Federal Reserve Bank of Chicago

Who Has the Time? Community College Students' Time-Use Response to Financial Incentives

Lisa Barrow, Cecilia Elena Rouse, and Amanda McFarland

January, 2020

WP 2020-03

https://doi.org/10.21033/wp-2020-03

Who Has the Time? Community College Students' Time-Use Response to Financial Incentives

Lisa Barrow
lbarrow@frbchi.org
Federal Reserve Bank of Chicago

Cecilia Elena Rouse
rouse@princeton.edu
Princeton University

Amanda McFarland
amcfarland@frbchi.org
Federal Reserve Bank of Chicago

January 2020

We thank Eric Auerbach, Elijah de la Campa, Ross Cole, Laurien Gilbert, Ming Gu, Steve Mello, Lauren Sartain, and Ini-Abasi Umosen for expert research assistance; Leslyn Hall and Lisa Markman Pithers with help developing the survey; Reshma Patel for extensive help in understanding the MDRC data. Orley Ashenfelter, Alan Krueger, Jonas Fisher, Derek Neal, Reshma Patel, Lashawn Richburg-Hayes, and Shyam Gouri Suresh as well as seminar participants at Cornell University, the Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Harvard University, Michigan State, Princeton University, University of Chicago, University of Pennsylvania, and University of Virginia provided helpful conversations and comments. This paper was also presented as the Presidential Address at the October 2019 of the International Atlantic Economic Society. Some of the data used in this paper are derived from data files made available by MDRC. We thank the Bill & Melinda Gates Foundation and the Princeton University Industrial Relation Section for generous funding. The authors remain solely responsible for how the data have been used or interpreted. Any views expressed in this paper do not necessarily reflect those of the Federal Reserve Bank of Chicago or the Federal Reserve System. Any errors are ours.

Who Has the Time? Community College Students' Time-Use Response to Financial Incentives

Abstract

We evaluate the effect of performance-based scholarship programs for postsecondary students on student time use and effort and whether these effects are different for students we hypothesize may be more or less responsive to incentives. To do so, we administered a time-use survey as part of a randomized experiment in which community college students in New York City were randomly assigned to be eligible for a performance-based scholarship or to a control group that was only eligible for the standard financial aid. This paper contributes to the literature by attempting to get inside the "black box" of how students respond to a monetary incentive to improve their educational attainment. We find that students eligible for a scholarship devoted more time to educational activities, increased the quality of effort toward and engagement with their studies, and allocated less time to leisure. Additional analyses suggest that students who were plausibly more myopic—place less weight on future benefits—were more responsive to the incentives, but we find no evidence that students who are arguably more time constrained were less responsive to the incentives.

Keywords: higher education; educational investment; time use; incentives; financial aid

JEL Classification: J24; D03; I2

I. Introduction

Concerns over low rates of college persistence and completion in the United States have led to a number of research studies aimed at understanding whether and how scholarships and incentives can improve student outcomes. Many of these studies have used randomized controlled trials to evaluate the effectiveness of scholarships, incentives, or some combination of the two along with other student supports aimed at improving grades, persistence, credit accumulation, and degree attainment (see, e.g., Angrist, Lang, and Oreopoulos 2009; Angrist, Oreopoulos, and Williams 2014; and Barrow, Richburg-Hayes, Rouse, and Brock 2014). Other studies rely on regression discontinuity design and other program features to identify causal impacts on similar outcomes (see, e.g. Cornwell, Lee, and Mustard 2005; Dynarski 2008, Jackson 2010, and Scott-Clayton 2011). Overall, previous evidence suggests that scholarships with and without performance incentives have relatively large effects on college enrollment but much more modest impacts on other postsecondary outcomes such as grades and credit accumulation.

One factor contributing to modest impacts on grades and credit accumulation may be differences in responsiveness to incentives among affected students. Researchers have used several strategies for understanding how, under what conditions, and for whom performance-based scholarships (PBS) may be more or less effective. For example, Barrow and Rouse (2018) evaluate whether performance-based scholarships led to changes in time use and effort among California high school seniors participating in a randomized evaluation of performance-based scholarships. They find that students eligible for the scholarship devoted more time and effort toward educational activities and less time to other activities, and that the incentive structure rather than the additional money seem to drive these effects. Surprisingly, neither Barrow and

Rouse (2018) nor De Paola, Scoppa, and Nisticó (2012) (a randomized experiment in Italy) find that larger incentive payments generated larger responses. Other researchers have explored heterogeneity in responsiveness to performance-based scholarships based on differences in student characteristics. Patel, Richburg-Hayes, de la Campa, and Rudd (2013) report that PBSs worked equally well across a wide variety of student types—low-income parents, first-generation college students, Latino men, etc.—based on an evaluation of PBSs across sites. Meanwhile, similar studies of undergraduates outside the U.S. find some evidence of differences in incentive impacts by student characteristics. Angrist, Lang, and Oreopoulos (2009); De Paola, Scoppa, and Nisticó (2012); and Angrist, Oreopoulos, and Williams (2014) find mixed evidence on whether incentive payments have differential impacts for men and women. Leuven, Oosterbeek, and van der Klaauw (2010) and De Paola, Scoppa, and Nisticó (2012) find evidence of larger impacts for higher-ability students. Notably, however, the De Paola, Scoppa, and Nisticó (2012) incentive structure embeds competition as only the top performers receive the incentive payments. Two more studies using randomized evaluation of financial aid grants with performance-based rules for scholarship renewal have also looked for differential impacts based on student characteristics. Carlson, Elwert, Hillman, Schmidt, and Wolfe (2019) find small effects of grant receipt on persistence and bachelor's degree attainment among four-year college students but no differences by race or gender. In contrast, Angrist, Autor, Hudson, and Pallais (2016) find positive effects on postsecondary enrollment that grow over time due to improvements in persistence, which are larger for non-white students. They also find stronger effects for first-generation college students and students with lower high school test scores and grade point averages.

In this paper, we evaluate the effect of a PBS program for community college students on student time use and effort as well as some survey measures of unintended consequences. We also explore whether effects differ for students who may be less time-constrained as well as students who may be less motivated by future postsecondary education benefits. The PBS program we study randomly assigned community college students at two campuses in New York City to treatment and control groups and tied the scholarship payments associated with treatment group assignment to meeting performance, enrollment, and attendance benchmarks. Scholarships were available to all treatment group participants for a fall and spring semester while a subset of students were part of a treatment group assignment that also included a summer semester. To measure the impact of PBSs on student educational effort, we surveyed participants during their first two semesters of program participation (excluding summers) about time use over the prior week and implemented a time diary survey.

We find that community college students eligible for a scholarship devoted more time to educational activities, increased the quality of effort toward and engagement with their studies, and allocated less time to leisure. Additional analyses imply that students who plausibly place less weight on future benefits (henceforth referred to as “myopic”) were more responsive to the incentives, but we find no evidence that students who are arguably more time constrained were less responsive to the incentives (as might be expected). These results are based on surveys that yielded an ever-respond response rate of 72 percent. We believe the estimates are internally valid as omnibus F-tests of the difference in means of background characteristics at baseline by treatment/control status for our analysis sample are not statistically significant at conventional levels, and our estimates are largely unchanged if we include baseline characteristics as controls.

