Working for College: The Causal Impacts of Financial Grants on Undergraduate Employment

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One way in which financial aid is thought to promote college success is by minimizing the time students spend working. Yet, little research has examined if this intended first-order effect occurs, and results are mixed. We leverage a randomized experiment and find that students from low-income families in Wisconsin offered additional grant aid were 5.88 percentage points less likely to work and worked 1.69 fewer hours per week than similar peers, an 8.56% and 14.35% reduction, respectively. Students offered the grant also improved qualitative aspects of their work experiences; they were less likely to work extensively, during the morning hours, or overnight. Grant aid thus appears to partially offset student employment, possibly improving prospects for academic achievement and attainment.

Keywords: *financial aid, employment, low-income college students, randomized experiment*

NEARLY three in four undergraduates work for pay while enrolled in college. Among those employed, one in five work full-time, and of those working part-time, half work more than 20 hours per week (Davis, 2012). The trend of increasing undergraduate employment dates back a half-century, concomitant with substantial growth in college costs and shrinkage in the purchasing power of need-based financial aid (Bowen, Chingos, & McPerson, 2009; Goldrick-Rab, 2016). Furthermore, the earning power of those without a college degree has declined (Lemieux, 2008), and precarious working conditions that make work more less certain or secure for employees have become more common over this time period (Kalleberg, 2011; Lambert, Fugiel, & Henly, 2014). Rising undergraduate employment is concentrated among full-time students in their late teens and early 20s, rather than older adults who have worked at approximately the same rate since 1970 (Scott-Clayton, 2012;

Turner, 2004). Among younger students (ages = 16–24) attending college full-time, two in five work, and the majority (64% of working students) report working 20 or more hours per week (U.S. Department of Education, 2014).

Studies of financial aid show a positive effect of grants and scholarships on college completion (e.g., Alon, 2007; Castleman & Long, 2013; S. Dynarski, 2008; S. M. Dynarski, 2003; Goldrick-Rab, Kelchen, Harris, & Benson, 2016; Scott-Clayton, 2011b; Singell, 2004), but we know little about the mechanisms through which those effects arise. One common hypothesis is that grant aid helps students cover their college costs so that they do not have to work as much to meet their needs (e.g., Goldrick-Rab, Harris, & Trostel, 2009; Richburg-Hayes et al., 2015). However, few studies have directly examined this relationship, and the results are mixed. Experimental studies of relatively modest performance-based scholarships (awarded conditional on academic

progress in college) awarded to low-income students often report no impact on work behaviors (Barrow & Rouse, 2013; Leuven, Oosterbeek, & van der Klaauw, 2010; MacDonald et al., 2009; Mayer, Patel, & Gutierrez, 2015; Richburg-Hayes et al., 2009; Sommo et al., 2014). Quasi-experimental research results, however, show an inverse relationship between relatively generous amounts of merit aid (awarded based on high school performance) and the number of hours worked or work earnings (DesJardins, McCall, Ott, & Kim, 2010; Scott-Clayton, 2011b).

The ability of grant aid to influence students' work behaviors is of particular interest to policymakers and practitioners looking for ways to improve college success. Several quasi-experimental studies indicate that working while in college is associated with lower levels of academic achievement (Dadgar, 2012; DeSimone, 2008; Scott-Clayton, 2011a; Scott-Clayton & Minaya, 2014; Soliz & Long, 2014; Stinebrickner & Stinebrickner, 2003) and credit completion (Darolia, 2014). Working is also associated with an interruption to students' studies, particularly when they work long hours (Bozick, 2007; Ehrenberg & Sherman, 1987; Horn & Malizio, 1998; Orszag, Orszag, & Whitmore, 2001; Van Dyke, Little, & Callender, 2005), and among those who graduate, working extends their time to degree (Bound, Lovenheim, & Turner, 2012). However, high-quality work experiences—particularly jobs with an on-campus location and those connected to academic interests—can shield students from these negative relationships and even promote college attainment (Ehrenberg & Sherman, 1987; Perna, 2010; Scott-Clayton & Minaya, 2014). Therefore, indicators of work quality and quantity are important for understanding students' work experiences and how they might influence future outcomes.

Given their relatively weaker financial strength, students from low-income families and those without college-educated parents are more likely than their more advantaged peers to combine schooling with work (Roksa & Velez, 2010; Scott-Clayton, 2012; Walpole, 2003). Furthermore, these students may be the least capable of juggling work and school and benefit the most from a reduction in work hours or improvement in work quality (Scott-Clayton & Minaya, 2014). Thus, it may be that the high incidence and extensive nature of student employment is undermining efforts to increase degree attainment and diminish persistent and troubling social inequalities in college completion (Bowen et al., 2009; Demos & Young Invincibles, 2011; O'Sullivan & Setzer, 2014; U.S. Department of Education, 2014).

To determine if grant aid can change work behaviors among college students, we use data from an experimental study in which undergraduates from low-income families were randomly assigned an offer of an additional need-based grant. Their subsequent work choices were tracked using a student survey. The results are promising—we find that need-based grant aid effectively reduced the quantity and improved the quality of student employment. Students who were offered the grant were less likely to work at all and worked fewer hours. They were also less likely to work extensively (i.e., 20+ hours/week) and less likely than similar peers to work during the morning or overnight. Further investigation of heterogeneity suggests that the impacts were largest for first-generation students (i.e., neither parent has a college degree) though additional research is needed to confirm this subgroup variation.

Background and Literature Review

Student Employment

Compared with previous generations, today's undergraduates are more likely to work and work extensively. In 1960, 25% of full-time students of traditional age (i.e., between the ages of 16 and 24 at the time of entry) worked while enrolled in college (Stern & Nakata, 1991) compared with 40% today (U.S. Department of Education, 2014). Growth in student employment began in the mid-1960s and continued until the percentage of employed full-time traditional-age students reached its peak at 52% in 2000 (Stern & Nakata, 1991; U.S. Department of Education, 2014). Growth in the percentage of students working extensively accounted for almost all the growth in student employment over this time period. In 1970, one in seven traditional-age full-time undergraduates were working 20 or more hours per week, whereas today, one in four college students are working extensively (U.S. Department of Education, 2014).

