schools offering experimental Pell Grant funds or beyond the study's completion window?							
Enrolled in any school	78.2	1,363	64.2	907	14.1	1.8	0.000
Completed a program at any school	64.3	1,363	54.9	907	9.4	2.0	0.000
Completed a program or still enrolled at the study school	54.6	1,363	44.5	907	10.1	1.9	0.000
Completed a program or still enrolled at any school	66.3	1,363	57.1	907	9.2	2.0	0.000
Exploratory research question 2: Did offering experimental Pell Grants affect the types of programs students enrolled in or completed?							
Enrolled in a high-demand program at the study school	59.9	1,363	9.7	907	50.2	1.6	0.000

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[34] As noted under Experiment 1, there is a notable decline in reported employment and earnings levels in the fourth quarter of 2021 relative to other quarters in the analysis because many employers did not report data until near the end of the reporting deadline (see Section D, Exhibits D.4 and D.5). However, there is no reason to expect that the offer of an experimental Pell Grant would influence the timing of employers reporting to the NDNH database and therefore affect the results. Further, the study found no evidence that offering experimental Pell Grants impacted employment and earnings in the third quarter of 2021, the preceding quarter with full employment data from employers.

Outcome (percentage unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	Standard error	p-value
	Mean	N	Mean	N			
Completed a high-demand program at the study school[a]	44.3	1,363	5.4	907	38.9	1.7	0.000
Completed a certificate program at the study school	58.2	1,344	45.2	903	13.1	1.7	0.000
Enrolled in a certificate program at any school	40.9	1,354	32.8	905	8.1	1.8	0.000
Completed a certificate program at any school	39.6	1,224	33.4	848	6.3	1.9	0.001
Completed an associate's degree program at the study school	56.5	1,363	48.3	907	8.2	1.7	0.000
Enrolled in an associate's degree program at any school	44.1	1,363	38.0	907	6.1	1.9	0.001
Completed an associate's degree program at any school	0.0	1,224	0.0	848	0.0	NA	NA
Exploratory research question 3: Did offering experimental Pell Grants impact students' use of federal student loans?							
Federal student loan use	9.1	1,363	8.3	907	0.9	1.1	0.452
Federal student loans disbursed at any school ($)[b]	391	1,363	393	907	-2	75	0.979
Exploratory research question 4: Did offering experimental Pell Grants affect not just whether individuals are employed or their earnings but the duration of their employment and their reliance on unemployment insurance benefits?							
Duration of employment (quarters)	3.6	1,335	3.7	880	-0.1	0.1	0.145
Ever received unemployment insurance benefits	19.1	1,335	21.0	880	-1.9	1.7	0.270
Average quarterly unemployment insurance benefits amount ($)	186	1,335	193	880	-7	28	0.788
Duration of receiving unemployment insurance benefits (quarters)	0.4	1,335	0.4	880	0.0	0.0	0.449
Exploratory research question 5: Would the effects on employment and earnings be different if the analysis examined employment and earnings in a labor market less affected by the COVID-19 pandemic?							
Ever employed in quarter 4 of 2021	46.2	1,335	47.6	880	-1.4	0.019	0.494

Outcome (percentage unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	Standard error	p-value
	Mean	N	Mean	N			
Average earnings in quarter 4 of 2021 ($)	5,143	1,335	5,592	880	-449	321	0.162

Notes: Impact estimates were calculated using the approach described in Section B.4 of Appendix B. Exhibit B.6 provides details on the outcomes reported in this exhibit. Column 6 contains impact estimates that are regression-adjusted for student socioeconomic characteristics measured before random assignment, as described in Appendix B. The "Offered experimental Pell Grant" group mean (column 2) equals the sum of the unadjusted control group mean (column 4) and the regression-adjusted impact estimate (column 6). Column 3 contains the number of students in the "Offered experimental Pell Grant" group who were included in the analysis, and column 5 contains the number of students in the "Not offered experimental Pell Grant" group. Column 7 reports the standard error of the impact in column 6, and column 8 reports the probability that the impact in column 6 could have been observed by chance, with small p-values indicating a low likelihood that the impact is due to chance and not to the offer of experimental Pell Grant funds. Percentages may not add up to 100 because of rounding. All employment, earnings, and unemployment insurance benefits measures reflect the period from third quarter of 2020 through the fourth quarter of 2021. As such, any counts among these measures will have a maximum value of six quarters.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid, National Student Clearinghouse, National Directory of New Hires.

[a] To determine whether a program was in a high-demand occupation in its state, the study adapted criteria established by the U.S. Department of Labor's Occupational Information Network (O*NET) for "Bright Outlook" occupations that were expected to grow rapidly or have large numbers of job openings between 2014 and 2016, midway through the study period. Additional details on how the study determined whether a program was in high demand are in Section B.3 of Appendix B.

[b] The federal student loan disbursement amounts reported in this table are averages taken about students who did and did not take out student loans (that is, the averages include zeroes). In the subset of students with positive federal student loan disbursement amounts, the average amount disbursed was $4,296 overall: $4,021 for those offered experimental Pell Grant funds, and $4,757 for those not offered experimental Pell Grant funds.

C.2   Additional information supporting estimates of the experiments' effects on subgroups of students, schools, and communities

The study examined whether impacts on the primary outcomes (enrollment in and completion of any program at study schools, employment, and earnings) varied for subgroups defined by student, program, and local characteristics (see Exhibit B.10 for a description and rationale of the study's choice of subgroups). This section reports estimates of the impacts of the offer of experimental Pell Grants on the primary outcomes by subgroup (for example, males and females); it also reports the difference in impacts across subgroups (Exhibits C.3 through C.6).