Overall, our findings indicate that incentives can induce postsecondary students to increase the quantity and quality of their effort toward educational attainment, but that they are more effective for some than for others.

We next discuss a theoretical framework for thinking about effort devoted to schooling and the role of incentive scholarships (Section II). We describe the intervention studied, the data, and sample characteristics of program participants in Section III. The estimation strategy and results are presented in Section IV, and Section V concludes.

II. Theoretical framework

The performance-based scholarship in this study was designed to provide financial aid to low-income community college students while simultaneously incentivizing the students to make academic progress while enrolled. The incentives were provided in the form of monetary payments to the student throughout the semester that were conditional on the student meeting certain benchmarks for enrollment, class attendance, and grades. As described in Barrow and Rouse (2018), these incentive payments should induce students to exert more effort toward meeting these benchmarks as long as the expected benefit, net the cost of effort, is positive. Expected benefits may include both short-term benefits—immediate financial gains (incentive payments) and the personal satisfaction a student may receive from academic accomplishment—as well as longer-term benefits such as increased lifetime earnings and better health. The present value of these benefits will be affected by how an individual discounts the benefits over time. Costs of effort toward school are more short-run and may include childcare payments, foregone earnings, and other opportunity costs.

Because the marginal benefits and costs of effort differ from person to person, there is likely to be some heterogeneity in responsiveness across students. We focus on one reason why the expected benefits of effort might differ—differences in discount rates—and one reason why costs might differ—less flexibility in allocating time to educationally productive activities—though we acknowledge that there are a multitude of other possible mechanisms at play, including ability, which may also affect the marginal benefit of effort. First, we expect that performance incentives will have a bigger impact on effort for myopic students, who heavily discount future benefits. While their less-myopic peers are motivated by the returns to schooling in terms of future earnings, more present-oriented students perceive a lower present value of expected earnings associated with increased schooling. Thus, by providing an immediate financial benefit, the PBS should counteract this undervaluation and induce myopic students to exert more effort. Since, all else equal, the marginal cost of effort will be higher for the less myopic students (at their optimal level of effort without the incentive payments) and they are already more likely to meet the performance benchmarks, we hypothesize the more myopic students will be more responsive to the incentive payments. We cannot directly observe each student's level of myopia, so we use prior educational attainment as a proxy measure. Second, we expect that performance incentives will have a smaller impact on effort for students with more inflexible schedules who may face higher marginal costs of effort. While it is true that time constrained students could increase the quality of their studying habits to compensate for their inability to increase the quantity of their studying, they should still be less responsive relative to their peers who are free to alter both dimensions. Again, since we cannot observe each individual's time demands, we proxy by examining if there are differential effects for students who care for young children.

Finally, the intention of a PBS is to increase student effort in educationally productive ways. However, a PBS could also incentivize students to try to raise their GPA in ways that are not educationally productive. For example, the Georgia HOPE scholarship, which had grade incentives but no credit incentives, reduced the probability of students registering for a full credit load and increased the probability that students dropped out of courses, presumably to raise their probability of meeting the GPA benchmark (Cornwell, Lee, and Mustard, 2005). Students might also be incentivized to engage in other unintended behaviors like taking easier classes, asking for regrading on tests and papers, or even cheating.

III. The Scholarship Programs and the Time-Use Survey

The data we analyze come from a supplementary "Time Use" survey of participants at two sites of the Performance-Based Scholarship Demonstration conducted by MDRC, a nonprofit, nonpartisan education and social policy research organization. These scholarships were awarded on top of any other financial aid for which the students qualified such as federal Pell Grants and state aid.[1]

A. The Scholarship Program

MDRC implemented the intervention at two campuses of the City University of New York System (CUNY) – the Borough of Manhattan Community College (BMCC) and Hostos Community

[1] Mayer, Patel, Rudd, and Ratledge (2015) find that program group students were awarded $2,209 more in total financial aid (including $2,002 of PBS money) than the control group students. There was no difference between the program and control group students in terms of total loans received. This evidence suggests that the only financial difference between groups is the PBS.

College (Hostos). Students were recruited on campus in three cohorts (Fall 2008, Spring 2009, and Fall 2009). Students were screened on whether they met several criteria before being invited to participate in the study. The criteria were as follows: aged 22-35, had tested into (and not yet passed) at least one developmental course (a course meant to prepare the student to take college-level courses), met the eligibility requirements for a federal Pell Grant, enrolled in at least 6 credit or contact hours (at the time of "intake"), and lived away from their parents. Once program staff determined that a student met all criteria for participating in the study, students who agreed to participate provided baseline demographic information, after which MDRC randomly assigned them to the program or control group. Everyone who attended an orientation session (at which students were introduced to the study and could sign up to participate) received a $25 metro card.

Students randomly assigned to the program (treatment) group were eligible to receive a performance-based scholarship worth up to $1,300 each semester for two semesters (for a total of $2,600).[2] As the goal of this scholarship was to reward attendance (an input to academic success) as well as performance at the end of the semester (an academic output), the incentive payments were structured as follows:

1. After registering for at least six credits (meaning that tuition had been paid or a payment plan had been established) the student received $200;

[2] Some students were randomly assigned to a second treatment group that was eligible to receive the PBS during the regular semesters plus a PBS for one consecutive summer term worth up to $1,300 (for a total of $3,900). Because we focus on regular semester outcomes during which the incentive structures for the two treatment groups are identical, we do not present results separately for the two treatment groups.

2. with "continued enrollment at mid-semester" he or she received $450;[3]
3. and with a final grade of "C" or better (or having passed a developmental education course) in at least 6 credits or equated credits, he or she received $650.[4]

So as not to discourage students in the middle of the semester, those who missed the mid-semester benchmark could recoup the second ($450) payment at the end of the semester if they met the final requirement. Students were also eligible for the same incentive payments a second semester, independent of having met any of the first semester benchmarks.[5]

B. Numbers of Participants

In Table 1 we present information on the number of students in each cohort in each demonstration. In total 1,501 individuals were recruited to be part of the PBS study—368 in fall 2008, 514 in spring 2009, and 619 in fall 2009. 754 study participants were randomly assigned to the program-eligible group and 747 were assigned to the control group.[6] Appendix Table A1 displays means of baseline characteristics by treatment/control status. While there are a couple of characteristics that appear to differ between treatment and control groups, an omnibus F-test yielded a p-value of 0.61 suggesting that randomization successfully balanced the two groups, on average.

---

[3] "Continued enrollment at mid-semester" was determined by whether the student attended class at least once in the first three weeks of the semester and at least once during the fourth or fifth weeks of the semester.

[4] Equated credits are given in developmental education classes and do not count towards a degree or certificate.

[5] See Richburg-Hayes, Sommo, and Welbeck (2011) for more background on the New York demonstration.