As student employment rates have risen, high-quality labor market opportunities for those without a college degree have plummeted (Kalleberg, 2011). For students, there are several important dimensions of job quality, including wages and fringe benefits, work schedule and timing of shifts, flexibility and autonomy, connection to interests and the academic environment, and location (Astin, 1993; Kalleberg, 2011; Lambert et al., 2014; Presser & Ward, 2011), but prior research often only distinguishes between on- and off-campus work (e.g., Ehrenberg & Sherman, 1987; Perna, 2010; Riggert, Boyle, Petrosko, Ash, & Rude-Parkins, 2006). This simplified measure of quality assumes that on-campus employers are more sensitive to students' academic schedules and goals, and students are not scheduled to work extensively. Results from a national survey indicate that 86% of college students work a "regular" job rather than in a work–study position or assistantship (7%), and a small fraction work in both types (7%). Just 4% of college students receive support from the Federal Work-Study program, which was established to help provide high-quality jobs to lower income students. Correspondingly, 88% of students work off-campus and 9% report on-campus work (3% work both on- and off-campus). Moreover, fewer than one in three working students believe that their job is related to their academic major (Perna, 2010).

There is a great deal of variation in student employment, even among full-time traditional-age undergraduates. A greater proportion of women than men work while in college (43% vs. 35%), and racial differences indicate that Whites are most likely to be employed (43% White vs. 34% Black and 37% Hispanic). Greater shares of community college students work when compared with their counterparts at 4-year colleges (42% vs. 38%), and they are more likely to work more than 20 hours per week (70% vs. 62%). A larger proportion of students attending public institutions work compared with their peers at private colleges (40% vs. 34% at 4-year schools; U.S. Department of Education, 2014). Students from socioeconomically disadvantaged backgrounds are also more likely to work and work extensively than their more privileged peers (Perna, 2010; Walpole, 2003). Among dependent full-time 4-year college students, 72% from families in the bottom income quartile report working sometime during the school year compared with 63% of those from families in the top quartile. On average, students from the lowest income quartile work 3.4 more hours per week than those from the top quartile (15.2 vs. 11.8 hours; Scott-Clayton, 2012). Similarly, students whose parents have lower levels of education are also more likely to work, even after controlling for parental net worth. Roksa and Velez (2010) argue that undergraduates with college-educated parents are shielded from extensive labor market participation to preserve educationally conducive conditions for success. College-educated parents seem to discourage their children from working during college via direct monetary transfers and cultural capital in the form of counseling and advice (Kalenkoski & Pabilonia, 2010; Roksa & Velez, 2010).

Why Students Work. Students work during college for a variety of reasons including gaining labor market experience, exploring career options, meeting cultural obligations, maintaining one's identity as a worker, and earning money to pay for basic needs, college costs, or supplemental spending (Cheng & Alcántara, 2007; Goldrick-Rab et al., 2009; Perna, 2010). Financial considerations play a key role in students' work decisions (Bound et al., 2012; Dundes & Marx, 2006). Working for financial reasons is particularly common among students from low-income families; 58% of students from families in the bottom income quartile report they cannot afford school without working compared with 30% of students from the top income quartile (Scott-Clayton, 2012). In addition to family background, the net price of college also affects students' need to work. Students attending colleges with higher net prices work more hours than similar peers attending more affordable schools (Kalenkoski & Pabilonia, 2010). Students working for financial reasons, rather than interest motives such as those listed above, may be more likely to change their work behaviors due to an increase in grant aid (Lobel, 1991).

Students often work long hours because their pay is low and college is expensive. The net price of college has grown as financial aid has lost "purchasing power" and sticker prices have risen. When the Pell Grant was created in the

early 1970s, it covered more than 75% of the cost of attending a public 4-year college for low-income students, whereas today, it covers just 30%. Currently, a dependent student from a family in the lowest income quartile (i.e., median annual earnings of US$21,000) would have to pay 59% of her family's total income to attend a public 4-year college for 1 year, after all grant aid has been taken into account (Goldrick-Rab & Kendall, 2014). Because most families cannot devote 59% of their total income to pay for college, students often turn to work. At the minimum wage rate of US$7.25, this amount of unmet need translates into 33 hours of work per week, year-round.[1]

Furthermore, the kinds of employment that allowed prior generations to work their way through college are no longer available (Kalleberg, 2011). Among full-time undergraduates, the most common type of employment is in the service industry, including waiting tables (Scott-Clayton, 2012). The tipped minimum wage, common among those in the service industry, has fallen in value by nearly 60% over the past 40 years (Allegretto & Filion, 2011). Moreover, part-time employment has become more precarious with inconsistent and unpredictable hours that are often not under the control of the employee (Kalleberg, 2011; Lambert et al., 2014). Thus, today's labor situation makes balancing work and school more difficult than it was a generation ago (Goldrick-Rab, 2016).

Financial Aid and Labor Market Participation

The idea that financial aid can substitute for work is based on the economic rationale that students need a certain amount of money to attend college, and they are neutral regarding whether those dollars come from aid or work. This theory relies on several assumptions, including students' preferences regarding work and financial aid as well as their ability to make ends meet and control their work hours as preferred. If grant aid is to entirely substitute for work, the dollar value of the aid must be large enough to meet students' full financial need, students must have the information to make this calculation and trust that the aid will be delivered in a reliable and timely manner, and they have to be willing to give up

any non-financial aspects of employment (e.g., work experience). There are several reasons why substituting grant aid for work might not be plausible. For example, a conservative estimate (Kelchen, Hosch, & Goldrick-Rab, 2014) of 4-year public college students' unmet annual need is US$12,300 for those from families in the bottom quartile of the income distribution and US$16,200 for those in the third income quartile (Goldrick-Rab & Kendall, 2014). Even the most generous grants and scholarships rarely match these estimates of financial need. Furthermore, students find the financial aid system complicated and confusing and thus have difficulty accurately estimating their aid packages (e.g., Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2012; S. Dynarski & Scott-Clayton, 2013). Finally, a small proportion of students (i.e., 7% of low-income students) primarily work for non-financial reasons (Scott-Clayton, 2012), and this may be a wise decision given potential future labor market payoffs (e.g., Light, 2001; Molitor & Leigh, 2005; Ruhm, 1997).

If the amount of grant aid is not large enough to meet students' full financial need or do so in a timely manner, then students must negotiate how much they plan to work, which loans they are willing to take, if they can reduce their budget, or receive any additional funds from friends and family. For students already struggling to make ends meet, the additional grant aid may be put toward existing unmet needs (Broton, Frank, & Goldrick-Rab, 2014), rather than to reduce employment. For example, when low-income students were asked how they spent a US$1,000 scholarship, the most common responses were to purchase books and school supplies (65%), pay tuition and fees (18%), pay for transportation (7%), and pay bills (5%; Richburg-Hayes et al., 2015). Other students may prefer to reduce loan amounts before they cut back on work (Binder, Krause, Miller, & Cerna, 2015; Cha & Patel, 2010; Mayer et al., 2015; Miller, Binder, Harris, & Krause, 2011; Patel & Valenzuela, 2013). Those with a normative preference against borrowing due to poor prior experiences or cultural norms may view additional grant aid as an opportunity to act on those preferences (Boatman, Evans, & Soliz, 2014; Cunningham & Santiago, 2008).