Exhibit C.3. Impacts on enrollment in and completion of a program at study schools for Experiment 1, by subgroup

Subgroup	N	Enrolled in the study school		Completed a program at the study school	
		Impact	*p*-value	Impact	*p*-value
Student characteristic					
Female	256	22.8	0.000	14.0	0.011
Male	144	33.2	0.000	22.5	0.005
Difference		-10.4	0.255	-8.5	0.389
Under age 25	77	18.8	0.010	5.3	0.496
Age 25 or older	337	27.7	0.000	19.5	0.000
Difference		-8.9	0.232	-14.2	0.075
EFC = 0[a]	142	21.0	0.002	15.5	0.037
EFC > 0	193	22.3	0.000	7.2	0.271
Difference		-1.2	0.894	8.3	0.403
Dislocated worker[b]	85	46.1	0.000	28.4	0.004
Not a dislocated worker	250	14.0	0.005	5.3	0.340
Difference		32.0	0.002	23.1	0.040
Enrolled prior to random assignment	101	25.8	0.000	4.5	0.559
Not enrolled prior to random assignment	313	26.1	0.000	20.7	0.000
Difference		-0.2	0.976	-16.2	0.060

Subgroup	N	Enrolled in the study school		Completed a program at the study school	
		Impact	*p*-value	Impact	*p*-value
Program characteristic					
High-demand occupation[c]	213	19.9	0.000	10.0	0.063
Not a high-demand occupation	189	33.7	0.000	25.8	0.000
Difference		-13.8	0.027	-15.8	0.019
Local characteristic					
County unemployment rate above national average	320	28.1	0.000	17.6	0.000
County unemployment rate below national average	94	18.2	0.019	13.7	0.100
Difference		10.0	0.234	3.9	0.666

Notes: This exhibit reports the number of students in each subgroup (column 2), the impact on the primary enrollment outcome for the subgroup (columns 3), the *p*-value denoting the likelihood that the impact on enrollment could have been observed by chance (columns 4), the impact on the primary completion outcome (column 5), and the associated *p*-value (column 6). The *Difference* rows report the difference in impact estimates between the two subgroups (for example, the impact for females subtracted from the impact for males; columns 3 and 5), and the p-value indicating whether this difference is statistically significantly different from zero (columns 4 and 6). Appendix B describes how these exploratory analyses were conducted. Exhibit B.10 provides details on the definitions of the subgroups reported. Percentages may not add up to 100 because of rounding.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid.

[a] The expected family contribution (EFC), which is a measure of a family's financial strength, is an index score calculated based on taxed and untaxed income, assets, and benefits (see https://studentaid.gov/help-center/answers/article/what-is-efc).

[b] An individual may qualify as a dislocated worker if they meet one of the following conditions: has lost a job, has been laid off or received a layoff notice, is receiving unemployment benefits due to being laid off or losing a job and is unlikely to return to a previous occupation, is self-employed but unemployed because of economic conditions or a natural disaster, is the spouse of an active duty member of the armed forces and is unemployed or underemployed and is experiencing difficulty in obtaining or upgrading employment, or is a displaced homemaker (a person who previously provided unpaid services to the family, is no longer supported by the spouse, is unemployed or underemployed, and is having trouble finding or upgrading employment) (see https://studentaid.gov/2324/help/student-dislocated-worker).

[c] To determine whether a program was in a high-demand occupation in its state, the study adapted criteria established by the U.S. Department of Labor's Occupational Information Network (O*NET) for "Bright Outlook" occupations that were expected to grow rapidly or have large numbers of job openings between 2014 and 2016, midway through the study period. Additional details on how the study determined whether a program was in high demand are in Section B.3 of Appendix B.

EFC = expected family contribution.

Exhibit C.4. Impacts on enrollment in and completion of a program at study schools for Experiment 2, by subgroup

Subgroup	N	Enrolled in the study school		Completed a program at the study school	
		Impact	*p*-value	Impact	*p*-value
Student characteristic					
Female	816	15.3	0.000	11.4	0.000
Male	1,431	14.8	0.000	8.5	0.000
Difference		0.6	0.880	2.9	0.477
Under 25	733	12.5	0.000	6.0	0.033
Age 25 or older	1,536	15.6	0.000	10.9	0.000
Difference		-3.1	0.271	-4.9	0.109
EFC = 0[a]	538	9.0	0.012	5.2	0.184
EFC > 0	1,524	16.9	0.000	10.5	0.000
Difference		-7.9	0.059	-5.4	0.234
Dislocated worker[b]	468	16.4	0.000	8.4	0.045
Not a dislocated worker	1,597	14.5	0.000	9.4	0.000
Difference		1.9	0.670	-1.0	0.826
Enrolled prior to random assignment	313	24.9	0.000	15.8	0.000
Not enrolled prior to random assignment	1,957	13.0	0.000	8.2	0.000
Difference		11.9	0.001	7.6	0.053
Program characteristic					
High-demand occupation[c]	1,302	15.5	0.000	8.4	0.000
Not a high-demand occupation	964	13.3	0.000	10.4	0.000
Difference		2.2	0.403	-2.0	0.493
Local characteristic					
County unemployment rate above national average	1,901	15.0	0.000	10.4	0.000
County unemployment rate below national average	369	12.9	0.000	3.8	0.289
Difference		2.1	0.545	6.5	0.076

Notes: This exhibit reports the number of students in each subgroup (column 2), the impact on the primary enrollment outcome for the subgroup (column 3), the *p*-value denoting the likelihood that the impact could have been observed by chance (column 4), the impact on the primary completion outcome (column 5), and the associated *p*-value (column 6). The *Difference* rows report the difference in impact estimates between the two subgroups (for example, the impact for females subtracted from the impact for males; columns 3 and 5), and the *p*-value indicating whether this difference is statistically significantly different from zero (columns 4 and 6). Appendix B describes how these exploratory analyses were conducted. Appendix B, Exhibit B.10 provides details on the definitions of the subgroups reported.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid.

[a] The expected family contribution (EFC), a measure of a family's financial strength, is an index score calculated based on taxed and untaxed income, assets, and benefits (see https://studentaid.gov/help-center/answers/article/what-is-efc).

[b] An individual may qualify as a dislocated worker if they meet one of the following conditions: has lost job, has been laid off or received a layoff notice, is receiving unemployment benefits due to being laid off or losing a job and is unlikely to return to a previous occupation, is self-employed but unemployed because of economic conditions or a natural disaster, is the spouse of an active duty member of the armed forces and is unemployed or underemployed and is experiencing difficulty in obtaining or upgrading employment, or is a displaced homemaker (a person who previously provided unpaid services to the family, is no longer supported by the spouse, is unemployed or underemployed, and is having trouble finding or upgrading employment) (see https://studentaid.gov/2324/help/student-dislocated-worker).

[c] To determine whether a program was in a high-demand occupation in its state, the study adapted criteria established by the U.S. Department of Labor's Occupational Information Network (O*NET) for "Bright Outlook" occupations that were expected to grow rapidly or have large numbers of job openings between 2014 and 2016, midway through the study period. Additional details on how the study determined whether a program was in high demand are provided in Section B.3 of Appendix B.

