INSTITUTE for RESEARCH on POVERTY
UNIVERSITY OF WISCONSIN–MADISON

IRP Discussion Paper

No. 1393-12 (revised)

Reducing Income Inequality in Educational Attainment:
Experimental Evidence on the Impact of Financial Aid on College Completion
(Revised title and paper from October 2012 version)

Sara Goldrick-Rab
University of Wisconsin–Madison
E-mail: srab@education.wisc.edu

Robert Kelchen
Seton Hall University
E-mail: robert.kelchen@shu.edu

Douglas N. Harris
Tulane University
E-mail: dharri5@tulane.edu

James Benson
University of Wisconsin–Madison
E-mail: jbenson@ssc.wisc.edu

March 2015

The Bill and Melinda Gates Foundation, Great Lakes Higher Education Guaranty Corporation, Institute for Research on Poverty, Spencer Foundation, William T. Grant Foundation, Wisconsin Center for the Advancement of Postsecondary Education, and an anonymous donor provided funding for this study, conducted in partnership with the Fund for Wisconsin Scholars, the Higher Educational Aids Board, the University of Wisconsin System, and the Wisconsin Technical College System. For significant contributions, we thank Drew Anderson, Alison Bowman, and Peter Kinsley, as well as Sigal Alon, Paul Attewell, Eric Bettinger, David Deming, Stephen DesJardins, Susan Dynarski, Felix Elwert, David Figlio, Adam Gamoran, Chad Goldberg, Donald Heller, Andrew Kelly, Bridget Long, David Mundel, Michael Olneck, Fabian Pfeffer, Lauren Schudde, Jeffrey Smith, Kevin Stange, and Christopher Taber. All opinions and errors are those of the authors. Direct all questions and other correspondence to the first author at srab@education.wisc.edu.

Abstract

Income inequality in educational attainment is a longstanding concern and disparities in college completion have grown over time. Need-based financial aid is commonly used to promote equality in college outcomes but its effectiveness has not been established and some are calling it into question. A randomized experiment is used to estimate the impact of a private need-based grant program on college persistence and degree completion among students from low-income families attending 13 public universities across Wisconsin. Results indicate that offering students additional grant aid increased the odds of bachelor's degree attainment over four years, helping to diminish income inequality in higher education.

Keywords: College attendance, financial aid, Pell Grants

JEL codes: C93, D03, H24, I23

The pulling apart of American society according to family income is sharper and more apparent today than at any point since the 1920s. The share of income going to families in the top decile is close to 50 percent, and the top one percent holds most of those resources (Saez and Piketty 2014). Contemporary income inequality is a significant concern because of its substantial magnitude and its causes, which include the rapid accumulation of advantages by the very elite (McCall and Percheski 2010; Reardon and Bischoff 2011). It is not the result of a deterministic process, but rather stems from stratifying forces pushing for rising or shrinking inequality (Saez and Piketty 2014). Historically, the American strategy for addressing those forces and reducing poverty has focused on the educational system, and consequently many are concerned with the contribution that education now is making to burgeoning inequality (Bowles and Gintis 2011; Corak 2013; Duncan and Murnane 2011; Katz and Rose 2013; Torche 2011). In particular, as college attainment has become more important for life chances, researchers and policymakers have renewed their focus on disparities in higher education (Alon 2009; Bailey and Dynarski 2011; Hout 2012).

In the middle of the twentieth century, the United States invested substantially in expanding postsecondary education to create opportunities for people unable to find work in the labor market and provide more spaces for those seeking a college education, often perceived as a promising pathway to social mobility (Attewell and Lavin 2007; Hout 2012; Rosenbaum 2001; Rosenbaum, Deil-Amen, and Person 2006; Shavit, Arum and Gamoran 2007; Torche 2011). In 1965, public policymakers crystallized a specific set of ambitions for higher education policy, aiming to reduce class stratification by facilitating college opportunities for the children of low-income families to obtain college degrees (Goldrick-Rab, Schudde, and Stampen 2014; Kerr et al. 1960; Parsons 1970; Treiman 1970). The inaugural Higher Education Act created a grant

program that led to the signature federal program known as the Pell Grant. At the time, both Senator Claiborne Pell and American Sociological Association president William Sewell gave speeches emphasizing the importance of making college more affordable in order to rapidly attenuate the link between family income and college attainment (Goldrick-Rab, Schudde and Stampen 2014; Sewell 1971).