Students induced to change their work behaviors through increased grant aid may select to

reduce their work hours. A general reduction in the number of hours worked may be particularly beneficial for those working extensively and provides students with more time to devote to academic, family, or leisure activities (Greene & Maggs, 2015). Students may also use the additional grant aid to change their work behaviors in ways that improve the quality of their employment experiences. For example, prior research suggests that a reduction in off-campus employment, rather than on-campus employment, may promote academic success. Students may also prefer to cut back on work during particular times of day, such as mornings and early afternoons when many classes are offered or overnights for better sleep. Of course, these changes in work behaviors depend on students' ability to meet their preferences and may be difficult for those in precarious labor situations (Kalleberg, 2011; Lambert et al., 2014) or in areas with few labor opportunities (Scott-Clayton, 2012). A final complicating factor in students' work decisions is federal regulation that allows students to work themselves out of financial aid if they earn more than the protected income allowance.[2] Students' non-work-study earnings above a certain threshold penalize their financial aid award (Goldrick-Rab, 2016). If a student reduces her income to within the protected allowance, she may actually receive more financial aid (Perna, 2010). Thus, the premise that financial aid can simply substitute for work may be more complicated than it initially seems.

Empirical Evidence on Financial Aid and Student Employment. The extant evidence on the impact of grant aid on students' work behaviors is mixed. Several experimental studies of relatively modest performance-based scholarships report no impact on work while quasi-experimental analyses of more generous merit scholarships indicate that aid reduces work. In a series of demonstration projects, MDRC randomly assigned low-income 2- and 4-year college students to receive additional grant aid, often US$1,000 per semester, if they met certain course credit and grade point average (GPA) thresholds. They theorize that this grant aid can substitute for work, but four experimental evaluations across five states yielded no significant impact on students' probability of working, number of hours

worked, or earnings, despite positive academic impacts of the scholarship (Barrow & Rouse, 2013; Mayer et al., 2015; Richburg-Hayes et al., 2009; Sommo et al., 2014). Similarly, two international studies in which students were randomly offered an additional US$250 or US$750 grant if they met certain academic benchmarks show no impact on students' employment decisions (Leuven et al., 2010; MacDonald et al., 2009). There are two notable exceptions. First, results from one experimental study indicate that students who were randomly assigned an offer of additional scholarship aid if they met certain academic benchmarks worked 3.3 *more* hours per week than similar peers who typically work 9.4 hours (Binder et al., 2015). In another study, students who were randomized to receive an offer of an additional performance-based scholarship were 4.7 percentage points less likely to work anytime during their first year of college (52.1% treatment vs. 56.8% control), but there were no experimental impacts on the proportion of students currently working, the number of current jobs, or the number of hours currently worked (Richburg-Hayes et al., 2015).

In a quasi-experimental analysis using a regression discontinuity design, DesJardins and colleagues (2010) report that Gates Millennial Scholars worked 4.295 fewer hours in their freshman year and 4.233 fewer hours in their junior year than similar peers. Investigation of heterogeneous impacts yielded few differences, but it appears that the reduction in freshman work hours was larger for those whose parents had some college.[3] The Gates Millennial Scholarship Program targets high-achieving racial/ethnic minority students and offers them a generous renewable scholarship worth US$8,000 in the first year as well as additional non-monetary supports. Assuming a constant linear effect, this translates into a 32-minute reduction in weekly work hours per US$1,000 of scholarship aid for freshman. Extant research suggests that a 4.295 reduction in work hours enables students to take one more 3-credit course per year (Darolia, 2014) or improve their GPA by 0.05 to 0.70 units (DeSimone, 2008; Stinebrickner & Stinebrickner, 2003). Similarly, West Virginia's Providing Real Opportunities for Maximizing In-State Student Excellence (PROMISE) scholarship program awards high-achieving students full tuition and

fees to attend an in-state 2- or 4-year college. The scholarship is renewable for 4 years, and the average total award is US$10,000. By exploiting discontinuities in student eligibility and program timing, Scott-Clayton (2011b) estimates that awardees earn about US$10 less per week than similar peers, which translates into a 10% reduction in weekly earnings.

Overall, it is not clear if these mixed results regarding the relationship between grant aid and work behaviors are attributable to differences in methods, scholarship types and amounts, the particular sample of students, or selection bias. Almost all prior experimental analyses of the impact of grant aid on work show no impact, but these are studies of relatively modest performance-based scholarships where students may be particularly unsure if they will receive an additional aid. Our experimental analysis of a more generous need-based grant indicates that aid reduces work. Thus, our findings support the extant quasi-experimental research, which indicates that relatively generous merit scholarships reduce work. Furthermore, we show that this inverse relationship generalizes beyond a select sample of high achievers.

Data and Empirical Approach

The Wisconsin Scholars Grant (WSG)

The WSG is a privately funded grant, initiated in 2008 and supported by a US$175 million endowment from the Fund for Wisconsin Scholars, making it one of the largest need-based grant programs in the state (Pope, 2010).[4] The WSG program offers students attending 4-year colleges a US$3,500 grant per year and students attending 2-year colleges a US$1,800 grant per year, renewable for up to 5 years.[5] To be eligible for the grant, students must meet the following criteria: Wisconsin residents who attended and graduated from a state public high school or earned a Wisconsin High School Equivalency Diploma within 3 years of matriculating to one of the state's 42 public colleges or universities, where they enrolled for at least 12 credits, completed the Free Application for Federal Student Aid (FAFSA), and qualified for a federal Pell Grant, while still possessing unmet need (excluding loans) of at least US$1.

The Fund for Wisconsin Scholars created a process in which eligible participants were identified using administrative records, randomly assigned via lottery, and then only notified of the program if chosen to receive the WSG offer. Twelve hundred students were randomly selected to receive an offer of the WSG and were sent an award notification letter that they had to sign and return to receive the grant, which was then packaged and disbursed through the college's financial aid office. In selecting the control group, the list of eligible non-recipients was blocked by college to facilitate the oversample of non-White students. Thus, the control group is 50% larger ($n = 1,800$) and contains more students attending racially/ethnically diverse colleges. To account for this research design, we use survey weights as described below. Data for this research study were obtained independently from the program, so as to avoid any interaction effects that could compromise the research or program (for more details, see Goldrick-Rab, 2016; Goldrick-Rab et al., 2016).