Exhibit C.5. Impacts on employment and earnings for Experiment 1, by subgroup

Subgroup	N	Ever employed		Average quarterly earnings ($)	
		Impact	*p*-value	Impact ($)	*p*-value
Student characteristic					
Female	252	-1.9	0.692	-580	0.639
Male	142	-2.2	0.749	-2,392	0.184
Difference		0.3	0.969	1,812	0.411
Under 25	77	-14.1	0.040	-2,057	0.241
Age 25 or older	329	0.4	0.914	-915	0.380
Difference		-14.6	0.040	-1,141	0.528
EFC = 0[a]	190	1.4	0.820	-3,067	0.087
EFC > 0	141	-2.6	0.631	275	0.862
Difference		4.0	0.629	-3,342	0.167
Dislocated worker[b]	84	-2.7	0.738	-5,919	0.013
Not a dislocated worker	247	-0.2	0.959	308	0.817
Difference		-2.5	0.790	-6,228	0.022
Enrolled prior to random assignment	98	-0.8	0.905	-1,749	0.322
Not enrolled prior to random assignment	308	-3.0	0.490	-943	0.387
Difference		2.1	0.781	-806	0.679
Program characteristic					
High-demand occupation[c]	208	-6.7	0.162	-1,402	0.255
Not a high-demand occupation	186	3.3	0.511	-576	0.656
Difference		-10.0	0.094	-826	0.590
Local characteristic					
County unemployment rate above national average	317	-3.4	0.421	-1,288	0.229
County unemployment rate below national average	89	1.1	0.881	-592	0.752
Difference		-4.5	0.574	-695	0.732

Notes: This exhibit reports the number of students in each subgroup (column 2), the impact on the primary employment outcome for the subgroup (column 3), the *p*-value denoting the likelihood that the impact could have been observed by chance (column 4), the impact on the earnings outcome (column 5), and the associated *p*-value (column 6). The *Difference* rows report the difference in impact estimates between the two subgroups (for example, the impact for females subtracted from the impact for males; columns 3 and 5), and the p-value indicating whether this difference is statistically significantly different from zero (columns 4 and 6). Appendix B describes how these exploratory analyses were conducted. Exhibit B.10 provides details on the definitions of the subgroups reported. Percentages may not add up to 100 because of rounding. All employment and earnings outcomes are measured from the third quarter of 2020 through the fourth quarter of 2021.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid, National Directory of New Hires.

[a] The expected family contribution (EFC), which is a measure of a family's financial strength, is an index score calculated based on taxed and untaxed income, assets, and benefits (see https://studentaid.gov/help-center/answers/article/what-is-efc).

[b] An individual may qualify as a dislocated worker if they meet one of the following conditions: has lost a job, has been laid off or received a layoff notice, is receiving unemployment benefits due to being laid off or losing a job and is unlikely to return to a previous occupation, is self-employed but unemployed because of economic conditions or a natural disaster, is the spouse of an active duty member of the armed forces and is unemployed or underemployed and is experiencing difficulty in obtaining or upgrading employment, or is a displaced homemaker (a person who previously provided unpaid services to the family, is no longer supported by the spouse, is unemployed or underemployed, and is having trouble finding or upgrading employment) (see https://studentaid.gov/2324/help/student-dislocated-worker).

[c] To determine whether a program was in a high-demand occupation in its state, the study adapted criteria established by the U.S. Department of Labor's Occupational Information Network (O*NET) for "Bright Outlook" occupations that were expected to grow rapidly or have large numbers of job openings between 2014 and 2016, midway through the study period. Programs were also determined to be either in a high-demand occupation or based on the time that employment and earnings were measured. The results (not shown) were similar. Additional details on how the study determined whether a program was in high demand are in Section B.3 of Appendix B.

Exhibit C.6. Impacts on employment and earnings for Experiment 2, by subgroup

Subgroup	N	Ever employed		Average quarterly earnings ($)	
		Impact	p-value	Impact ($)	p-value
Student characteristic					
Female	800	1.5	0.611	211	0.620
Male	1,398	-2.7	0.225	-535	0.090
Difference		4.2	0.259	746	0.160
Under 25	1,500	-0.5	0.842	-445	0.230
Age 25 or older	714	-1.8	0.355	-206	0.467
Difference		1.3	0.641	-240	0.552
EFC = 0[a]	1,494	5.4	0.134	41	0.938
EFC > 0	530	-4.1	0.054	-496	0.110
Difference		9.5	0.024	536	0.378
Dislocated worker[b]	461	-4.2	0.282	-470	0.404
Not a dislocated worker	1,566	-0.9	0.667	-320	0.290
Difference		-3.3	0.457	-150	0.814
Enrolled prior to random assignment	310	-0.6	0.856	-751	0.141
Not enrolled prior to random assignment	1,905	-1.5	0.403	-208	0.427
Difference		0.9	0.807	-544	0.292
Program characteristic					
High-demand occupation[c]	1,272	-1.3	0.543	-475	0.112
Not a high-demand occupation	939	-1.9	0.400	-44	0.895
Difference		0.7	0.796	-432	0.252
Local characteristic					
County unemployment rate above national average	361	-2.1	0.267	-225	0.394
County unemployment rate below national average	1,854	1.8	0.588	-572	0.232
Difference		-3.9	0.257	346	0.478

Notes: This exhibit reports the number of students in each subgroup (column 2), the impact on the primary employment outcome for the subgroup (column 3), the *p*-value denoting the likelihood that the impact could have been observed by chance (column 4), the impact on the earnings outcome (column 5), and the associated *p*-value (column 6). The *Difference* rows report the difference in impact estimates between the two subgroups (for example, the impact for females subtracted from the impact for males; columns 3 and 5), and the p-value indicating whether this difference is statistically significantly different from zero (columns 4 and 6). Appendix B describes how these exploratory analyses were conducted. Exhibit B.10 provides details on the definitions of the subgroups reported. Percentages may not add up to 100 because of rounding. All employment and earnings measures reflect the period from third quarter of 2020 through the fourth quarter of 2021. As such, any counts among these measures will have a maximum value of six quarters.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid, National Directory of New Hires.

[a] The expected family contribution (EFC), which is a measure of a family's financial strength, is an index score calculated based on taxed and untaxed income, assets, and benefits (see https://studentaid.gov/help-center/answers/article/what-is-efc).

[b] An individual may qualify as a dislocated worker if they meet one of the following conditions: has lost a job, has been laid off or received a layoff notice, is receiving unemployment benefits due to being laid off or losing a job and is unlikely to return to a previous occupation, is self-employed but unemployed because of economic conditions or a natural disaster, is the spouse of an active duty member of the armed forces and is unemployed or underemployed and is experiencing difficulty in obtaining or upgrading employment, or is a displaced homemaker (a person who previously provided unpaid services to the family, is no longer supported by the spouse, is unemployed or underemployed, and is having trouble finding or upgrading employment) (see https://studentaid.gov/2324/help/student-dislocated-worker).