But sociologists have long been concerned with the contribution of the educational system to inequality, with many positing that it creates as much inequality as it mitigates (Bowles and Gintis 2011; Bourdieu 1973; Coleman 1988; Lucas 1999; MacLeod 1987; Raftery and Hout 1993; Shavit and Bloesfeld 1993; Willis 1977). The debate over the role that higher education plays in inequality is fueled by stark evidence that despite major college initiatives and significant spending on financial aid over the last forty years, the relationship between family income and college attainment is stronger than ever (Alon 2009; Bastedo and Jacquette 2011; Ellwood and Kane 2000; Haveman and Smeeding 2006; Roksa 2012). Today just 30 percent of children born to families in the bottom income quartile are expected to enroll in college, compared to 80 percent from the top income quartile. The completion gap is even more substantial: students from high-income families are six times more likely than those from low-income families to complete a bachelor's degree by age 25 (Bailey and Dynarski 2011).

One key challenge is that many students are starting college but leaving without degrees (Attewell, Heil and Reisel 2011; Bailey and Dynarski 2011; Deil-Amen and Deluca 2010; Goldrick-Rab 2010; Rosenbaum, Deil-Amen, and Person 2006; Turner 2004). Some are doing this after attending multiple colleges and accruing debt (Goldrick-Rab 2006; Goldrick-Rab and Pfeffer 2009). Nationally, 11 percent of Pell Grant recipients entering public universities do not enroll for a second year of college, and about 80 percent do not receive a bachelor's degree

within four years (only another 20 percent earn that degree over six years) (authors' calculations).[1] This is problematic, especially since some research suggests that the students most at risk of non-completion would stand to benefit the most from holding college degrees (Brand 2010; Brand and Xie 2010; Brand and Davis 2011; Hout 2012). At the same time, government, philanthropic, institutional, and employer spending on financial grant aid has reached an all-time high of more than $115 billion a year (College Board 2013).[2] As a result, many researchers and policymakers are posing a critical and difficult question: Is financial aid an effective strategy for addressing income inequality by increasing college attainment among students from low-income families?

This article presents results from the nation's first experimental analysis of need-based financial grant aid, examining the impacts of a program distributing grants to students from low-income families. In selecting among first-year undergraduates beginning college at 13 public universities across Wisconsin, the private program used a lottery to select eligible students. The impacts of that program are estimated for three cohorts of undergraduates, focusing on changes in term-by-term enrollment, credit completion, grades, and degree completion. Variability in the program's effects are explored according to how much additional support students received, their demographic, family, and academic characteristics, and where they began college. The findings provide rigorous empirical evidence that need-based financial grant aid can improve bachelor's degree completion rates among students from low-income families, helping to reduce income inequality in educational attainmement.

[1] These statistics are based on the nationally representative Beginning Postsecondary Students Study of 2003-2004.
[2] In 2012-2013, this included $47 billion in federal grants (including the $32 billion on Pell Grants), $44 billion in institutional grants, $14.5 billion in private and employer grants, and $9.7 billion in state grants. Some but not all of these grants were distributed based on financial need (College Board 2013).

Fourteen percent of children from poor families reach the top two quintiles of the income distribution if they do not earn a bachelor's degree, but if they do their chances of attaining that status are almost three times greater (Haskins, Holzer, and Lerman 2009). College-educated people enjoy a range of advantages when it comes to employment, health, economic stability, the marriage market, and the tasks associated with parenting (Attewell and Lavin 2007; Hout 2012; Lleras-Muney and Cutler 2010; Oreopoulos and Petronijevic 2013; Schwartz 2013; Torche 2011). But while college degrees continue to be associated with social mobility, family income persists in conscribing the prospects of completing them. Both direct and indirect effects of lower income over the short and long-term reduce the chances of college attendance and persistence to degree completion. For example, low-income families are less likely to reside in communities with strong and effective schools offering opportunities for the advanced coursework necessary for college success (Long, Conger, and Iaterola 2012; Reardon and Bischoff 2011; Roderick, Nagaoka, and Coca 2009), transmit the forms of social and cultural capital required to obtain college knowledge (Bourdieu 1973; Coleman 1988; Lareau and Cox 2011; Plank and Jordan 2001), purchase the assistance in test-preparation and college applications increasingly needed to secure admission to the best schools (Klasik 2012; McDonough 1997), and have the knowledge, beliefs and dispositions necessary to navigate and benefit from the financial aid system (Bettinger, Long, Oreopoulos and Sabonmatsu 2012; Conley 2001; Goldrick-Rab and Kelchen 2013; Grodsky and Jones 2007; Luna de la Rosa 2006; McDonough and Calderone 2006). Thus, even if they gain admission to higher education, many children from low-income families are less equipped to succeed.