[6] The MDRC PBS study includes one additional participant for whom we did not receive contact information and thus were unable to survey.

According to Patel and Rudd (2012) nearly all (99%) of the treatment students received the initial payment the first semester, 97% received the midterm payment (that required continued enrollment, as defined above), and 72% received the performance-based payment at the end of the term.

C. Time-Use Survey[7]

As described more fully in Barrow and Rouse (2013) and Barrow and Rouse (2018), we independently surveyed participants using a web-based survey in order to measure the effect of performance-based scholarships on student educational effort. In addition to asking respondents general questions about educational attainment and work, we asked questions regarding time use to measure the "quantity" of effort allocated to both academic and non-academic activities; questions regarding learning strategies, academic self-efficacy, and motivation in order to measure the "quality" of effort on academic activities; [8] and questions to get at unintended consequences like cheating. We offered individuals an incentive to participate,

[7] We only briefly describe the survey in this section. See Barrow and Rouse (2013) for more details on the survey design and implementation.

[8] Instead of or in addition to increasing time devoted to education and learning, students may improve the quality of their effort by adopting more effective learning strategies. Researchers have also documented a relationship between perceived self-efficacy and academic performance. Finally, cognitive psychologists distinguish between internal motivation and external motivation (see, e.g., Deci 1975 and Deci and Ryan 1985) and document that more positive educational outcomes are associated with greater levels of internal motivation (e.g., Pintrich and De Groot 1990). Therefore, one concern is that providing external motivation through incentives may reduce a student's internal motivation (e.g., Deci, Koestner, and Ryan 1999).

and we surveyed them in the study twice each semester (around the middle of the semester and at the end).

Overall, 72% of participants responded to at least one time-use survey—66 percent of the control group and 77 percent of the treatment group—with somewhat higher response rates in the first semester after random assignment. To make the most compelling and statistically powerful analysis, we focus this analysis on time use and effort at the end of the first semester, as this is the period with the largest sample of survey respondents.[9]

Table 2 presents select baseline characteristic means for study participants at the time of random assignment (column 1) and compares them to a nationally-representative sample of students from the 2007-08 *National Postsecondary Student Aid Study* (NPSAS) (column 2).[10] We limit the NPSAS sample to first-time college students, enrolled in a public two-year college, and between 22 and 36 years of age in order for the sample to be comparable to study participants. The proportions of women, Hispanics/Latinos, and Blacks were much higher in the study sites than nationally. For example, 69% of study participants were female compared with 52% of comparably aged students enrolled in public 2-year colleges nationally. In addition, more than 80% of the participants were Black or Hispanic/Latino compared to 40% nationally. Study participants were also much more likely to speak a language other than English at home, about 55%, compared with 20% nationally.

---

[9] Because we focus on the first semester after random assignment, we do not include data from the first cohort as we were only able to first survey them in the second semester after random assignment.

[10] The baseline data were collected by MDRC at the time participants were enrolled in the study and before they were randomly assigned to a program or control group.

IV. Estimation and Results

A. Empirical Approach and Sample

As in Barrow and Rouse (2018), we estimate the effect of program eligibility on a variety of outcomes and then group the outcomes into "activity domains" in order to improve statistical power. Each outcome *Y* for individual *i* is modeled as follows:

$$\textbf{(1)} \qquad Y_i = \alpha + \beta T_i + \boldsymbol{X}_i\Theta + \boldsymbol{p_i}\gamma + \nu_i,$$

where T_i is a treatment status indicator for individual *i* being eligible for a program scholarship, $\boldsymbol{X}_i$ is a vector of baseline characteristics (which may or may not be included), $\boldsymbol{p}_i$ is a vector of indicators for the student's "randomization pool," ν_i is the error term, and α, β, Θ, and γ are parameters to be estimated.[11] β represents the average effect on outcome *Y* of being randomly assigned to be eligible for the scholarship.

To facilitate interpretation and to improve statistical power, we group impacts on individual time use into two activity domains of most interest for this study: academic activities and non-academic activities.[12] Further, we also summarize impacts of measures that reflect the quality of educational effort and those that capture potential "unintended consequences."

---

[11] Randomization pool fixed effects reflect the community college and cohort in which the participant was recruited. See the table notes for the full list of baseline control variables.

[12] As an alternative, we used factor analysis to identify empirically-determined principal components. The results roughly suggested that variables reflecting academic effort should be grouped together and those reflecting time spent on non-academic time should be grouped together. We prefer our approach because it is more intuitive, and it is possible to identify exactly which outcomes contribute to each domain.

To analyze the effect of PBS eligibility on an activity domain, we can rewrite equation (1) to obtain an effect of the treatment on each individual outcome, where *k* refers to the *k*th outcome:

(2) $$Y_k = \alpha_k + \beta_k T + \boldsymbol{X}\Theta_k + \boldsymbol{p}\gamma_k + \nu_k = \boldsymbol{A}\Phi_k + \nu_k,$$

and then summarize the individual estimates using a seemingly-unrelated regression (SUR) approach (Kling and Liebman 2004). This strategy is similar to simply averaging the estimated effect of being randomly assigned to be eligible for a PBS, if there are no missing values and no covariates.

We first estimate equation (2) and obtain an item-by-item estimate of β (i.e., β_k). We then standardize the estimates of β_k by the standard deviation of the outcome using the responses from the control group participants, denoted σ_{k0}. The estimated impact of eligibility on time use and individual behavior is then the average of the standardized β's within each activity domain,

(3) $$\beta_{AVG} = \frac{1}{K}\sum_{k=1}^{K} \beta_k / \sigma_{k0}\,.$$

We estimate the standard errors for this average effect size (β_{AVG}) using a SUR system that allows us to account for the covariance between the estimates of β_k within each domain:

(4) $$Y = (I_k \otimes \boldsymbol{A})\Phi + \boldsymbol{\nu} \qquad Y = (Y_1', \ldots, Y_K')'$$

where I_K is a *K* by *K* identity matrix and ***A*** is defined as in equation (2). The standard error of the resulting summary measure is the square root of the weighted sum of the variances and covariances among the individual effect estimates. One potential advantage of the SUR is that while estimates of each β_k may be statistically insignificant, the estimate of β_{AVG} may be statistically significant due to covariation among the outcomes. We present estimates of the

underlying regressions as well as those using the summary measures (i.e. the outcomes aggregated within an activity domain).

From our data, we restrict our analysis to participants who responded to the survey administered late in the first semester after random assignment (fall or spring semester depending on the study cohort).[13] After dropping individuals who did not complete the time diary, who had more than four "non-categorized" hours in the 24-hour time period, and those for whom we did not have data in the first part of the survey due to an error by the survey contractor, we have data from 613 surveys. These complete surveys represent 93% of the total number of survey respondents and 54% of the corresponding treated and control participants. Baseline characteristics for the analysis sample are shown in column (1) of Table A2. Women and those receiving any government benefit were significantly more likely to respond to the survey, but an omnibus F-test of whether baseline characteristics jointly predict survey response status yielded a p-values of 0.775 (see Appendix Table A2). Based on observables, the analysis sample appears to be representative of the full experimental sample.