[c] To determine whether a program was in a high-demand occupation in its state, the study adapted criteria established by the U.S. Department of Labor's Occupational Information Network (O*NET) for "Bright Outlook" occupations that were expected to grow rapidly or have large numbers of job openings between 2014 and 2016, midway through the study period. Programs were also determined to be either in a high-demand occupation or based on the time that employment and earnings were measured. The results (not shown) were similar. Additional details on how the study determined whether a program was in high demand are in Section B.3 of Appendix B.

C.3 Additional information supporting estimates of students most likely to use experimental Pell Grants

In addition to knowing the share of students offered experimental Pell Grants who went on to use the funds as reported earlier, it is important to understand why students decided to use the funds by enrolling in a program at study schools. To shed some light on this subject, the study examined what student characteristics were correlated with the decision to use experimental Pell Grants for those offered the funds. The sign of the coefficients reported in Exhibit C.7 denote whether there was a positive or negative relationship between each student characteristic and the decision to use experimental Pell Grants, and the magnitude of the coefficient signifies how much the probability that a student used experimental Pell Grants changes given a one-unit shift in each student characteristic, holding the other characteristics constant. Exhibit C.7 also reports *p*-values, which signify how likely it is that the relationship between the student characteristic and the decision to use experimental Pell Grants is due to chance.

Of the characteristics analyzed (see Appendix B, Exhibit B.7 and Section B.4, for an explanation of the characteristics chosen and details on the analysis method), for students in Experiment 1, only age had a correlation with the decision to take up the offer of experimental Pell that was significantly different from zero (that is, unlikely to be observed by chance). Older students were significantly less likely to take up experimental Pell, compared to younger students (Exhibit C.7). For students in Experiment 2, only one student characteristic had a correlation with the decision to take up the offer of experimental Pell that was significantly different from zero. Students with a larger EFC (that is, those who were

expected to pay more out of pocket for attending school because of having higher incomes or greater assets) were significantly less likely to take up the offer of experimental Pell Grants, compared to students with a smaller EFC (Exhibit C.7).

Exhibit C.7. Correlation between student characteristics and the decision to take up the offer of experimental Pell Grants

Student characteristic	Experiment 1		Experiment 2	
	Coefficient	*p*-value	Coefficient	*p*-value
Age (years)	-0.01	0.009	0.0008	0.468
Gender (female)	0.04	0.525	-0.02	0.458
High school diploma or equivalent	-0.03	0.859	0.18	0.068
Expected family contribution (EFC)[a]	0.000009	0.364	-0.00002	0.000
Indicator for EFC = 0	-0.07	0.385	0.04	0.157
Dislocated worker[b]	0.10	0.197	-0.02	0.393
Regression statistics				
N	254	--	1,363	--
R-squared	0.42	--	0.38	--

Notes: Appendix B, Section B.4 describes how this exploratory analysis was conducted. Appendix B, Exhibit B.7, provides details on the student characteristics reported in this exhibit.

Sources: Office of Federal Student Aid random assignment system, school records, FSA.

[a] The expected family contribution, a measure of a family's financial strength, is an index score calculated based on taxed and untaxed income, assets, and benefits (see https://studentaid.gov/help-center/answers/article/what-is-efc).

[b] An individual may qualify as a dislocated worker if they meet one of the following conditions: has lost job; has been laid off or received a layoff notice; is receiving unemployment benefits due to being laid off or losing a job and is unlikely to return to a previous occupation; is self-employed but unemployed because of economic conditions or a natural disaster; is the spouse of an active duty member of the Armed Forces and is unemployed or underemployed and is experiencing difficulty in obtaining or upgrading employment; or is a displaced homemaker (a person who previously provided unpaid services to the family, is no longer supported by the spouse, is unemployed or underemployed, and is having trouble finding or upgrading employment) (see https://studentaid.gov/2324/help/student-dislocated-worker).

C.4   Additional information supporting assessment of programs students expressed interest in, enrolled in, and completed

This section reports on the percentage of students in each experiment who expressed interest in, enrolled in, and completed different types of programs. Programs are classified by two-digit Classification of Instructional Program (CIP) codes.[35] Findings are described earlier in the report.

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[35] https://nces.ed.gov/pubs2002/cip2000/.

Exhibit C.8. Programs students expressed interest in at random assignment, Experiment 1

Program	Percentage of Experiment 1 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
Health professions and related programs	5.5	10.0	7.2
Business, management, marketing, and related support services	6.7	6.9	6.8
Other	3.5	1.9	2.9
Missing CIP code	84.3	81.3	83.1
Total number of students	**254**	**160**	**414**

Notes: This exhibit shows the programs students expressed interest in at the time of random assignment based on the two-digit CIP code label for each program; the exhibit also reports the percentages of students overall, of students who were offered experimental Pell Grants, and of students who were not offered experimental Pell Grants who expressed interest in a program. "Other" includes multiple programs that have been combined to protect respondent confidentiality in accordance with National Center for Education Statistics standards.

Sources: Office of Federal Student Aid random assignment system, National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

CIP = Classification of Instructional Program.

Exhibit C.9. Programs students expressed interest in at random assignment, Experiment 2

Program	Percentage of Experiment 2 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
Transportation and materials moving	46.8	46.3	46.6
Health professions and related programs	34.5	34.8	34.6
Homeland security, law enforcement, firefighting and related protective services	7.8	7.5	7.7
Mechanic and repair technologies/technicians	7.3	7.2	7.3
Business, management, marketing, and related support services	1.1	1.5	1.3
Precision production	1.0	0.6	0.8
Family and consumer sciences/human sciences	0.7	0.9	0.8
Other or missing CIP code	0.7	1.2	0.9
Total number of students	**1,363**	**907**	**2,270**

Notes: This exhibit shows the programs students expressed interest in at the time of random assignment based on the two-digit CIP code label for each program "Other" includes multiple programs, each with fewer than 10 students per program, that have been combined with missing CIP codes to protect respondent confidentiality in accordance with National Center for Education Statistics standards.

Sources: Office of Federal Student Aid random assignment system, National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

CIP = Classification of Instructional Program.

Exhibit C.10. Percentage of students who expressed interest in a program considered to be in high demand during the initial study period and the follow-up period for employment and earnings outcomes, Experiment 1

Program	Percentage of Experiment 1 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
High-demand program during the initial study period	32.0	20.0	52.0
High-demand program during the follow-up period for employment and earnings outcomes	36.8	23.4	60.2
Both	21.7	15.4	37.1

Notes: This exhibit reports the percentage of students who expressed interest in a high-demand program, where the high-demand classification of a program is assessed both at the time of random assignment and at the time of employment and earnings. Appendix B, Section B.5, describes how the study identified high-demand programs.