Research Questions

Can offering students from low-income families additional grant aid induce changes in their work behaviors? We consider average impacts on the percent of students working at all, working off-campus, and working extensively. We also estimate the average impact on the number of total hours worked, number of hours worked off-campus, and hours worked in on-campus employment. Next, we examine if the grant offer affected the time of day students worked. Finally, we investigate variation in impact by factors likely to influence work behaviors, including students' ascribed characteristics (gender, race/ethnicity), type of institution attended (2- or 4-year college), family background (parental education level and income), and prior work behavior.

Sample and Descriptive Statistics

The analytic sample includes 1,438 students who responded to a survey administered in the fall of their second year of college and completed at least one of the work behavior questions.[6] Nearly two thirds of WSLS students ($n = 1,879$) were eligible to participate in the fall 2009 survey based on WSG eligibility criteria described above and past

TABLE 1

Baseline Characteristics of Analytic Sample by Treatment Status

Characteristic	Control group	Treatment group	*p* value	Effect size
Response rate for survey-eligible sample (%)[a]	75.60	77.79	.972	NA
Female (%)	60.42	60.38	.991	−0.001
Targeted racial/ethnic minority (%)[b]	22.58	23.13	.813	0.019
Average age (years)	18.30	18.40	.543	0.034
Married (%)	1.34	0.99	.570	−0.188
Has dependent child (%)	3.47	3.16	.750	−0.058
First-generation college student (%)[c]	56.05	56.43	.895	0.010
Father holds a college degree (AA or higher; %)	25.99	27.67	.534	0.052
Mother holds a college degree (AA or higher; %)	34.23	36.01	.538	0.047
Financially dependent on parents (%)	94.20	94.98	.531	0.092
Average expected family contribution (US$)	1,407	1,541	.250	0.068
Parent(s)' adjusted gross income (US$)	27,109	29,079	.061	0.105
Parent(s)' investment income (US$)[d]	5,160	4,151	.210	−0.068
Student's adjusted gross income (US$)	3,141	3,200	.780	0.016
Student's investment income (US$)	279	213	.385	−0.052
Eligible for Simplified Needs Test (%)	57.99	55.07	.294	−0.072
Enrolled in 4-year college (%)	63.71	64.17	.861	0.012
First year in college with no prior enrollment (%)[e]	99.63	99.84	.469	0.520
Sample size	818	620		

Note. Data come from students' 2008 FAFSA except for race/ethnicity, which are self-reported on a survey. No imputation is performed for missing data items. Effect sizes are calculated according to What Works Clearinghouse (2014). For information regarding randomization among the full WSLS study sample, see Goldrick-Rab (2016) and Goldrick-Rab, Kelchen, Harris, and Benson (2016). FAFSA = Free Application for Federal Student Aid; WSG = Wisconsin Scholars Grant; WSLS = Wisconsin Scholars Longitudinal Study.

[a]The fall 2009 survey-eligible sample includes 1,879 students (1,082 in the control group and 797 in the treatment group) and is based on WSG eligibility criteria and past survey participation.

[b]Targeted minority groups include African American, Latino, Southeast Asian, Native American, and multiracial. "Targeted" refers to a policy of the University of Wisconsin System.

[c]First generation means that neither parent has a college degree.

[d]Parent investment income had few extreme values with undue influences and were therefore trimmed at the 99th percentile (Osborne & Overbay, 2004).

[e]The large effect size on the no prior college enrollment variable likely reflects the fact that both groups are so close to 1 and the standard deviation is small rather than a meaningful difference between groups.

survey participation; eligibility for participation was independent of treatment status ($p > .05$). The overall response rate was 76.53% (77.79% treatment group and 75.60% control group) indicating low overall and differential attrition (What Works Clearinghouse, 2014).[7] Examination of baseline characteristics indicates no statistically significant ($p < .05$) differences between the treatment and control groups in the analytic sample. Given the internal validity, observed differences in outcomes between the treatment and control groups are attributable to the WSG offer (Table 1).

Six in 10 students in the analytic sample are women and nearly one in four identify as a targeted racial or ethnic minority.[8] The average age is 18.3 years, 64% attend a 4-year college, and 95% are financially dependent on their parents. Their parents' average adjusted gross income is approximately US$28,000, and the average expected family contribution to college expenses is nearly US$1,500. Almost all the students reported that they are first-time enrollees in college and 56% are first-generation college students, meaning that neither parent has a college degree. Because the full WSLS study sample was not eligible to participate in the fall 2009 survey, the analytic sample is not representative of the full study sample. Students in the analytic sample

TABLE 2
Baseline Characteristics of Full, Survey-Eligible, and Analytic Samples

Characteristic	Full study sample	Survey-eligible sample[a]	Analytic sample	*p* value
Assigned to treatment (%)	40.00	41.12	41.15	.217
Female (%)	58.69	57.74	60.40	.010
Targeted racial/ethnic minority (%)[b]	NA	23.27	22.80	NA
Average age (years)	19.53	18.36	18.34	.000
Married (%)	3.98	0.98	1.20	.000
Has dependent child (%)	13.07	4.07	3.34	.000
First-generation college student (%)[c]	57.29	56.22	56.21	.282
Father holds a college degree (AA or higher; %)	26.21	26.45	26.66	.243
Mother holds a college degree (AA or higher; %)	33.93	35.00	34.94	.212
Financially dependent on parents (%)	82.39	94.09	94.52	.000
Average expected family contribution (US$)	1,314	1,435	1,462	.015
Parent(s)' adjusted gross income (US$)	23,220	27,422	27,916	.000
Parent(s)' investment income (US$)[d]	4,031	7,050	4,743	.011
Student's adjusted gross income (US$)	4,784	3,224	3,165	.000
Student's investment income (US$)	359	347	252	.150
Eligible for Simplified Needs Test (%)	61.87	58.85	56.80	.000
Enrolled in 4-year college (%)	50.00	60.94	63.90	.000
First year in college with no prior enrollment (%)	86.78	99.78	99.72	.000
Sample size	3,000	1,879	1,438	