Ability does not diminish the difficulties associated with covering college costs. The most talented students possessing strong cultural and social capital still must be able to cover the costs of attendance in order to register for college each year. Families need access to financial capital on an ongoing, continual basis if their students are to gain academic momentum and persist until degree completion (Attewell, Heil, and Reisel 2011; Deil-Amen and DeLuca 2010; DesJardins and Toutkoushian 2005; Harris and Goldrick-Rab 2012). Need-based financial grant aid is supposed to make college these payments possible by discounting the costs of college and in doing so encourage students enroll for more years of college and complete degrees (Bowen, Chingos, and McPherson 2009; Deming and Dynarski 2010; Dynarski 2003; Goldin and Katz 2008; Goldrick-Rab et al. 2009). Government, philanthropy, private business and educational institutions have invested large sums of money in this strategy, which in theory should be effective as long as students' remaining short-term out-of-pocket costs are sufficiently low enough to be manageable while they pursue higher education (Feeney and Heroff 2013; Goldrick-Rab, Harris and Trostel 2009; Goldrick-Rab, Stampen and Schudde 2014; Heller 1997; Leslie and Brinkman 1987).

Theoretically, a rational choice approach to understanding stratification in higher education suggests that the effects of financial aid will operate in a straightforward manner: Individuals will invest in their human capital to the point where the marginal benefits equal the marginal costs, and financial aid serves to reduce those costs (Becker 1964; Hechter and Kanazawa 1997; Leslie and Brinkman 1987; Manski and Wise 1983). Many students need to work intensively to pay for college if they do not have sufficient financial aid (Bozick 2007; Clydesdale 2007; Goldrick-Rab, Harris and Trostel 2009; Roksa and Velez 2010, 2012). Grants that do not have to be repaid and are therefore "free" to the student should be especially

effective. Yet many studies suggest that the effects of distributing financial aid are not so clearly positive, with many studies identifying null effects (for a full review, see Goldrick-Rab et al., 2009). Complexities in the procedures for obtaining and retaining financial aid also present barriers, making it important to have social and cultural capital in order to access the financial capital from aid (Dynarski and Wiederspan 2012). These challenges may also reduce program effectiveness, including by creating difficulties when students must navigate requirements in order to access the financial discount. For example, the Georgia HOPE program, which distributes aid to high-achieving high school students (without a means test) and requires a 3.0 college GPA, appears to increase college persistence by five to eleven percentage points, and overall degree completion by three or four percentage points (Dynarski 2008). However, the program also seems to reduce the fraction of students enrolling full time (possibly increasing the time it took students to complete degrees) and induces students to take easier courses and majors (Cornwell, Lee, and Mustard 2005). This may contribute to widening disparities in college experiences, especially when such requirements are attached to means-tested programs.

Despite the lack of clarity on whether and precisely how financial aid serves to increase college attainment, federal and state spending on need-based grant aid has risen substantially, although not nearly as fast as college costs (College Board 2013).[3] At the start of the Great Recession, spending on the Pell Grant grew by over $10 billion a year due to policy changes that expanded program eligibility, growth in college enrollment, and economic conditions that increased unemployment and reduced family financial strength. Today virtually every state in the nation funds a financial aid program of some kind, with total spending topping $9.2 billion

[3] Between 2008 and 2012 the period of the present study, the average amount of grant aid per full-time-equivalent undergraduate increased from just over $5,000 to just over $7,000, while the average loan grew from just under $4,000 to almost $5,000 (College Board 2013).