Comparing background characteristics for the analysis sample by treatment status suggests that our estimates are internally valid. Appendix Table A3 shows means of background characteristics (at baseline) by treatment/control status for our analysis sample along with p-values for tests that the differences in means are equal to zero. A few characteristics appear to differ between treatment and control groups; however, an omnibus F-test is not statistically

[13] The analysis sample only includes study participants from cohorts 2 (Spring 2009) and 3 (Fall 2010) because we were unable to survey the first cohort in the first semester after random assignment.

significant at conventional levels, and our estimates are largely unchanged if we include baseline characteristics as controls.

B. Basic Program Impacts on Educational and Other Outcomes

In Table 3a we present estimates of the effect of program eligibility on individual measures of time use from the OLS regressions. In column (1) we provide outcome means for the control group participants. Program effect estimates with standard errors in parentheses are presented in column (2), estimates controlling for baseline characteristics are presented in column (3), and column (4) lists the number of observations used for each estimate. All estimates include controls for randomization pool fixed effects, and estimates are similar if we control for baseline characteristics such as age, sex, race, and parental education.

We find that program-eligible students are no more likely to report ever enrolling in a postsecondary institution since program group assignment than those in the control group. This result is not particularly surprising given that students were on campus when they were recruited for the program and needed to have registered for at least 6 credits (or equated credits) in order to be eligible to participate in the study. As evidence as shown in column (1) of Table 3a, 92% of the control-group students report ever attending a postsecondary institution since random assignment. In contrast, there are large differences in outcomes reflecting student effort. For example, the results suggest that eligibility for a performance-based scholarship induced participants to devote 0.47 more hours (about 30 more minutes) to educational activities in the prior 24-hour period than those assigned to the control group, although the difference is not statistically significant. While control group students report spending about 2.8 hours per day

studying in the last seven days, the PBS-eligible students report devoting 0.22 hours (13 minutes) more time to studying per day, although the difference is not statistically significant at conventional levels. Further, 78 percent of control group students report having attended most or all of their classes in the last seven days compared to 84 percent of students eligible for a performance-based scholarship, a difference that is statistically significant at the 10 percent level (p-value = 0.052).[14] Evidence from MDRC on number of credits earned corroborates our findings. PBS-eligible students earned a modest 0.9 more credits in the first year after random assignment but were no more likely to enroll in either the first or second semester (Patel, Richburg-Hayes, de la Campa, and Rudd 2013).

Before investigating how participants allocated their time to other activities, we consider two measures that may reflect increased academic effort without necessarily increasing studying time, learning strategies and academic self-efficacy. PBS eligibility may induce better academic performance by encouraging students to employ more effective and efficient study strategies to make academic time more productive. Similarly, the scholarships may also induce students to be more engaged with their studies by raising their academic self-efficacy. Results using scales based on the Motivated Strategies for Learning Questionnaire (MSLQ) Learning Strategies index (Pintrich, Smith, Garcia, and McKeachie 1991) and the Patterns of Adaptive Learning Scales (PALS) academic self-efficacy index (Midgley, Maehr, Hruda, Anderman, Anderman, and Freeman et al. 2000) are presented in the last two rows of Table 3a. We have standardized the variables using their respective control group means and standard deviations, so the coefficients therefore reflect impacts in standard deviation units. We estimate that eligibility for a PBS had positive and

[14] P-value = 0.066 for estimate including controls.

statistically significant impacts on these dimensions that range from 20 to 23 percent of a standard deviation.

Results presented thus far generally suggest that participants selected for a PBS devoted more time and effort to educational activities. Given there are only 24 hours in the day, a key question is what did PBS-eligible participants spend less time doing? Table 3b presents results from three other broad time categories based on the 24-hour time diary: work, household production, and leisure and other activities.[15] We estimate that the typical participant (as represented by the control group) works about 2.5 hours per day, devotes nearly 12 hours to home production (which includes sleeping), and devotes about 5 hours to "leisure." We find that PBS-eligible participants accommodated spending about 30 more minutes in the last 24 hours on educational activities by devoting about 41 fewer minutes to leisure activities, an impact that is statistically significant at the 5 percent level. We find no evidence that PBS eligibility induced participants to reduce time spent on work or home production; the estimated PBS impacts are small, positive, and not statistically different from zero.

Finally, concerns about using incentives for academic achievement include the possibility of unintended consequences of the programs, such as cheating, taking easier classes to get good grades, or reducing students' internal motivation to pursue more education. In the bottom rows of Table 3b, we present impacts on several potential unintended consequences for the participants. We find little systematic evidence that eligibility for a PBS resulted in adverse

[15] "Home production" includes time spent on personal care, sleeping, eating and drinking, performing household tasks, and caring for others. "Leisure activities" include participating in a cultural activity, watching TV/movies/listening to music, using the computer, spending time with friends, sports, talking on the phone, volunteering, religious activities, and other leisure activities.

outcomes. For example, those randomly selected for a PBS were no more likely to report having taken challenging classes, having asked for a re-grade, or having felt that they had to cheat, as evidenced by the lack of economic and statistical significance. However, they were more likely to report being satisfied with life (statistically significant at the 10% level), and more likely to report behavior consistent with an increase in internal motivations. Thus, the incentive payments did not seem to reduce their internal motivation.

Overall, the results in Tables 3a and 3b suggest that eligibility for a scholarship that requires achieving benchmarks results in an increase in time and effort devoted to educational activities and a consequent decrease in time devoted to leisure. Further, there is little evidence that the same incentives result in adverse outcomes, such as cheating, "grade grubbing," or taking easier classes. However, for many of the outcomes the impacts are not statistically different from zero.

To improve precision, in Table 4 we combine the individual outcomes into four activity domains using the SUR approach previously described. The activity domains are academic activities, quality of educational input, non-academic activities, and unintended consequences.[16] We standardized the impacts reported in Tables 4 and 5 such that they represent average impacts

[16] *Educational activities* includes: "Hours spent on all academics in the last 24 hours," "Hours studied in past 7 days," "Prepared for last class in last 7 days," and "Attended most/all classes in last 7 days." *Quality of educational input* includes "Academic self-efficacy" and "MSLQ index." *Non-academic activities* includes "Hours on household production," "Hours on leisure," "Nights out for fun in the past 7 days," "Hours worked in last 24 hours," and "Hours worked in the past 7 days." *Unintended consequences* includes "Strongly agree/agree have taken challenging classes," "Ever felt had to cheat," "indices of external motivation and internal motivation," "Ever asked for a re-grade," and "Very satisfied/satisfied with life." We do not include whether an individual had "ever enrolled" in a postsecondary institution in the "all academic activities" index as it represents an academic decision on the extensive margin rather than the intensive margin, and participants were recruited on campus after they had made the decision to enroll.

as a percentage of the control group standard deviation, henceforth referred to as "effect sizes." Using this SUR method, we now estimate a positive impact on academic activities of about 10 percent of a standard deviation, which is statistically significant at the 5 percent level. We also continue to estimate a positive and statistically significant impact on the quality of educational effort. In addition, we estimate a reduction in non-academic activities, though the estimate is not significantly different from zero. Further, we estimate that, overall, there is no increase in "unintended consequences" from the financial incentive.[17] In sum, these results suggest that scholarship incentives change student time allocation by increasing time and effort spent on academic activities and decreasing time on other activities.