Note. Data come from students' 2008 FAFSA except for race/ethnicity, which are self-reported on a survey. No imputation is performed for missing data items. The reported *p* value compares the analytic sample with the full study sample. FAFSA = Free Application for Federal Student Aid; WSG = Wisconsin Scholars Grant.
[a]The fall 2009 survey-eligible sample includes 1,879 students (1,082 in the control group and 797 in the treatment group) and is based on WSG eligibility criteria and past survey participation.
[b]Targeted minority groups include African American, Latino, Southeast Asian, Native American, and multiracial. "Targeted" refers to a policy of the University of Wisconsin System.
[c]First generation means that neither parent has a college degree.
[d]Parent investment income had few extreme values with undue influences and were therefore trimmed at the 99th percentile (Osborne & Overbay, 2004).

are more likely to be younger, female, financially dependent on their parents, first-time college enrollees, and from more economically advantaged families. Students in the analytic sample are also less likely to be married, have dependent children, or attend a 2-year college (Table 2). Thus, the results may not be generalizable to the sample of Wisconsin students described above.

Survey Measures

Measures of undergraduate labor force participation are based on student self-reports to survey questions in fall 2009 and are based on work measures used in national studies (e.g., American Community Survey). Students were asked if in the last week they had a job where they worked for pay and how many hours they worked in off-campus and on-campus employment.[9] From these measures, we created a total hours worked variable and two indicator variables: one noting any off-campus work and one noting extensive work if students worked 20 or more total hours in the past week. Finally, employed students were asked to indicate if they had worked during any of the following blocks of time: 8:00 a.m. to 12:00 p.m., 12:00 p.m. to 6:00 p.m., 6:00 p.m. to 10:00 p.m., 10:00 p.m. to 2:00 a.m., or 2:00 a.m. to 8:00 a.m.

Analytic Plan

An intent-to-treat analysis is used to estimate the experimental effect in which students offered the WSG are compared with students who would

have been offered it if selected during random assignment.[10] The equation is

$$y_i = \alpha + \beta\left(WSG_i\right) + \gamma X_i + \varepsilon_i, \qquad (1)$$

where y_i is a student outcome, WSG_i is an indicator of an offer of the WSG, X_i is a vector of individual-level baseline controls, and ε_i is an error term. Ordinary least squares regression is used to estimate impacts on continuous outcome variables including total hours worked in the past week as well as total hours worked in on- and off-campus employment. Logistic regression is used to estimate the effect of the grant offer on dichotomous outcome measures, including working at all, working off-campus, working extensively, or during certain 4- to 6-hour blocks of time throughout the day. Individual-level baseline control variables serve to increase precision and include expected family contribution, financial dependency status, parents and students adjusted gross income, parents and students investment income, first-time college enrollment, eligibility for simplified needs test, marital status, and parental status.[11] Inverse probability weights are used in all analyses due to unequal assignment probabilities among students across schools.[12] The treatment impacts are reported as changes in the number of hours worked for continuous outcomes and as percentage point differences for dichotomous outcomes. In addition, the magnitudes of the treatment impacts are reported as effect sizes to aid the reader in substantive interpretation (Lipsey et al., 2012). The standardized mean difference, Hedges's *g*, is reported for continuous outcomes, and the Cox index, which is a comparable measure, is used for dichotomous outcomes (What Works Clearinghouse, 2014). In addition, we report unadjusted impact estimates in the appendix as a reference for the reader (Table A1).

Following the analysis of average impacts, heterogeneous treatment effects are estimated by introducing interaction terms. The equation is

$$\begin{aligned} y_i = {} & \alpha + \beta\left(WSG_i\right) + \gamma X_i + \delta Z_i \\ & + \theta\left(WSG_i \times Z_i\right) + \varepsilon_i \end{aligned} \qquad (2)$$

where y_i is a student outcome, WSG_i is an indicator of an offer of the WSG, X_i is a vector of individual-level baseline controls described above, Z_i is a vector of individual-level baseline characteristics, $WSG_i \times Z_i$ is a vector of interaction terms between the WSG indicator and individual-level characteristics, and ε_i is an error term. Interaction terms include the following individual-level characteristics: gender, race/ethnicity, college institutional sector, first-generation college student status, family income, and prior work behavior.[13] To conserve space, only statistically significant interaction terms are reported in the text. To aid in interpretation, we present predicted means and probabilities for each subgroup (Ai & Norton, 2003).

Limitations

There are several limitations in this study. The sample is not nationally representative and only includes full-time, traditional-age students from low-income families attending a public college in the state of Wisconsin. Older adults, including those who have been primarily in the workforce and returned to college are excluded and warrant additional study. Our analyses are limited to intent-to-treat estimates to cleanly exploit the exogenous variation in the lottery design; analyses incorporating non-random compliance would likely result in slightly larger impacts. Finally, work behaviors are self-reported on a survey during students' second year of college. We proxy for work quality using measures of work location, work shift, and evidence of extensive work hours. Longer term impacts are not examined.

Findings

Among students not offered the WSG, 68.72% report working in the prior week with an average of 11.78 hours worked (Table 3). The proportion of working students in our sample is 28 percentage points higher than a national estimate of the percentage of full-time college students (ages = 16–24) working in 2009 (U.S. Department of Education, 2014). This likely reflects the fact that our sample only includes students from low-income households who attend a public college or university. Half of control group students work off-campus and indeed, this is where they spend most of their work hours (10.03 hours off-campus vs. 1.74 hours on-campus). Three in 10 students in the control sample work extensively, whereas nationally in 2009, one in four full-time

TABLE 3

Wisconsin Scholars Grant Impact on Undergraduate Labor Market Participation

Outcome	Control	Treatment group	*p* value	Effect size	*n*
Working at all (%)	68.72	−5.88	.029*	0.159	1,397
Total hours worked (in the last week)	11.78	−1.69	.013*	0.144	1,383
On-campus hours worked	1.74	−0.33	.151	0.083	1,386
Off-campus hours worked	10.03	−1.37	.047*	0.114	1,392
Working off-campus (%)	49.92	−4.36	.124	0.107	1,392
Working extensively (20+ hours; %)	30.21	−5.17	.042*	0.159	1,383
Working 8:00 a.m.–noon (%)	54.97	−7.67	.029*	0.190	916
Working noon–6:00 p.m. (%)	71.81	2.34	.456	0.072	916
Working 6:00 p.m.–10:00 p.m. (%)	59.42	3.05	.370	0.079	916
Working 10:00 p.m.–2:00 a.m. (%)	16.44	−0.67	.797	0.031	916
Working 2:00 a.m.–8:00 a.m. (%)	14.26	−6.40	.005**	0.408	916