(Brookings Institution, 2012). That investment is the result of a significant upward trend over time in state support of aid programs, both in absolute terms and as a percentage of state funds devoted to higher education. Compared to 30 years ago, states are spending about three times as much (after adjusting for inflation), and about 1.6 times as much per student, on need-based grant aid (Brookings Institution, 2012). That said, these investments do not match demand. While federal government expenditures on financial aid have nearly doubled since 2009, state programs are not keeping up with federal expansions or even with growing demand for existing programs--during the Great Recession about half of the states reduced need-based aid, while overall college enrollment expanded (Bettinger and Williams 2014). The effective purchasing power of the Pell Grant declined as well: In the early 1970s, the Pell covered almost 75 percent of the costs of attending a public 4-year college or university; today, it covers less than 33 percent. It would seem, therefore, that in order to improve college attainment rates and reduce income inequality, further increasing the availability of fairly simple forms of need-based grant aid would be an important priority.

Instead, many policymakers are questioning whether means-tested grants are an effective way to boost college attainment. Legislators, policy analysis, and newspapers have begun to brand Pell Grant recipients as unmotivated, undeserving, and fraudulent (Cheston 2013; Field 2011; McCluskey 2008; Nelson 2013; Terkel 2011), even though there is little evidence that widespread abuse exists (The Institute for College Access and Success 2011). This behavior is consistent with the treatment of other means-tested programs (Katz 2013; Piven and Cloward 1993). Rarely discussed is the possibility suggested by prior research that these concerns are raised about the effectiveness of financial grant programs partly because they are targeted to poor people rather than universally available (Bruch, Ferree, and Soss 2010; Soss, Fording, and

Schram 2011). In other words, not only has means-testing, often central to the process of distributing grant aid higher education, created political challenges to these programs, but it contributes to the perception that they are difficult to access and unfair in their allocation; a sharp contrast to how other aid programs like the G.I. Bill have been viewed in the past (Dynarski and Scott-Clayton 2007; Mettler 2005). Funding for financial aid has increasingly shifted toward merit-based or performance-based scholarships, which provide support for students only if they meet narrowly defined criteria of academic ability or performance (Kelly and Goldrick-Rab 2014). This is a consistent with a broader movement away from mass public higher education (Attewell and Lavin 2007).

EVIDENCE ON THE EQUITY EFFECTS OF NEED-BASED AID

There is very little rigorous research directly testing the theory that means-tested financial aid effectively reduces college costs to the point that students are more likely to complete their degree, and the dearth of compelling research evidence on the effectiveness of need-based grants is often noted in policy discussions (Bettinger 2011; Kelly and Goldrick-Rab 2014; Lederman 2011; Owen and Sawhill 2013; Sawhill 2013).[4] The empirical challenge is that, as with all means-tested programs, students eligible for financial grants are different from ineligible students. There are many reasons having little to do with grant aid as to why students from low-income families might not complete college, given that they disproportionately receive weaker K-12 preparation, come from homes where college-going is rarely normative, and receive fewer social supports in their efforts to pursue degrees (for example by having attended schools with fewer resources). At the same time, recipients of financial aid have successfully navigated a

[4] There are many studies on the impacts of merit-based financial aid program distributed based on students' academic preparation for college or their tested abilities; since these are not based on family income, they are not considered here. The mechanisms and impacts of merit and need-based programs are thought to be quite different.

complex system and thus may be more motivated or possess more social and cultural capital than their peers. Together these selection processes mean that a simple correlation between the receipt of grant aid and college completion may substantially over or understate the true benefits of that aid, partly depending on whether the estimates are based on aid eligibility or aid receipt among other factors (Alon 2005; Castleman and Long 2013; Cellini 2008; Goldrick-Rab et al. 2009; Harris and Goldrick-Rab 2012).

Given that social contexts often moderate decision-making, it is reasonable to anticipate heterogeneity; estimates of impacts may vary across studies based on the composition of the students and the colleges or universities under examination. They could also vary depending on whether they consider the effect of grants on whether students enroll in college, remain for a year, or complete degrees. These represent distinct educational decisions, and short-term income constraints may exert different effects at each point. The rate at which college attendance is transformed into degree completion has declined over time, especially for younger students like those in this study (Turner 2004). In addition, grants may be more or less effective according to the depth of familial poverty students face, the degree to which their academic barriers make college success more or less possible, their levels of social capital related to parental education, or the costs or financial resources of their schools that they attend (Goldrick-Rab et al. 2009; Roksa and Potter 2011). This variation could reduce, or enhance, the degree to which grants affect inequality in outcomes.