C. Impacts by Type of Participant

Finally, we consider whether the impact of the incentive scholarships differs by type of participant. In particular, we hypothesize that the scholarships should have a larger impact for participants who have a lower marginal cost of time and for those who are relatively more myopic meaning that they focus on near term payoffs rather than the longer-term benefits of postsecondary education. Because we do not directly observe these individual characteristics, we infer them based on background characteristics.[18]

---

[17] In fact, in Table 4 the estimate of the impact on unintended consequences is negative and statistically significant. The literature is largely silent on why the incentives would have decreased unintended consequences, and we hesitate to speculate.

[18] The baseline characteristics between the treatment and control groups for these subgroups (age, race, primary language, etc.) are also statistically balanced. The p-values for the omnibus F-tests for treatment and control balance are: 0.756 for those with more than 11 years of schooling, 0.162 for those with less than 11 years of schooling, 0.973 for those without young children, and 0.98 for those with young children. Results are economically similar but statistically noisy if we control for baseline characteristics.

In Panel A of Table 5, we estimate whether the incentive scholarships had a greater impact on those participants who did not have young children under the age of six on the assumption that parents of young children have time-inflexible parenting responsibilities that, in turn, raise the marginal cost of their study time. The SUR coefficient estimates in column (1) represent the main effect of PBS eligibility; those in column (2) represent the interaction effect. We list the p-value on the interaction term in column (3).

The estimated coefficient on the interaction term for all academic activities is positive in column (2) of Panel A in Table 5 indicating that the impact of the PBS was larger for those without children, as expected. Specifically, those without young children increased their time on academic activities by more than those with young children. Notably, however, eligibility for a PBS generated a larger impact on the quality of educational input for those with young children compared to those without. This may not be surprising, as one might expect that those who find it costly to increase the quantity of their effort will try, instead, to increase the quality of that effort in order to reach the scholarship benchmark(s). In all cases, the interaction term is not statistically significant at conventional levels due to large standard errors, but the pattern of coefficients is suggestive that those who can make time adjustments do so.

As a second exercise, we examine if the scholarships had a differential impact on a subgroup of students who had completed 11 or fewer years of schooling before completing a GED or enrolling in (community) college. This is a reasonably large group of individuals who are getting a “second” chance at schooling but are arguably less prepared for college because they did not complete their high school education. These results are reported in Panel B of Table 5.

We find suggestive evidence that incentives matter more for these second-chance students. For example, the program's impacts on time spent on educational activities and quality of educational input were statistically significantly larger for participants who dropped out of high school before 12th grade than for those who had completed more schooling. We also estimate larger impacts on non-academic activities for the high school dropouts, but this difference is not statistically significant at conventional levels. These differences are consistent with our conjecture that the responses to incentives may be larger for students who are myopic in their time preferences.

While we do not have direct measures of the marginal cost of time for participants or the rates at which they discount the future, we find some evidence that the performance-based scholarships had larger impacts for two subgroups that could be explained by the incentive mechanisms largely working through hypothesized channels.

V. Conclusion

Education policymakers have been interested in using incentives to improve educational outcomes at the postsecondary level; however, the research evidence is mixed. We find evidence that students eligible for performance-based scholarships increase the quantity and quality of effort spent on educational activities, and decrease their time spent on other activities. Further, we find some evidence that students we expect to be most responsive to the incentive—such as those with fewer time constraints and those who may be more myopic in their time preferences—likely were.

This study highlights the potential benefits of better understanding student behavior in response to interventions to provide insights for future policy development. For example, if further research confirms that, indeed, those most likely to be constrained by time (such as parents) are less able to change the amount of time devoted to studies, then effective strategies to improve educational attainment among nontraditional students must account for these constraints. Specifically, any efforts to improve educational outcomes for these students must also address constraints on their time by providing them the resources to respond to the intervention or program, such as strategic scheduling and bundling of classes, or a more condensed curricula. Further, if this intervention was more effective for high school drop outs because of a difference in time preference, interventions aimed at assisting this population of students would be more effective if combined with more immediate reward systems. Finally, while the evidence from this and other studies suggests modest impacts on educational outcomes, performance-based scholarships may still be a useful tool in postsecondary education policy. Evidence from Barrow, Richburg-Hayes, Rouse, and Brock (2014), suggests that small impacts on educational attainment be cost effective. Thus, these modest positive behavioral changes may be economically relevant, especially for those most able to take advantage of the incentive.

References

Angrist, J., Lang, D. & Oreopoulos, P. (2009). Incentives and services for college achievement: Evidence from a randomized trial. *American Economic Journal: Applied Economics*, 1(1), 136-63.

Angrist, J., Oreopoulos, P., & Williams, T. (2014). When opportunity knocks, who answers? New evidence on college achievement awards. *The Journal of Human Resources*, 49(3), 572-610.

Angrist, J., Autor, D., Hudson, S., & Pallais, A. (2016). Evaluating post-secondary aid: Enrollment, persistence, and projected completion effects. NBER Working Paper No. 23015. doi: 10.3386/w23015. Accessed 4 December 2017.

Barrow, L., Richburg-Hayes, L., Rouse, C. E., & Brock, T. (2014). Paying for performance: The education impacts of a community college scholarship program for low-income adults. *Journal of Labor Economics*, 32(3), 563-599.

Barrow, L., & Rouse, C. E. (2013). Technical report on the PBS time use survey. https://www.chicagofed.org/~/media/others/people/research-resources/barrow/barrow-pbs-time-use-survey-pdf.pdf?la=en.

Barrow, L., & Rouse, C. E. (2018). Financial incentives and educational investment: The impact of performance-based scholarships on student time use. Education Finance and Policy, 13(4), 419-448.

Carlson, D. E., Elwert, F., Hillman, N., Schmidt, A., & Wolfe, B. L. (2019). The effects of financial aid grant offers on postsecondary educational outcomes: New experimental evidence from the Fund for Wisconsin Scholars. NBER Working Paper No. 26419. doi: 10.3386/w26419. Accessed 15 November 2019.

Cornwell, C. M., Lee, K. H., & Mustard, D. B. (2005). Student responses to merit scholarship rules. *Journal of Human Resources*, 50(4), 895-917.

Deci, E. L. (1975). *Intrinsic Motivation*. New York: Plenum.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, 126(6), 627-668.

Deci, E. L. & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Dynarski, S. M. (2008). Building the stock of college-educated labor. *Journal of Human Resources*, 43(3), 576-610.

Jackson, C. K. (2010). A little now for a lot later: A look at a Texas Advanced Placement incentive program. *Journal of Human Resources*, 45(3), 591-639.