Note. The following covariates are included in the models: expected family contribution, parents and students adjusted gross income, parents and students investment income, dependency status, first-time enrollment, eligibility for simplified needs test, marital status, and parental status. Sensitivity checks indicate that the inclusion of father's college status does not substantively or significantly change the findings; point estimates are somewhat larger with the inclusion of father's college education status. Effect sizes are calculated according to What Works Clearinghouse (2014).
[†]*p* < .10. **p* < .05. ***p* < .01.

young adult students reported working 20 or more hours weekly (U.S. Department of Education, 2014). The most popular time for students to work is between noon and 6:00 p.m. (71.81%) and more than half work in the mornings (8:00 a.m.–noon) or evenings (6:00 p.m.–10:00 p.m.). Late night (10:00 p.m.–2:00 a.m.) and overnight (2:00 a.m.–8:00 a.m.) shifts are less common, but 16.44% and 14.26% of students report working during these times in the past week, respectively.

Results indicate that offer of the WSG changed both the quantity and quality of undergraduate student employment. Students offered the WSG are 5.88 percentage points less likely to work at all, a reduction of 8.56% (*p* < .05; effect size = 0.16). Treatment group students reduced their total weekly work hours by 1.69 hours or 14.35% (*p* < .05; effect size = 0.14). This reduction came through a 1.37 hour or 13.66% decline in the number of hours worked off-campus (*p* < .05; effect size = 0.11) and a 0.33 hour or 18.97% decline in the number of hours worked on-campus (*p* = .15; effect size = 0.08). The grant offer also reduced the proportion of students working extensively (20+ hours) by 5.17 percentage points or 17.11% (*p* < .05; effect size = 0.16). Finally, offer of the WSG influenced the time of day in which students worked. Treatment students are 7.67 percentage

points less likely to work mornings between 8:00 a.m. and noon (*p* < .05; effect size = 0.19) and 6.40 percentage points less likely to work overnight between 2:00 a.m. and 8:00 a.m. (*p* < .01, effect size = 0.41).

Variation in Impacts

Investigation of heterogeneous impacts suggests that main effects differ by level of parental education with treatment effects concentrated among those whose parents do not have a college degree. Due to the large number of interactions tested, however, this finding may be the result of chance and should be interpreted with caution. Results presented in Table 4 indicate a statistically significant interaction between first-generation college student status and WSG offer on the probability of working extensively (*p* < .05) and the number of hours worked off-campus (*p* < .05). Thirty-five percent of first-generation college students in the control group are predicted to work extensively compared with 24.01% of first-generation students offered the additional grant aid—a difference of 11.14 percentage points or a 31.69% reduction. Among those with a college-educated parent, 25.61% of students in the control group and 25.44% of students in the treatment group are predicted to work more than 20 hours per week.

TABLE 4
Subgroup Variation in WSG Treatment Impacts

Interaction model	Working at all	p value	Total hours worked	p value	On-campus hours worked	p value	Off-campus hours worked	p value	Working off-campus	p value	Working extensively (20+ hours)	p value
WSG	−0.110	.550	−0.782	.458	−0.249	.471	−0.583	.578	−0.079	.668	−0.253	.239
	(0.183)		(1.052)		(0.345)		(1.048)		(0.184)		(0.214)	
WSG × Female	−0.276	.262	−1.463	.288	−0.139	.762	−1.265	.361	−0.158	.503	−0.008	.977
	(0.246)		(1.375)		(0.459)		(1.385)		(0.236)		(0.268)	
WSG	−0.371	.009	−1.976	.015	−0.448	.105	−1.498	.069	−0.227	.092	−0.309	.039
	(0.143)		(0.808)		(0.276)		(0.822)		(0.134)		(0.149)	
WSG × Minority[a]	0.354	.213	1.416	.365	0.256	.621	1.019	.514	0.244	.374	0.315	.309
	(0.284)		(1.561)		(0.518)		(1.561)		(0.274)		(0.309)	
WSG	−0.280	.177	−2.078	.105	−0.362	.124	−1.788	.165	−0.148	.438	−0.265	.171
	(0.208)		(1.282)		(0.235)		(1.288)		(0.191)		(0.193)	
WSG × FourYearCollege	0.021	.933	0.622	.676	0.042	.918	0.649	.663	−0.057	.813	−0.016	.952
	(0.255)		(1.487)		(0.408)		(1.490)		(0.241)		(0.264)	
WSG	−0.341	.073	−1.034	.306	−0.732	.059	−0.291	.776	0.029	.874	−0.009	.964
	(0.190)		(1.009)		(0.387)		(1.020)		(0.181)		(0.207)	
WSG × FirstGeneration[b]	0.001	.996	−2.041	.149	0.769	.124	−2.819	**.048**	−0.474	**.052**	−0.538	**.049**
	(0.256)		(1.414)		(0.500)		(1.427)		(0.244)		(0.273)	
WSG	−0.162	.350	−1.414	.165	−0.417	.143	−0.976	.347	−0.079	.629	−0.202	.261
	(0.173)		(1.018)		(0.285)		(1.037)		(0.163)		(0.180)	
WSG × HigherIncome[c]	−0.203	.403	−0.591	.664	0.174	.705	−0.821	.552	−0.201	.383	−0.125	.628
	(0.242)		(1.363)		(0.460)		(1.379)		(0.230)		(0.259)	
WSG	−0.277	.046	−1.828	.018	−0.495	.050	−1.361	.081	−0.134	.294	−0.270	.053
	(0.139)		(0.769)		(0.252)		(0.780)		(0.128)		(0.139)	
WSG × NoWork_HS[d]	0.107	.741	1.709	.294	0.941	.187	0.868	.588	−0.247	.477	0.431	.325
	(0.324)		(1.628)		(0.713)		(1.603)		(0.347)		(0.437)	
Sample size	1,397		1,383		1,386		1,392		1,392		1,383	

(continued)

TABLE 4 (continued)