Studies vary widely in the extent to which they address selection bias, whether they isolate impacts on college completion from effects on college enrollment, and whether they consider the potential for effect heterogeneity. Most financial aid research uses basic regression techniques to control for observable differences between students, an approach that fails to

specify appropriate counterfactuals to financial aid receipt (Morgan and Winship 2007). There is also a growing number of studies utilizing quasi-experimental techniques, usually propensity score analysis and regression discontinuity designs, or taking advantage of natural experiments. But to date there have not been any experimental studies.

Moreover, the effects of aid on college attendance and effects on college persistence are often melded together in analyses (e.g., Bound and Turner 2002; DesJardins, Ahlburg and MccAll 2002; Kane 1994, 2007; Light and Strayer 2000; McPherson and Shapiro 1991; Paulsen and St. John 2002; Seftor and Turner 2002; Singell 2004; Singell and Stater 2006; Stater 2009; Stinebrickner and Stinebrickner 2003; van der Klauuw 2002; for notable exceptions see Bettinger 2004 and Turner 2004). It is possible that reducing the costs of college attendance by providing aid may induce more students to attend college yet do little to help them finish. According to the most rigorous and relevant studies, the impact of a $1,000 increase in grant aid on rates of college retention (annual enrollment following initial entry) ranges from 1.5 percentage points (Alon 2011), one to five percentage points (Singell 2004), two to three percentage points (Bettinger 2010), to 3.6 percentage points (Dynarski 2003).[5],[6] Very few studies observe students for enough time to consider impacts on degree completion. The study most relevant to the current analysis uses a regression-discontinuity framework to estimate impacts of a Florida state grant program over six years. The authors find that an additional $1,300 in grant aid eligibility (covering 57% of average costs of tuition and fees at public

[5] Authors tend to report on the impacts of dollars of aid receipt even though, as Castleman and Long (2013) point out, aid programs and policies make aid available to students but cannot assure that all eligible students receive it. Thus when considering the effects of programs or policies, it is best to focus on students offered aid rather than only those receiving it. This is the approach taken in this article.

[6] There are other studies that examine the impact of aid on persistence, however the methods employed do not address the likely selection bias and thus are not considered among the most rigorous (e.g. DesJardins and McCall 2010; Dowd 2004; McCready 2001; Murdock 1987; Perna 1998; St. John, Hu, and Tuttle 2000; St. John, Hu and Weber 2001).

universities in that state) increased the probability of earning a bachelor's degree within six years by 4.6 percentage points, or 22 percent (Castleman and Long 2013). However, given the limitations of the research design, the authors could only produce those estimates for a subsample of the students eligible for the grant and the estimates may still suffer from bias.

The costs of college are clearly not the same for all students and thus it is important that studies consider variation in the effects of financial grants across different types of students. Some research has identified effect heterogeneity according to race/ethnicity, gender, or pre-college academic preparation (Angrist, Lang and Oreopoulous 2009; Angrist, Oreopoulous, and Williams 2010; Castleman and Long 2013; Chen and DesJardins 2010; Crockett, Heffron, and Schneider 2011; Dowd 2008; Dynarski 2008; Ellwood and Kane 2000; Heller 1997, 1999; Kane 1994; Linsenmeier et al. 2006). For example, in a difference-in-difference analysis of an Ohio need-based grant program, Bettinger (2010) found that an unexpected increase in aid for a group of less advantaged students generated a small average positive effect in first-year persistence rates for that group, while the same policy change reduced aid for a more advantaged group—but did not result in a reduction in persistence. Using data from the nationally-representative Beginning Postsecondary Study, Alon (2011) exploited a discontinuity created by the number of siblings attending college and identified much larger positive benefits of need-based grants (including federal, state, and institutional) on first-year persistence accruing to students in the bottom half of the income distribution and virtually no benefits accruing to students in the top half. Effects on completion were not estimated in either study. But to increase program effectiveness—and promote equity—Alon recommended focusing the Pell on poorer families by adjusting the targeting of that program.