Kling, J. R., & Liebman, J. B. (2004). Experimental analysis of neighborhood effects on youth. Princeton University Industrial Relations Section Working Paper No. 483. http://arks.princeton.edu/ark:/88435/dsp01m613mx58m. Accessed 14 August 2013.

Leuven, E., Oosterbeek, H., & van der Klaauw, B. (2010). The effect of financial rewards on students' achievement: Evidence from a randomized experiment. *Journal of the European Economic Association*, 8(6), 1243-1265.

Mayer, A., Patel, R., Rudd, T., & Ratledge, A. 2015. Designing scholarships to improve college success: Final report on the Performance-Based Scholarship Demonstration. MDRC report. https://www.mdrc.org/sites/default/files/designing_scholarships_FR.pdf. Accessed 13 January 2020.

Midgley, C., Maehr, M. L., Hruda, L. Z., Anderman, E., Anderman, L., Freeman, K. et al. (2000). Manual for the patterns of adaptive learning scales. University of Michigan monograph. Available at: http://www.umich.edu/~pals/PALS%202000_V13Word97.pdf. Accessed 28 June 2012.

National Commission on Excellence in Education, U.S. Dept. of Education (1983). *A nation at risk: The imperative for educational reform.* Report. Available at: https://www.edreform.com/wp-content/uploads/2013/02/A_Nation_At_Risk_1983.pdf.

De Paola, M., Scoppa, V., & Nisticó, R. (2012). Monetary incentives and student achievement in a depressed labor market: Results from a randomized experiment. *Journal of Human Capital*, 6(1), 56-85.

Patel, R., Richburg-Hayes, L., de la Campa, E., & Rudd, T. (2013). *Performance-based scholarships: What have we learned? Interim findings from the PBS demonstration*. MDRC report. https://www.mdrc.org/publication/performance-based-scholarships-what-have-we-learned. Accessed 18 October 2013.

Patel, R., & Rudd, T. (2012). Can scholarships alone help students succeed? Lessons from two New York City community colleges. MDRC report. Retrieved from the MDRC website: https://www.mdrc.org/publication/can-scholarships-alone-help-students-succeed. Accessed 30 May 2013.

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82(1), 33-40.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). Office of Educational Research and Improvement/Department of Education (OERI/ED) Technical Report No. 91-B-004. Available at: https://files.eric.ed.gov/fulltext/ED338122.pdf. Accessed 26 March 2012.

Richburg-Hayes, L., Sommo, C., & Welbeck, R. (2011). Promoting full-time attendance among adults in community college. MDRC report. https://www.mdrc.org/publication/promoting-full-time-attendance-among-adults-community-college. Accessed 14 March 2012.

Scott-Clayton, J. (2011). On money and motivation: A quasi-experimental analysis of financial incentives for colleges achievement. *Journal of Human Resources*, 46(3), 614-646.

U.S. Department of Education (2008). National Postsecondary Student Aid Study. Available at: https://nces.ed.gov/surveys/npsas/.

Table 1: Total (Baseline) Sample Size by Cohort and Site

Cohort	BMCC $1,300/term 2 or 3 terms	Hostos $1,300/term 2 or 3 terms	Combined
Fall 2008	368		368
Spring 2009	374	140	514
Fall 2009	426	193	619
Total	1,168	333	1501

Notes: "BMCC" is the Borough of Manhattan Community College. "Hostos" is Hostos Community College.

Table 2: Characteristics of PBS Study Participants and First-year Students in the National Postsecondary Student Aid Study (NPSAS) of 2008

Characteristics	MDRC PBS participants	NPSAS 2-Year Public Colleges
	(1)	(2)
Age (years)	26.5	27.0
Age 21-35 (%)	99.9	96.2
Female (%)	69.1	52.1
Race/ethnicity (%)		
Hispanic/Latino	44.3	21.6
Black	37.2	18.8
Asian	9.7	7.1
Native American	0.2	1.9
Other	1.0	1.8
Children		
Has any children (%)	47.8	46.9
Number of children	0.8	1.8
Household size		2.6
Education		
Years since high school	6.8	7.0
Enrolled to complete certificate program	2.9	12.1
Enrolled to transfer to 4-year college	43.1	32.1
Highest degree completed		
GED	26.6	19.9
High school diploma	55.4	54.1
Technical certificate or Associate's degree	15.1	19.3
First family member to attend college (%)	32.9	47.0
Highest degree by either parent (%)		
Did not complete high school	24.2	13.4
High school diploma or equivalent	32.9	33.6
Some college including tech certificate	16.1	18.9
Associate's or similar degree	6.4	8.5
4-year bachelor's degree or higher	20.3	25.6
Non-English spoken at home (%)	54.6	19.6
Number of observations	1,501	250,997

Notes: Based on authors' calculations from MDRC data (column 1) and data from the U.S. Department of Education's 2007-08 National Postsecondary Student Aid Study (NPSAS) using PowerStats (column 2). We limit the NPSAS data to first-time students, enrolled at any point from July 1 through December 31, 2007. For comparability with the PBS study participants, we also limit the sample to students from 22 to 36 years of age attending public two-year colleges. The NPSAS means and number of observations are weighted by the 2008 study weight.

Table 3a: OLS Estimates of PBS Impact on Academic Outcomes

		PBS Impact Estimates		
	Control Mean	No Baseline Controls[a]	Including Baseline Characteristics[b]	Obs
Variable	(1)	(2)	(3)	(4)
Ever Enrolled Postsecondary (share)	0.922	-0.012 (0.023)	-0.009 (0.023)	613
Hours on All Academics in Last 24 Hours	4.504	0.470 (0.314)	0.342 (0.313)	613
Hours per Day Studied in Past 7 Days	2.843	0.217 (0.204)	0.126 (0.205)	611
Prepared for Last Class (share)	0.810	0.026 (0.032)	0.034 (0.032)	606
Attended Most/All Classes in Past 7 Days (share)	0.778	0.062* (0.032)	0.060* (0.033)	613
PALS Academic Self-Efficacy[c]	0.000	0.189** (0.078)	0.187** (0.077)	610
MSLQ Index[c]	0.000	0.225*** (0.078)	0.227*** (0.075)	613

Notes: Estimates obtained via ordinary least squares (OLS) regressions. Standard errors are shown in parentheses, and the number of observations in each estimate is shown in column (4).

[a] Estimates include location-cohort fixed effects.

[b] Estimates include location-cohort fixed effects and baseline characteristics—age; number of months between HS diploma/GED receipt and random assignment; standardized responses to exit questions based on motivation; as well as indicators for sex is female; race/ethnicity is Hispanic/Latino, black/African American, Asian, white, American Indian or Alaska native, or other; having no children younger than 6 years old; any household member receiving unemployment insurance, SSI, TANF, or food stamps; being dependent on parents for more than 50% of expenses; current employment; highest level of education less than 12th grade, a HS diploma, a GED, an occupational or technical certificate, or an Associate's degree; being the first in family to go to college; main reason for enrolling in college is to get an Associate's degree, certificate, job skills, or transfer to a four-year college; primary language is English, or primary language is Spanish.