Interaction model	Working 8:00 a.m.–noon	p value	Working noon–6:00 p.m.	p value	Working 6:00 p.m.–10:00 p.m.	p value	Working 10:00 p.m.–2:00 a.m.	p value	Working 2:00 a.m.–8:00 a.m.	p value
WSG	−0.552 (0.246)	.025	−0.016 (0.263)	.952	0.337 (0.253)	.184	0.003 (0.316)	.993	−1.512 (0.472)	.001
WSG × Female	0.361 (0.302)	.233	0.222 (0.332)	.503	−0.309 (0.310)	.319	−0.093 (0.399)	.817	1.191 (0.545)	**.029**
WSG	−0.447 (0.166)	.007	0.103 (0.185)	.578	0.243 (0.170)	.154	0.069 (0.215)	.750	−0.779 (0.281)	.006
WSG × Minority[a]	0.566 (0.348)	.104	0.191 (0.402)	.634	−0.439 (0.354)	.215	−0.699 (0.564)	.215	0.426 (0.614)	.488
WSG	−0.057 (0.225)	.802	0.648 (0.260)	.013	0.234 (0.230)	.308	0.004 (0.300)	.990	−0.660 (0.339)	.052
WSG × FourYearCollege	−0.425 (0.292)	.146	−0.860 (0.330)	**.009**	−0.174 (0.298)	.560	−0.092 (0.398)	.817	−0.028 (0.482)	.953
WSG	−0.464 (0.228)	.042	0.331 (0.261)	.205	0.441 (0.236)	.062	0.041 (0.313)	.895	−0.944 (0.374)	.012
WSG × FirstGeneration[b]	0.235 (0.304)	.439	−0.421 (0.345)	.223	−0.493 (0.314)	.116	−0.085 (0.412)	.837	0.435 (0.506)	.390
WSG	−0.401 (0.203)	.048	−0.034 (0.224)	.880	0.075 (0.209)	.719	−0.168 (0.289)	.562	−0.572 (0.335)	.088
WSG × HigherIncome[c]	0.163 (0.285)	.567	0.304 (0.320)	.342	0.095 (0.293)	.746	0.236 (0.393)	.547	−0.193 (0.486)	.692
WSG	−0.364 (0.155)	.019	0.194 (0.176)	.272	0.112 (0.159)	.484	−0.131 (0.209)	.529	−0.780 (0.258)	.003
WSG × NoWork_HS[d]	0.295 (0.454)	.515	−0.214 (0.506)	.672	0.194 (0.459)	.673	0.847 (0.714)	.236	0.893 (1.004)	.374
Sample size	916		916		916		916		916	

Note. This table presents the WSG coefficient and WSG × Characteristic Coefficient for each of the six interaction models (i.e., gender, race/ethnicity, college institutional sector, first-generation college student status, family income, and prior work behavior). Standard errors are shown in parentheses. The following covariates are included in each model: expected family contribution, parents and students adjusted gross income, parents and students investment income, dependency status, first-time enrollment, eligibility for simplified needs test, marital status, and parental status. Maximum sample size is reported. No imputation is performed for missing data items. Interaction terms with *p* values below .10 are bolded to aid in interpretation. WSG = Wisconsin Scholars Grant.

[a]Minority includes African American, Latino, Southeast Asian, Native American, and multiracial. These groups are "targeted" racial/ethnic minorities according to University of Wisconsin System policy.
[b]First generation means that neither parent has a college degree.
[c]Higher income is operationalized as those with a parental adjusted gross income above the mean. The results are not sensitive to the operationalization of higher income.
[d]No work in high school is operationalized as those who indicated they typically worked 0 hours during their senior year in high school on a student survey (16%). The results are not sensitive to the operationalization of work behavior in high school. As a sensitivity test, we also examined if the impact of the grant offer varied by students' work behavior in fall of their first year of college (after they had been notified of the WSG but typically had not received any grant aid), and it did not.

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The reduction in work hours occurred through a decline in the number of hours worked off-campus. First-generation college students in the control group are predicted to work 11.53 hours off-campus per week while those in the treatment group are predicted to work 8.42 hours, a difference of 3.11 hours or a 26.97% reduction. Among those with a college-educated parent, students in the control group are predicted to work 8.81 hours off-campus compared with 8.51 hours among those in the treatment group. Treatment impacts regarding working at all, on-campus work, or during particular shifts did not systematically vary by parental education level (Table 4).

In addition, results indicate subgroup variation by gender and college institutional sector regarding working during different times of day. Further examination of the data, however, does not suggest any clear or systematic pattern of subgroup variation in changes to shift work. Men offered the grant were 12.48 percentage points less likely to work overnight (4.30% WSG vs. 16.78% control) whereas women were 3.19 percentage points less likely to work between 2:00 a.m. and 8:00 a.m. (9.79% WSG vs. 12.98% control; $p < .05$). The grant offer also induced 2-year college students to work between noon and 6:00 p.m. (80.04% WSG vs. 67.81% control) whereas it reduced the probability of working afternoons for 4-year college students (70.29% WSG vs. 74.48% control; $p < .05$; Table 3).

Discussion

Using a randomized experiment, we find that the offer of a private need-based grant induced undergraduates to change their work behaviors. Students offered the grant were less likely to work at all and reported working fewer hours. They also changed their work experiences in important ways: treatment students were less likely to work extensively and reduced the number of hours they worked in off-campus employment. In addition, these students changed the time of day in which they worked, resulting in a smaller proportion working overnight or during the morning, likely allowing them a greater opportunity to sleep and attend classes. These quantitative and qualitative changes in work behaviors are consistent with changes recommended by theory and practice to improve college achievement and attainment. Indeed, research shows that the offer of the WSG improved students' academic outcomes, including on-time bachelor's degree completion for 4-year college entrants (Goldrick-Rab et al., 2016).

Furthermore, the impacts of the grant offer appear to be larger for some of the most disadvantaged students although we cannot be sure that this subgroup variation is not the result of statistical chance. First-generation students typically work more than their peers with a college-educated parent, but the WSG offer entirely offset this advantage in extensive and off-campus work. Thus, the grant offer may have enabled first-generation students to make work decisions on par with students who have a college-educated parent.

The magnitude of the reduction in work hours is very similar to prior quasi-experimental estimates. DesJardins and colleagues (2010) suggest a 32-minute reduction in weekly work hours per US$1,000 of merit scholarship aid. Our impact translates into a 35-minute reduction in weekly work hour per US$1,000 of additional need-based grant aid.[14] Furthermore, Scott-Clayton (2011b) suggests a US$4.04 reduction in weekly earnings per US$1,000 of merit scholarship aid and assuming minimum wage work, our results indicate a US$4.25 weekly reduction per US$1,000 of grant aid.[15] Prior research suggests that a 1.69-hour reduction in weekly work induces students to take one additional course credit per year (Darolia, 2014) or improve their GPA by 0.02 to 0.27 units (DeSimone, 2008; Stinebrickner & Stinebrickner, 2003).