Sources: School records, O*Net (https://www.onetonline.org/find/bright), National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

Exhibit C.11. Percentage of students who expressed interest in a program considered to be in high demand during the initial study period and the follow-up period for employment and earnings outcomes, Experiment 2

Program	Percentage of Experiment 2 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
High-demand program during the initial study period	34.4	23.1	57.4
High-demand program during the follow-up period for employment and earnings outcomes	35.9	23.6	59.6
Both	25.1	16.6	41.6

Notes: This exhibit reports the percentage of students who expressed interest in a high-demand program, where the high-demand classification of a program is assessed both at the time of random assignment and at the time of employment and earnings. Appendix B, Section B.5, describes how the study identified high-demand programs.

Sources: School records, O*Net (https://www.onetonline.org/find/bright), National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

Exhibit C.12. Programs students enrolled in, Experiment 1

Program	Percentage of Experiment 1 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
Health professions and related programs	39.0	37.5	38.4
Business, management, marketing, and related support services	7.1	4.4	6.0
Mechanic and repair technologies/technicians	6.3	0.0	3.9
Education	3.9	1.9	3.1
Engineering technologies and engineering-related fields	2.8	1.9	2.4
Other or missing CIP code	16.5	6.3	12.6
Did not enroll in a study school	24.4	48.1	33.6
Total number of students	**254**	**160**	**414**

Notes: This exhibit shows the programs students enrolled in based on the two-digit CIP code label for each program; also shown are the percentages of students overall who enrolled in each program, as well as percentages of enrolled students who were offered experimental Pell Grants and percentages of those enrolled who were not offered experimental Pell Grants. "Other" includes multiple programs that have been combined to protect respondent confidentiality in accordance with National Center for Education Statistics standards.

Sources: School records, National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

CIP = Classification of Instructional Program.

Exhibit C.13. Programs students enrolled in, Experiment 2

Program	Percentage of Experiment 2 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
Transportation and materials moving	35.1	28.6	32.5
Health professions and related programs	20.3	14.7	18.1
Construction trades	4.7	2.0	3.6
Homeland security, law enforcement, firefighting and related protective services	4.4	3.3	4.0
Precision production	0.9	0.7	0.8
Mechanic and repair technologies/technicians	0.6	0.4	0.5
Family and consumer sciences/human sciences	D	D	D
Business, management, marketing, and related support services	D	D	D
Other or missing CIP code	0.9	1.3	1.1
Did not enroll in a study school	32.4	48.2	38.7
Total number of students	1,363	907	2,270

Notes: This exhibit shows the programs students enrolled in based on the two-digit CIP code label for each program; also shown are the percentages of students overall who enrolled in each program, as well as percentages of enrolled students who were offered experimental Pell Grants and percentages of those enrolled who were not offered experimental Pell Grants. "Other" includes multiple programs that have been combined to protect respondent confidentiality in accordance with National Center for Education Statistics standards. D is used to denote suppressed cells.

Sources: School records, National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

CIP = Classification of Instructional Program.

Exhibit C.14. Programs students completed, Experiment 1

Program	Percentage of Experiment 1 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
Health professions and related programs	29.1	28.8	29.0
Mechanic and repair technologies/technicians	4.3	0.0	2.7
Other	17.7	6.9	13.5
Did not complete a program in a study school	48.8	64.4	54.8
Total number of students	254	160	414

Notes: This exhibit shows the programs students completed based on the two-digit CIP code label for each program; also shown are the percentages of students overall, of students who were offered experimental Pell Grants, and of students who were not offered experimental Pell Grants who completed a program. "Other" includes multiple programs that have been combined to protect respondent confidentiality in accordance with National Center for Education Statistics standards.

Sources: School records, National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

Exhibit C.15. Programs students completed, Experiment 2

Program	Percentage of Experiment 2 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
Transportation and materials moving	26.1	23.2	24.9
Health professions and related programs	13.9	8.8	11.9
Homeland security, law enforcement, firefighting and related protective services	3.5	2.8	3.2
Construction trades	3.2	1.8	2.6
Precision production	0.4	D	D
Other or missing CIP code	1.8	D	D
Did not complete a program in a study school	51.9	62.3	56.0
Total number of students	1,363	907	2,270

Notes: This exhibit shows the programs students completed based on the two-digit CIP code label for each program; also reported are the percentages of students overall, of students who were offered experimental Pell Grants, and of students who were not offered experimental Pell Grants who completed a program. "Other" includes multiple programs that have been combined to protect respondent confidentiality in accordance with National Center for Education Statistics standards. D is used to denote suppressed cells.

Sources: School records, National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

CIP = Classification of Instructional Program.

Exhibit C.16. High-demand programs that students completed, Experiment 1

Program	Percentage of Experiment 1 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
Health professions and related programs	26.0	23.8	25.1
Other	12.5	5.0	9.6
Did not complete a high-demand program	59.1	68.8	62.8
Missing CIP code or high-demand indicator	2.4	2.5	2.4
Total number of students	**254**	**160**	**414**

Notes: This exhibit contains information on the high-demand programs students completed based on the two-digit CIP code label for each program; also reported are the percentages of students overall, of students who were offered experimental Pell Grants and completed a program and of those who were not offered experimental Pell Grants and completed a program. "Other" includes multiple programs that have been combined to protect respondent confidentiality in accordance with National Center for Education Statistics standards. Appendix B, Section B.5, describes how the study identified high-demand programs.

Sources: School records, O*Net (https://www.onetonline.org/find/bright), National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

Exhibit C.17. High-demand programs that students completed, Experiment 2

Program	Percentage of Experiment 2 students		
	Offered experimental Pell Grant	Not offered experimental Pell Grant	Overall
Transportation and materials moving	25.9	23.2	24.8
Health professions and related programs	10.8	6.6	9.1
Construction trades	3.2	1.8	2.6
Other or missing CIP code or high-demand indicator	2.2	1.4	1.9
Did not complete a high-demand program	57.8	67.0	61.5
Total number of students	**1,363**	**907**	**2,270**

Notes: This exhibit shows the high-demand programs students completed based on the two-digit CIP code label for each program; also reported are the percentages of students overall, of students who were offered experimental Pell Grants, and of students who were not offered experimental Pell Grants who completed each program. "Other" includes multiple programs that have been combined with missing CIP codes to protect respondent confidentiality in accordance with National Center for Education Statistics standards. Appendix B, Section B.5, describes how the study identified high-demand programs.

Sources: Office of Federal Student Aid random assignment system, O*Net (https://www.onetonline.org/find/bright), National Center for Education Statistics (https://nces.ed.gov/pubs2002/cip2000/).