Only a few studies have been able to consider whether the effectiveness of grant aid depends on the extent to which it reduces personal out-of-pocket costs for college (Leslie and Brinkman 1987). As noted earlier, rapidly rising costs of college attendance have outpaced increases in need-based grant aid, resulting in a rising net price (Bowen, Chingos, and McPherson 2009; Goldin and Katz 2008). Due to those changes, the purchasing power of programs such as the Pell Grant has declined precipitously. In addition, while state and federal spending on higher education as increased over time, so has enrollment, and thus per-student subsidies have declined. As a result, even though spending on need-based financial aid is over $40 billion a year, poor families must spend as much as 75 percent of their annual income in order to send their children to college (Goldrick-Rab 2013; Goldrick-Rab and Kendall 2014). Thus, even with financial aid, students' short-term out-of-pocket costs (the difference between their calculated financial need and all forms of financial aid) can continue to be unmanageable, causing them to leave school. This would be a reason why aid is insufficient at ameliorating inequality. It is therefore particularly important to attend to these costs and consider how they are affected by grant aid when analyzing the impacts of grant programs.

RESEARCH QUESTIONS

This article builds on prior theory and research by presenting the first-ever experimental test of a need-based financial grant program. Can offering students from low-income families more grant aid reduce inequality in college attainment by increasing degree completion rates among those students? The creation and implementation of a new private program made it possible to examine this important question critical to scholars of stratification, education policy researchers, and practitioners and policymakers throughout the country. We first consider the average impacts of the grant program on students' retention rates, academic achievement, and

on-time (4-year) bachelor's degree attainment. Next, we ask whether impacts varied depending on the extent to which the grant reduced students' short-term out-of-pocket costs instead of reducing their loans during the first year of college. Then, we investigate whether the aid was more or less effective based on students' ascribed characteristics (race, gender, immigrant status, family income, level of parental education), high school preparation, and tested ability. Finally, we examine variation impacts according to the type of university students attended. In this way, we explore the capacity of grant aid to reduce income inequality in college persistence and degree completion, as well as other sources of inequities among students from low-income families.

THE INTERVENTION: A STATEWIDE FINANCIAL AID PROGRAM

The Wisconsin Scholars Grant (WSG) is a privately funded grant, initiated in 2008 and supported by a $175 million endowment from the Fund for Wisconsin Scholars (FFWS), making it one of the largest need-based grant programs in the state (Pope 2010).[7] This paper describes a study of the program's first cohort, with some additional data from the cohorts of 2009 and 2010.

While there has been a proliferation of more complicated programs attaching academic requirements to financial aid as incentives to improve student performance (Kelly and Goldrick-Rab 2014; Patel and Richburg-Hayes 2012), most federal and state financial grant programs remain need-based and straightforward, with only modest academic requirements. For example, the federal Pell Grant program simply requires students to enroll in college full-time (12 credits) in order to receive the full amount of the grant and stipulates that students must make

[7] More information on the Fund for Wisconsin Scholars is at www.ffws.org.

"satisfactory academic progress" (SAP) each term in order to retain the aid (typically a C average). The WSG is similarly structured.[8]

The WSG program offers students a $3,500 grant per year which is renewable for up to five years, with a total potential maximum award of $17,500 per student.[9,10] On average, for students in the entering class of 2008, this amounted to 20 percent of the estimated costs of attendance (defined as tuition and fees, room and board, books, transportation, and other expenses), including 56 percent of tuition and fees at the median university. Since all students offered the WSG were already receiving other aid, it is also worth noting that the WSG amount was equivalent to 85 percent of the remaining short-term out-of-pocket costs they faced in September when beginning college.

Students were eligible for the WSG if they were Wisconsin residents who attended and graduated from a state public high school within three years of matriculating to one of the state's 13 public universities, where they enrolled for at least 12 credits (full-time), 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 $1.[11]

In many experiments, researchers recruit participants by describing the potential benefits of the intervention, seeking consent for research participation, and then using random assignment

[8] However, the Pell Grant is prorated for students attending college less than full-time, while the WSG is not.
[9] A student is eligible to receive the Pell Grant if his or her expected family contribution, as determined by completion of a federal aid application and a need analysis methodology, is below a certain value ($4,041 in the 2008-2009 academic year). For more details, see Dynarski and Scott-Clayton (2007).
[10] The grant was transferable among all public colleges and universities in Wisconsin. Students were still eligible if they switched to a Wisconsin public two-year college, but the grant amount declined to $1,800 per year.
[11] The WSG could not have affected college entry in the first cohort and it is very unlikely to have affected the initial enrollment decision of later cohorts. While the program was first announced about one year before the awards were made (December 2007), program details were not public until September 2008 and even then received little publicity. Because of this, we think the estimated impacts are purely on persistence and not on the initial decision to enroll in college.

to determine who is assigned to the treatment or comparison conditions. If employed here, this process could have led students to feel coerced into research participation and/or created disappointment if they did not receive the WSG. Instead, the FFWS created a process in which eligible participants were identified, randomly assigned, and then only notified of the program if chosen to receive the WSG offer. Data for this research study was obtained independently from the program, so as to avoid any interaction effects that could compromise the research or the program.