[c] Outcomes has been standardized using the control group distribution.

*** indicates statistical significance at the 1% level; ** indicates statistical significance at the 5% level; and * indicates statistical significance at the 10% level.

Table 3b: OLS Estimates of PBS Impact on Quality of Non-academic Outcomes and Potential Unintended Consequences

		PBS Impact Estimates		
Variable	Control Mean (1)	No Baseline Controls[a] (2)	Including Baseline Characteristics[b] (3)	Obs (4)
Hours Worked in Last 24 Hours	2.496	0.096	0.112	613
		(0.299)	(0.283)	
Hours Worked in Past 7 Days	14.953	0.671	1.119	605
		(1.414)	(1.137)	
Hours on Household Production in Last 24 Hours	11.887	0.118	0.408	613
		(0.352)	(0.344)	
Hours on Leisure in Last 24 Hours	5.080	-0.689**	-0.865***	613
		(0.302)	(0.307)	
Times Out in Past 7 Days	0.761	-0.014	-0.021	613
		(0.084)	(0.087)	
Strongly Agree/Agree to Take Challenging Classes (share)	0.451	0.024	0.005	607
		(0.041)	(0.042)	
Ever Felt Had to Cheat (share)	0.176	-0.027	-0.026	611
		(0.030)	(0.031)	
External Motivation[c]	0.000	0.031	0.046	558
		(0.088)	(0.083)	
Internal Motivation[c]	0.000	0.195***	0.191***	560
		(0.076)	(0.068)	
Ever Asked for Regrade (share)	0.262	-0.018	-0.025	609
		(0.036)	(0.038)	
Very Satisfied/Satisfied with Life (share)	0.494	0.070*	0.064	608
		(0.041)	(0.041)	

Notes: Estimates obtained via ordinary least squares (OLS) regressions. The number of observations in each estimate is shown in column (4).
[a] Estimates include location-cohort fixed effects.
[b] Estimates include location-cohort fixed effects and baseline characteristics—age; number of months between HS diploma/GED receipt and random assignment; standardized responses to exit questions based on motivation; as well as indicators for sex is female; race/ethnicity is Hispanic/Latino, black/African American, Asian, white, American Indian or Alaska native, or other; having no children younger than 6 years old; any household member receiving unemployment insurance, SSI, TANF, or food stamps; being dependent on parents for more than 50% of expenses; current employment; highest level of education less than 12th grade, a HS diploma, a GED, an occupational or technical certificate, or an Associate's degree; being the first in family to go to college; main reason for enrolling in college is to get an Associate's degree, certificate, job skills, or transfer to a four-year college; primary language is English, or primary language is Spanish.
[c] Outcome has been standardized using the control group distribution.
*** indicates statistical significance at the 1% level; ** indicates statistical significance at the 5% level; and * indicates statistical significance at the 10% level.

Table 4: Index Estimates of PBS-Impact using SUR

	PBS Impact
	(1)
All Academic Activities	0.106**
	(0.051)
Quality of Educational Input	0.207***
	(0.068)
Non-Academic Activities	-0.021
	(0.030)
Unintended Consequences[a]	-0.077**
	(0.033)

Notes: Estimates are indexed estimates obtained via the seemingly unrelated regression strategy discussed in the paper and reflect an average effect size. All regressions include location-cohort fixed-effects.

[a] In the "Unintended Consequences" Index, Internal Motivation, Agree to Take Challenging Classes & Satisfied with Life are adjusted so that a negative indicates a "good" outcome.

*** indicates statistical significance at the 1% level; ** indicates statistical significance at the 5% level; and * indicates statistical significance at the 10% level. There are 613 observations in each estimate.

Table 5: PBS Impact in NYC by Respondent Characteristics

	Panel A: PBS Impact by Parental Status		
	PBS	PBS x No Young Child	P-value of Interaction
	(1)	(2)	(3)
All Academic Activities	0.038	0.086	0.410
	(0.080)	(0.105)	
Quality of Educational Input	0.250**	-0.091	0.528
	(0.117)	(0.144)	
Non-Academic Activities	-0.046	0.047	0.451
	(0.049)	(0.062)	
Unintended Consequences	-0.121**	0.070	0.301
	(0.052)	(0.068)	
	Panel B: PBS Impact by Previous Education Attainment		
	PBS	PBS x ≤11yrs Education	P-value of Interaction
	(1)	(2)	(3)
All Academic Activities	0.054	0.200*	0.065
	(0.064)	(0.109)	
Quality of Educational Input	0.093	0.349**	0.022
	(0.084)	(0.152)	
Non-Academic Activities	0.007	-0.107	0.101
	(0.037)	(0.065)	
Unintended Consequences[a]	-0.033	-0.091	0.205
	(0.042)	(0.071)	

Notes: Estimates are indexed estimates obtained via the SUR strategy discussed in the paper. Regressions also include an indicator for participant's parental status/low educational attainment and cohort-location fixed effects.
[a] In constructing the index, components are adjusted so that a negative indicates a "good" outcome. See Table 4 notes.
*** indicates statistical significance at the 1% level; ** indicates statistical significance at the 5% level; and * indicates statistical significance at the 10% level. There are 609 observations in Panel A and 570 observations in Panel B.

Appendix Table A1: Randomization of Program and Control Groups

Baseline Characteristic (%)	Random Assignment: Program Group	Random Assignment: Control Group	p-value of difference	N
Age (years)	26.5	26.6	0.714	1501
Marital Status:				
Married, living with spouse	11.1	13.8	0.130	1384
Married, not living with spouse	7.4	7.2	0.917	1384
Not married, living with partner	12.2	10.1	0.206	1384
Single	69.3	68.9	0.871	1384
Female	69.8	68.4	0.568	1501
No children under six	69.2	65.5	0.119	1492
Race/ethnicity:				
Hispanic	44.4	44.3	0.996	1468
Black	36.2	38.2	0.421	1468
White	6.3	5.9	0.736	1468
Asian	10.3	9.0	0.382	1468
Native American	0.1	0.3	0.570	1468
Other	1.0	1.1	0.791	1468
Multi-racial	1.8	1.2	0.400	1468
Race not reported	2.5	1.9	0.396	1501
Household receiving benefits:				
Receiving any government benefit	42.2	43.9	0.529	1321
Receiving unemployment insurance	7.7	11.5	0.018	1321
Household receiving SSI	6.6	6.1	0.704	1321
Household receiving TANF	9.2	6.9	0.124	1321
Household receiving food stamps	30.1	30.2	0.960	1321
Public housing or section 8 housing	10.7	10.7	0.999	1321
Financially dependent on parents	1.0	1.7	0.232	1435
Currently employed	56.5	55.4	0.649	1446
Years since HS (years)	6.8	6.9	0.852	1375
High school diploma or GED	96.6	96.5	0.885	1470
Technical certificate	11.8	14.9	0.082	1470
Last attended 11th grade or lower	29.5	31.8	0.346	1408
First family member to attend college	34.5	31.3	0.194	1454
Main reason for enrolling in college:				
Complete certificate program	3.0	2.8	0.890	1478
Obtain Associate's degree	48.6	52.8	0.105	1478
Transfer to four-year college	46.1	40.0	0.018	1478
Obtain job skills	2.8	3.7	0.376	1478
Other reason	1.2	2.0	0.205	1478
Primary language				