CIP = Classification of Instructional Program.

C.5 Additional information supporting estimates of federal student loan use and disbursement amounts

This section reports on the number and percentage of students offered experimental Pell Grants in each experiment who used federal student loans during the study period (2012-2018) as well as the average federal loan amount disbursed per student during the study period.

Exhibit C.18. Federal student loan take-up rates and disbursement amounts for those offered experimental Pell Grants

Usage Overview of Federal Student Loans	Experiment 1	Experiment 2
Number of students offered experimental Pell Grants	254	1,363
Number of students offered experimental Pell Grants who took out federal student loans	87	126
Federal student loan take-up rate (number of students who took out student loans divided by the number of students offered experimental Pell Grants)	34%	9%
Average federal student loan amount disbursed (total amount disbursed divided by the number of students who took out student loans)	$12,950	$4,021
Number of students offered experimental Pell Grants who used one	170	705
Number of students who used experimental Pell Grants and also took out federal student loans	63	39
Share of students who used experimental Pell Grants who took out federal student loans (number of students who used experimental Pell Grants who also took out student loans divided by the number of students who used experimental Pell Grants)	37%	6%

Source: School records, Office of Federal Student Aid.

APPENDIX D. SENSITIVITY ANALYSES

This appendix describes tests of whether the effects described in the report were sensitive to certain analytic decisions made by the study team. Researchers frequently conduct sensitivity testing to determine how confident they can be about their key findings. The sensitivity analyses here examined whether the study results would differ by[36]

- Changing the sample of students used to calculate the impacts on the primary program enrollment, program completion, employment, and earnings outcomes (sensitivity analyses 1-4).

Using different methods for treating missing covariate data and estimating the impacts of experimental Pell Grants on the primary program enrollment and completion outcomes (sensitivity analyses 5 and 6).

- Evaluating the impact of the experimental Pell Grants on the employment and earnings outcomes separately in each of the six complete quarters of available labor market data (sensitivity analysis 7).

The description and purpose of the sensitivity analyses are described in Exhibit D.1.

The results of the sensitivity analyses for both experiments, shown in Exhibits D.2 and D.4 for Experiment 1 and D.3 and D.5 for Experiment 2, were consistent with findings reported in the main body of the report.[37]

Exhibit D.1. Description and purpose of sensitivity analyses

Sensitivity analysis	Purpose
Changing the sample of students	
1. *Include students who enrolled in both experiments.* **The main analysis excludes students who enrolled in both experiments to isolate the impact of each experiment separately. This sensitivity analysis includes those students and adds an indicator for enrollment in both experiments to the benchmark model.**	To explore whether results are sensitive to including these participants. In addition, because statistical power to detect effects in this study is modest, particularly for Experiment 1, this sensitivity analysis takes advantage of the increased sample size and statistical power afforded by adding these. Including individuals who enrolled in both experiments increases the analysis sample size and allows the study to test whether results are sensitive to including these individuals.
2. *Include students who were subject to an error in the random assignment system.* **The main analysis excludes students who were subject to an error in the RAS (see Appendix B for a description of these errors). This sensitivity analysis includes them in the analysis sample.**	To explore whether results are sensitive to including these students and to take advantage of the increased sample size and statistical power afforded by adding these students to the analysis.

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[36] The model specifications are the same as for the main impact analyses described in Appendix B.

[37] One exception is in Experiment 1, sensitivity analysis 4: The impact on completion of a program at the study school was positive but not significantly different from zero (Exhibit D.2) when participants who were found ineligible for Pell Grants after random assignment were excluded from the analytic sample.

Sensitivity analysis	Purpose
3. *Exclude students with an enrollment date before the random assignment date.* **Some students were already enrolled at study schools before the experiments began. (The Office of Federal Student Aid permitted study schools to include students in the experiments who were already enrolled at the schools.) The main analysis includes these students. This sensitivity analysis estimates impacts for the sample of students whose program enrollment dates occur on or after their random assignment dates.**	To explore whether results are sensitive to excluding these students.
4. *Exclude participants who were found ineligible for Pell Grants after random assignment.* **Some students were found to be ineligible for Pell Grants after random assignment ended and after the RAS was closed. The main analysis includes these students. This sensitivity analysis excludes them.**	To explore whether results are sensitive to excluding these students.
Using different analysis methods	
5. *Use casewise deletion to account for missing covariate data.* **The main analysis imputes missing data using a method described in Appendix B. This sensitivity analysis estimates the impact model without imputing any missing covariate data. In this analysis, students with missing covariate data are dropped from the analysis.**	To explore whether results are sensitive to the method of accounting for missing data in the benchmark approach.
6. *Use an alternative estimation strategy for binary outcomes.* **The study's primary program outcomes (enrollment in the study school and completion of a program at the study school) are binary. The main analysis uses ordinary least squares (OLS) to estimate the impacts on these outcomes in a linear probability model. This sensitivity analysis uses a nonlinear logit model.**[38]	To explore whether impact results are sensitive to the model used to estimate impacts on binary outcomes. When predicting the probability that an individual enrolled in a study school using parameters estimated in a linear OLS model, it is possible for the predicted probabilities to be greater than 1 or less than 0. Logit models do not share this weakness–using logit models, predicted probabilities always fall between 0 and 1.

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[38] The sensitivity analysis was not conducted for the employment outcome.

Sensitivity analysis	Purpose
Using smaller windows of time to understand labor market outcomes	
7. *Evaluating the impact of the experimental Pell Grants separately in each of the six complete quarters with available labor market data.* **The main analysis assesses the impact of each experimental Pell Grant on whether a student is employed in any of the six complete quarters of data and on their average earnings across this period. This sensitivity analysis assesses the impact of each experimental Pell Grant separately in each quarter.**	To explore whether results are sensitive to when employment and earnings were measured given that the six quarters of data examined overlapped with a period of high unemployment following the pandemic-induced recession in early 2020. Evaluating the impact of the experimental Pell Grants separately for each quarter of data, particularly for the later quarters when the economy had largely recovered, could shed light on whether the findings were influenced by the COVID-19 pandemic and resulting changes in the economy. In addition, examining impacts by quarter can provides evidence of any patterns in the impacts on labor market outcomes over time.