The effect sizes reported in our study (e.g., 0.15) are often interpreted as substantively meaningful by education researchers (Lipsey et al., 2012), but students offered additional grant aid did not come close to substituting a dollar of aid for a dollar of work earnings. On average, treatment students in our sample could have used the grant aid to buy themselves out of US$96 in weekly work earnings or 13.27 hours of work per week at the minimum wage rate.[16] Instead, students report working less than 2 fewer hours per week. This means that students were either unable to use the grant aid to buy themselves out of work or preferred not to do so. There is some evidence that the grant crowded

out loans due to rules about financial aid packaging. Specifically, to include the grant in students' financial aid packages, sometimes loans had to be reduced. This limited the extent to which the grant could help students have more cash-in-hand to avoid working (Goldrick-Rab et al., 2016). Prior work also indicates that the financial need of low-income students is understated through a systematic overestimate of the expected family contribution and underestimate of living costs (Goldrick-Rab, 2016; Kelchen et al., 2014). Certainly, a sizable minority of students in our sample are struggling to make ends meet and report trouble affording basic needs like food and housing, so these students may have applied the additional grant aid to unmet needs (Broton et al., 2014).

Scholars and policymakers hypothesize that financial aid can buy students out of work, and our findings support this theory. However, grant aid is not a simple dollar-for-dollar substitute for work earnings. Instead, students pay for college through a complex combination of grant aid, loans, gifts, work, and cost-cutting measures. Furthermore, changes in work behavior may be an important pathway through which financial aid affects college success, but it is not likely the only mechanism, and more research is needed to understand the full causal chain of events. To the extent that working while in college is a key mechanism in the reproduction of social advantage, the results suggest that need-based grant aid may be a promising path for promoting more equitable college outcomes.

Appendix

TABLE A1

Wisconsin Scholars Grant Unadjusted Impact on Undergraduate Labor Market Participation

Outcome	Control	Treatment group	*p* value	Effect size	*n*
Working at all (%)	68.64	−5.27	0.048*	−0.143	1,436
Total hours worked (in the last week)	11.73	−1.61	0.017*	−0.137	1,420
On-campus hours worked	1.75	−0.31	0.175	−0.077	1,423
Off-campus hours worked	9.96	−1.31	0.056[†]	−0.109	1,431
Working off-campus (%)	49.55	−3.93	0.160	−0.096	1,431
Working extensively (20+ hours) (%)	29.83	−4.79	0.056[†]	−0.146	1,420
Working 8:00 a.m.–noon (%)	54.14	−7.53	0.030*	−0.183	942
Working noon–6:00 p.m. (%)	71.83	1.88	0.544	0.058	942
Working 6:00 p.m.–10:00 p.m. (%)	59.25	3.71	0.273	0.095	942
Working 10:00 p.m.–2:00 a.m. (%)	16.14	0.00	0.999	0.000	942
Working 2:00 a.m.–8:00 a.m. (%)	13.99	−5.84	0.008**	−0.367	942

Note. Models do not include any covariates. Effect sizes are calculated according to What Works Clearinghouse (2014).
[†]*p* < .10. **p* < .05. ***p* < .01.

Authors' Note

All opinions and errors are those of the authors. James Benson worked on this project as a post-doctoral fellow at the University of Wisconsin–Madison. This article was written when James Benson was employed by the University of Wisconsin–Madison, and it does not necessarily reflect the views of the Institute of Education Sciences, where he is currently employed.

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Notes

1. Calculation based on 59% of US$21,000 = US$12,390 in unmet need. (US$12,390 / 52 weeks) / US$7.25 = 33 hours per week.

2. The Working Student Act (S.2796) is legislation that has been introduced by Senator Tammy Baldwin to enact an across-the-board 35% increase in the income protection allowance for students. This means that a dependent student can earn up to US$2,191 more before their income affects their financial aid award (*The Working Student Act*, 2014).

3. Note that DesJardins, McCall, Ott, and Kim (2010) made 54 comparisons, and two were statistically significant, which is what we would expect by chance. "So some caution is warranted when interpreting these findings" (p. 472).

4. More information on the Fund for Wisconsin Scholars is available at www.ffws.org.

5. The renewable nature of the grant is conditional on Pell Grant eligibility, full-time enrollment, and satisfactory academic progress. The grant is transferable among all public 2- and 4-year colleges in Wisconsin.

6. Most students completed all or none of the work behavior questions; there was 1% item missingness.

7. The overall attrition rate is 23.47%, and the differential attrition rate is 2.19%. This level of overall and differential attrition meets the conservative boundary for "low attrition" according to the What Works Clearinghouse (2014).

8. Targeted minority groups include African American, Latino, Southeast Asian, Native American, and multiracial. "Targeted" refers to a policy of the University of Wisconsin System.

9. Due to a few outliers, the off-campus work hours measure was trimmed to 40 hours/week and the on-campus work hours measure was trimmed to 20 hours/week. This affected less than 2% of off-campus cases and less than 1% of on-campus cases (Osborne & Overbay, 2004).

10. Approximately, 90% of students who were offered the Wisconsin Scholars Grant (WSG) received the grant in the 2008–2009 academic year, according to the Fund for Wisconsin Scholars. We report work outcomes from fall 2009.

11. These baseline control variables are included because they have an effect size difference greater than 0.05 standard deviations (see Table 1; What Works Clearinghouse, 2014). Father holds a college degree is not included in the covariate adjusted model due to missing data, but was included as a sensitivity check and did not significantly or substantively change the findings; results from that model were less conservative.

12. The use of survey weights is designed to ensure internal validity. As an external validity sensitivity check, we also ran the models with school fixed effects. The results are substantively and statistically similar.

13. Because we estimate six potential types of subgroup variation for each of 11 outcomes, we make 66 statistical comparisons. We would expect about three statistically significant results by chance. Thus, we also conduct a visual analysis of the data to determine the overall pattern of findings. Still, caution is warranted in interpreting these results.

14. Calculation based on the weighted average value of the grant for the analytic sample (US$2,886.30) assuming a constant linear effect.

15. Scott-Clayton (2011b) reports a US$9.55 reduction in weekly earnings per US$2,366 in grant aid, on average in Years 2 through 4. Our calculation is based on the average grant amount of US$2,886.30 and a US$7.25 minimum wage rate. These are estimates, as we do not have wage data.

16. For this calculation, we define a school year as 30 weeks in conjunction with University of Wisconsin (UW) System Regent policy.

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