English	45.6	45.2	0.886	1487
Spanish	29.0	29.9	0.718	1487
Other language	25.4	24.9	0.836	1487
Relative Autonomy Index (baseline motivation to complete schoolwork/attend class)	3.5	3.5	0.967	1495

Notes: Calculations using Baseline Information Form (BIF) data. Means have been adjusted by research cohort and location. An omnibus F-test of whether baseline characteristics jointly predict research group status yielded a p-value of 0.614. Distributions may not add to 100 percent because of rounding. Respondents who reported being Hispanic/Latino and reported a race are included only in the Hispanic category. Respondents who are not coded as Hispanic and chose more than one race are coded as multi-racial.

Appendix Table A2: Representativeness of the Analysis Sample

Baseline Characteristic (%)	Analysis Sample	Non-respondents	p-value of difference	N
Age (years)	26.5	26.3	0.259	1132
Marital Status:				
Married, living with spouse	13.0	12.3	0.713	1040
Married, not living with spouse	8.2	6.3	0.240	1040
Not married, living with partner	10.7	10.6	0.939	1040
Single	68.0	70.8	0.330	1040
Female	73.4	65.5	0.004	1132
No children under six	66.0	68.8	0.324	1125
Race/ethnicity:				
Hispanic	43.8	47.5	0.196	1109
Black	39.3	35.6	0.207	1109
White	5.4	4.3	0.419	1109
Asian	8.4	10.2	0.289	1109
Native American	0.0	0.2	0.280	1109
Other	1.0	1.0	0.969	1109
Multi-racial	2.2	1.2	0.202	1109
Race not reported	2.4	1.5	0.280	1132
Household receiving benefits:				
Receiving any government benefit	48.9	42.6	0.046	994
Receiving unemployment insurance	12.1	8.7	0.077	994
Household receiving SSI	6.3	6.4	0.916	994
Household receiving TANF	8.9	6.6	0.192	994
Household receiving food stamps	34.6	30.0	0.119	994
Public housing or section 8 housing	12.3	10.6	0.405	994
Financially dependent on parents	1.2	1.6	0.526	1080
Currently employed	52.8	57.5	0.123	1090
Years since HS (years)	6.7	6.6	0.506	1036
High school diploma or GED	96.8	96.8	0.983	1103
Technical certificate	13.5	12.7	0.705	1103
Last attended 11th grade or lower	31.1	28.9	0.455	1057
First family member to attend college	33.3	32.4	0.763	1097
Main reason for enrolling in college:				
Complete certificate program	3.0	3.6	0.584	1113
Obtain Associate's degree	51.8	51.0	0.790	1113
Transfer to four-year college	42.8	42.1	0.812	1113
Obtain job skills	3.1	2.8	0.722	1113
Other reason	1.2	2.6	0.083	1113
Primary language				

English	43.4	39.6	0.190	1119
Spanish	31.8	32.8	0.735	1119
Other language	24.8	27.7	0.271	1119
Relative Autonomy Index (baseline motivation to complete schoolwork/ attend class)	3.5	3.4	0.506	1127

Notes: Calculations using Baseline Information Form (BIF) data for all experiment participants (1,132 individuals) whom we attempted to survey at the end of their first program semester. For cohort 2, this is the second wave of the survey administration in Spring 2009; for cohort 3 it is the second wave of the survey administration in Fall 2009. Non-respondents include individuals who responded to the survey but were not included in the analysis sample as described in the paper. Means have been adjusted by research cohort and location. An omnibus F-test of whether baseline characteristics jointly predict analysis group status yielded a p-value of 0.775. Distributions may not add to 100 percent because of rounding. Participants who reported being Hispanic/Latino and reported a race are included only in the Hispanic category. Participants who are not coded as Hispanic and chose more than one race are coded as multi-racial.

Appendix Table A3: Random Assignment of Program and Control Groups, Analysis Sample

Baseline Characteristic (%)	Random Assignment: Program Group	Random Assignment: Control Group	p-value of difference	N
Age (years)	26.4	26.7	0.376	613
Marital Status				
Married, living with spouse	12.8	13.4	0.826	559
Married, not living with spouse	7.2	9.6	0.326	559
Not married, living with partner	12.8	7.9	0.068	559
Single	67.2	69.1	0.633	559
Female	71.9	75.5	0.326	613
No children under six	69.1	61.7	0.061	609
Race/ethnicity				
Hispanic	43.4	44.4	0.810	598
Black	38.4	40.6	0.582	598
White	5.6	5.0	0.742	598
Asian	10.0	6.1	0.088	598
Native American	0.0	0.0		598
Other	0.9	1.2	0.723	598
Multi-racial	1.7	2.8	0.406	598
Race not reported	2.6	2.3	0.815	613
Household receiving benefits				
Receiving any government benefit	47.3	51.3	0.360	543
Receiving unemployment insurance	9.1	16.4	0.010	543
Household receiving SSI	6.4	6.1	0.886	543
Household receiving TANF	8.8	8.9	0.961	543
Household receiving food stamps	33.2	36.5	0.430	543
Public housing or section 8 housing	12.6	12.0	0.853	543
Financially dependent on parents	0.9	1.6	0.409	592
Currently employed	53.3	52.1	0.765	589
Years since HS (years)	6.7	6.8	0.817	566
High school diploma or GED	96.5	97.3	0.620	600
Technical certificate	13.5	13.4	0.972	600
Last attended 11th grade or lower	29.8	32.8	0.435	570
First family member to attend college	36.3	29.3	0.075	597
Main reason for enrolling in college				
Complete certificate program	3.2	2.7	0.764	605
Obtain Associate's degree	50.2	53.8	0.381	605
Transfer to four-year college	45.3	39.4	0.150	605
Obtain job skills	2.8	3.6	0.599	605
Other reason	1.5	0.8	0.433	605
Primary language				

English	43.4	43.4	0.986	606
Spanish	31.3	32.5	0.769	606
Other language	25.2	24.1	0.746	606
Relative Autonomy Index (baseline motivation to complete schoolwork/ attend class)	3.5	3.4	0.786	611

Notes: Calculations using Baseline Information Form data. The means have been adjusted by research cohort and location. Of the 613 respondents in the analysis sample, 356 are part of the treatment group and 257 are part of the control group. An omnibus F-test of whether baseline characteristics jointly predict research group status yielded a p-value of 0.464. Distributions may not add to 100 percent because of rounding. Respondents who reported being Hispanic/Latino and reported a race are included only in the Hispanic category. Respondents who are not coded as Hispanic and chose more than one race are coded as multi-racial.