Exhibit D.2. Sensitivity analyses for impacts on primary program enrollment and completion outcomes for Experiment 1

Outcome (percentages unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant			
	Mean	*N*	Mean	*N*	Impact	*p*-value
Primary						
Enrolled in the study school	77.9	254	51.9	160	26.0	0.000
Completed a program at the study school	52.4	254	35.6	160	16.7	0.000
Sensitivity analysis 1: Include students who enrolled in both experiments						
Enrolled in the study school	76.1	301	52.7	184	23.4	0.000
Completed a program at the study school	50.9	301	36.4	184	14.4	0.001
Sensitivity analysis 2: Include students who were subject to an error in the random assignment system						
Enrolled in the study school	75.8	274	51.9	160	23.9	0.000
Completed a program at the study school	52.1	274	35.6	160	16.5	0.000
Sensitivity analysis 3: Exclude students with an enrollment date before the random assignment date						
Enrolled in the study school	70.3	191	39.3	122	31.0	0.000
Completed a program at the study school	50.9	191	26.2	122	24.7	0.000
Sensitivity analysis 4: Exclude participants who were found ineligible for experimental Pell Grant funds after random assignment						
Enrolled in the study school	77.8	194	60.7	122	17.2	0.000
Completed a program at the study school	49.0	194	41.8	122	7.2	0.143
Sensitivity analysis 5: Use casewise deletion to account for missing covariate data						
Enrolled in the study school	73.6	208	51.9	127	21.7	0.000
Completed a program at the study school	46.4	208	35.6	127	10.8	0.026
Sensitivity analysis 6: Use an alternative estimation strategy for binary outcomes						
Enrolled in the study school	78.4	208	59.1	127	19.3	0.000
Completed a program at the study school	51.4	208	40.9	127	10.5	0.022

Notes: Sensitivity analyses 1–4 use the same method as described in Appendix B to estimate the impacts of the experiments on the primary outcomes. Sensitivity analysis 5 uses covariates with missing data instead of the method described in Appendix B. Sensitivity analysis 6 uses a nonlinear logit model and covariates with missing data and excludes school and program fixed effects. Column 6 contains impact estimates that are regression-adjusted for student socioeconomic characteristics measured before random assignment, as described in Appendix B. The "Offered experimental Pell Grant" group mean (column 2) equals the sum of the unadjusted control group mean (column 4) and the regression-adjusted impact estimate (column 6). Column 3 contains the number of students in the "Offered experimental Pell Grant" group who were included in the sensitivity analysis, and column 5 contains the number of students in the "Not offered experimental Pell Grant" group who were included in the sensitivity analysis. Column 7 reports the probability that the impact in column 6 could have been observed by chance, with small *p*-values indicating a low likelihood that the impact is due to chance and not to the offer of experimental Pell Grant funds. Percentages may not add up to 100 because of rounding.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid.

Exhibit D.3. Sensitivity analyses for impacts on primary program enrollment and completion outcomes for Experiment 2

Outcome (percentages unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	*p*-value
	Mean	*N*	Mean	*N*		
Primary						
Enrolled in the study school	66.4	1,363	51.8	907	14.6	0.000
Completed a program at the study school	47.0	1,363	37.7	907	9.3	0.000
Sensitivity analysis 1: Include students who enrolled in both experiments						
Enrolled in the study school	66.4	1,410	52.0	931	14.4	0.000
Completed a program at the study school	46.8	1,410	37.8	931	9.0	0.000
Sensitivity analysis 2: Include students who received incorrect assignments						
Enrolled in the study school	66.3	1,484	51.7	910	14.6	0.000
Completed a program at the study school	47.2	1,484	37.6	910	9.6	0.000
Sensitivity analysis 3: Exclude students with an enrollment date before the random assignment date						
Enrolled in the study school	62.2	1,175	45.1	782	17.1	0.000
Completed a program at the study school	44.1	1,175	33.1	782	11.0	0.000
Sensitivity analysis 4: Exclude participants who were found ineligible for experimental Pell Grant funds after random assignment						
Enrolled in the study school	68.4	1,201	53.0	793	15.4	0.000
Completed a program at the study school	47.8	1,201	38.1	793	9.7	0.000
Sensitivity analysis 5: Use casewise deletion to account for missing covariate data						
Enrolled in the study school	66.7	1,233	51.8	827	14.9	0.000
Completed a program at the study school	46.9	1,233	37.7	827	9.1	0.000
Sensitivity analysis 6: Use an alternative estimation strategy for binary outcomes						
Enrolled in the study school	68.0	1,233	52.8	827	15.2	0.000
Completed a program at the study school	47.8	1,233	38.3	827	9.5	0.000

Notes: Sensitivity analyses 1–4 use the same method described in Appendix B to estimate the impacts of the experiments on the primary outcomes. Sensitivity analysis 5 uses covariates with missing data instead of the method described in Appendix B. Sensitivity analysis 6 uses a nonlinear logit model and covariates with missing data and excludes school and program fixed effects. Column 6 contains impact estimates that are regression-adjusted for student socioeconomic characteristics measured before random assignment, as described in Appendix B. The "Offered experimental Pell Grant" group mean (column 2) equals the sum of the unadjusted control group mean (column 4) and the regression-adjusted impact estimate (column 6). Column 3 contains the number of students in the "Offered experimental Pell Grant" group who were included in the sensitivity analysis, and column 5 contains the number of students in the "Not offered experimental Pell Grant" group who were included in the sensitivity analysis. Column 7 reports the probability that the impact in column 6 could have been observed by chance, with small *p*-values indicating a low likelihood that the impact is due to chance and not to the offer of experimental Pell Grant funds. Percentages may not add up to 100 because of rounding.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid.

Exhibit D.4. Sensitivity analyses for impacts on primary employment and earnings outcomes for Experiment 1

Outcome (percentages unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	p-value
	Mean	*N*	Mean	*N*		
Primary						
Ever employed	80.6	250	83.0	156	-2.4	0.527
Average quarterly earnings ($)	8,956	250	10,097	156	-1,141	0.244
Sensitivity analysis 1: Include students who enrolled in both experiments						
Ever employed	81.4	297	82.0	180	-0.7	0.857
Average quarterly earnings ($)	9,088	297	9,797	180	-709	0.414
Sensitivity analysis 2: Include students who were subject to an error in the random assignment system						
Ever employed	80.3	269	83.0	156	-2.7	0.471
Average quarterly earnings ($)	8,872	269	10,097	156	-1,225	0.199
Sensitivity analysis 3: Exclude students with an enrollment date before the random assignment date						
Ever employed	80.1	189	80.0	119	0.1	0.976
Average quarterly earnings ($)	8,820	189	9,344	119	-524	0.644
Sensitivity analysis 4: Exclude participants who were found ineligible for experimental Pell Grant funds after random assignment						
Ever employed	82.9	191	85.0	121	-2.1	0.618
Average quarterly earnings ($)	10,082	191	10,529	121	-448	0.667
Sensitivity analysis 5: Use casewise deletion to account for missing covariate data						
Ever employed	84.2	205	85.0	126	-0.8	0.833
Average quarterly earnings ($)	9,906	205	11,103	126	-1,197	0.306
Sensitivity analysis 6: Evaluating the impact of the experimental Pell Grants separately in each of the six complete quarters						
Ever employed						
Quarter 3 of 2020	71.2	250	72.4	156	-1.2	0.231
Quarter 4 of 2020	69.6	250	75	156	-5.4	0.222
Quarter 1 of 2021	70.0	250	69.9	156	0.1	0.997
Quarter 2 of 2021	72.4	250	73.1	156	-0.7	0.875
Quarter 3 of 2021	69.0	250	69.9	156	-0.9	0.841
Quarter 4 of 2021	36.4	250	34.6	156	1.8	0.656

Outcome (percentages unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	p-value
	Mean	N	Mean	N		
Average quarterly earnings ($)						
Quarter 3 of 2020	8,802	250	10,031	156	-1,229	0.784
Quarter 4 of 2020	9,642	250	11,643	156	-2,001	0.084
Quarter 1 of 2021	9,462	250	11,054	156	-1,592	0.196
Quarter 2 of 2021	9,819	250	10,636	156	-816	0.432
Quarter 3 of 2021	10,127	250	11,741	156	-1,615	0.196
Quarter 4 of 2021	5,884	250	5,474	156	410	0.631

Notes: Sensitivity analyses 1–4 use the same method as described in Appendix B to estimate the impacts of the experiments on the primary outcomes. Sensitivity analysis 5 uses covariates with missing data instead of the method described in Appendix B. Sensitivity analysis 6 estimates impacts **separately in each of the six complete quarters with observable labor market data**. Column 6 contains impact estimates that are regression-adjusted for student socioeconomic characteristics measured before random assignment, as described in Appendix B. The "Offered experimental Pell Grant" group mean (column 2) equals the sum of the unadjusted control group mean (column 4) and the regression-adjusted impact estimate (column 6). Column 3 contains the number of students in the "Offered experimental Pell Grant" group who were included in the sensitivity analysis, and column 5 contains the number of students in the "Not offered experimental Pell Grant" group who were included in the sensitivity analysis. Column 7 reports the probability that the impact in column 6 could have been observed by chance, with small *p*-values indicating a low likelihood that the impact is due to chance and not to the offer of experimental Pell Grant funds. Percentages may not add up to 100 because of rounding.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid, National Directory of New Hires.

Exhibit D.5. Sensitivity analyses for impacts on primary employment and earnings outcomes for Experiment 2

Outcome (percentages unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	p-value
	Mean	*N*	Mean	*N*		
Primary						
Ever employed	77.6	1,335	79.0	880	-1.4	0.424
Average quarterly earnings ($)	5,993	1,335	6,276	880	-283	0.260
Sensitivity analysis 1: Include students who enrolled in both experiments						
Ever employed	77.9	1,382	79.0	904	-1.1	0.529
Average quarterly earnings ($)	6,086	1,382	6,318	904	-232	0.352
Sensitivity analysis 2: Include students who were subject to an error in the random assignment system						
Ever employed	77.7	1,453	79.0	883	-1.3	0.448
Average quarterly earnings ($)	6,015	1,453	6,266	883	-251	0.319
Sensitivity analysis 3: Exclude students with an enrollment date before the random assignment date						
Ever employed	78.3	1,150	81.0	755	-2.7	0.145
Average quarterly earnings ($)	6,078	1,150	6,345	755	-267	0.325
Sensitivity analysis 4: Exclude participants who were found ineligible for experimental Pell Grant funds after random assignment						
Ever employed	78.1	1,184	80.0	776	-1.9	0.315
Average quarterly earnings ($)	6,039	1,184	6,394	776	-355	0.189
Sensitivity analysis 5: Use casewise deletion to account for missing covariate data						
Ever employed	78.5	1,214	80.0	808	-1.5	0.405
Average quarterly earnings ($)	6,090	1,214	6,442	808	-352	0.186
Sensitivity analysis 6: Evaluating the impact of the experimental Pell Grants separately in each of the six complete quarters						
Ever employed						
Quarter 3 of 2020	62.9	1,335	66.4	880	-3.5	0.085
Quarter 4 of 2020	64.8	1,335	68.9	880	-4.1	0.044
Quarter 1 of 2021	61.4	1,335	62	880	-0.6	0.776
Quarter 2 of 2021	63.5	1,335	65.8	880	-2.3	0.252
Quarter 3 of 2021	59.0	1,335	61.6	880	-2.7	0.205
Quarter 4 of 2021	46.2	1,335	47.6	880	-1.4	0.494

Outcome (percentages unless otherwise noted)	Offered experimental Pell Grant		Not offered experimental Pell Grant		Impact	*p*-value
	Mean	*N*	Mean	*N*		
Average quarterly earnings ($)						
Quarter 3 of 2020	5,819	1,335	6,170	880	-352	0.196
Quarter 4 of 2020	6,801	1,335	7,188	880	-386	0.219
Quarter 1 of 2021	5,668	1,335	5,901	880	-232	0.399
Quarter 2 of 2021	6,424	1,335	6,631	880	-207	0.484
Quarter 3 of 2021	6,103	1,335	6,176	880	-73	0.812
Quarter 4 of 2021	5,143	1,335	5,592	880	-449	0.162

Notes: Sensitivity analyses 1-4 use the same method as described in Appendix B to estimate the impacts of the experiments on the primary outcomes. Sensitivity analysis 5 uses covariates with missing data instead of the method described in Appendix B. Sensitivity analysis 6 estimates impacts separately in each of the six complete quarters with observable labor market data. Column 6 contains impact estimates that are regression-adjusted for student socioeconomic characteristics measured before random assignment, as described in Appendix B. The "Offered experimental Pell Grant" group mean (column 2) equals the sum of the unadjusted control group mean (column 4) and the regression-adjusted impact estimate (column 6). Column 3 contains the number of students in the "Offered experimental Pell Grant" group who were included in the sensitivity analysis, and column 5 contains the number of students in the "Not offered experimental Pell Grant" group who were included in the sensitivity analysis. Column 7 reports the probability that the impact in column 6 could have been observed by chance, with small *p*-values indicating a low likelihood that the impact is due to chance and not to the offer of experimental Pell Grant funds. Percentages may not add up to 100 because of rounding.

Sources: Office of Federal Student Aid random assignment system, school records, Office of Federal Student Aid, National Directory of New Hires.