In early September of each academic year, financial aid officers at each university identified eligible students using administrative records and sent their names to the state agency overseeing the distribution of grant and loan programs. Using a lottery, students were drawn at random from this pool, thereby receiving an offer of the WSG. An award notification letter was sent to the chosen students at the end of September.[12] To receive the grant, eligible students had to receive, sign, and return that form to the FFWS by December, when the first checks were distributed to universities. After that, students could continue receiving the grant for up to five academic years if they maintained Pell eligibility and enrolled at a Wisconsin public university or two-year college, full-time (at least 12 credits) at the start of each term, and made SAP. Of course, not all students offered the WSG received the grant, initially or throughout college, since receipt depended on their actions. Therefore, when presenting analyses of the grant's impacts in each term, the fraction of students receiving the grant in that term is reported.

Furthermore, the programmatic cost of the WSG ($3,500) did not always translate into the equivalent reduction in students' short-term out-of-pocket costs or an increase in the amount

[12] For the cohorts described in this paper, the letter was sent in October. Students were also sent email from their financial aid officer verifying the legitimacy of the grant and to watch for documents in the mail.

of money immediately available to cover their expenses. This is a common challenge in the delivery of grants and scholarships, stemming from a federal regulation stipulating that students cannot receive more need-based financial aid (of any type, including loans) than their calculated financial "need," computed based on the FAFSA. Calculated need is the difference between a student's expected family contribution and their school's cost of attendance. Three types of financial aid are allocated to cover that need: non-repayable grants and scholarships, loans, and work-study. Rarely do students, even the poorest Pell Grant recipients, receive sufficient non-repayable grant aid to cover all of that need. Loans and work-study are often considered "self-help" since they require repayment or effort on the part of students and families. Therefore, the difference between a student's need and the grants and scholarships available to them represents their "unmet need." Students choosing to cover entirely that unmet need with loans or work-study have no short-term out-of-pocket costs for college. Those not using loans or work-study, or having need exceeding the maximum amount they can borrow, may have remaining short-term out-of-pocket costs that must be covered if they are to make ends meet during college. In this way, two students with the same level of calculated unmet financial need at the start of the school year may also face different out-of-pocket costs.

The need to cover those out-of-pocket costs drives many students to work while in school, cut corners by not buying required books or supplies, or forgo living expenses such as food or gas. In theory, borrowed dollars are as effective at covering these costs as gifted dollars, and thus offsetting students' short-term (uncovered) out-of-pocket costs might be more important than reducing their debt—at least in terms of promoting college completion. Of course, students

might benefit in other ways from having their debt alleviated—for example, it might improve their post-college prospects in terms of purchasing a home, or beginning a family.[13]

The way in which the WSG was integrated into students' aid packages makes it possible to examine whether it was more effective (in terms of improving degree completion) to use grant aid to increase the amount of cash students have in hand, or reduce their debt. At the time it was awarded, students had already made the decision to accept or reject loans, and work-study funds were already allocated.[14] In other words, the amount of their out-of-pocket costs at that time pre-dated the offer of the WSG. Some students already had an amount of financial aid in their package equal to or close to their calculated "need," and therefore possessed few out-of-pocket costs. While these students were eligible to receive the WSG (since their need was not already met entirely through grant aid), in order to receive the WSG some displacement of existing aid was required. By law, subsidized and unsubsidized loans had to be removed first, followed by work-study, and then state grants.[15] This substitution meant that students who had accepted loans or otherwise had fewer out-of-pocket costs when the WSG was awarded often had their loans reduced by the grant.[16] Only those students with out-of-pocket costs of at least $1,000 before the WSG was awarded received at least that much of the grant as additional cash-in-hand available for short-term expenses. The correlation between the out-of-pocket costs students faced before the WSG was offered and the number of additional dollars students received as cash-in-hand from the grant offer is 0.63. Thus, the relative effectiveness of loan reduction versus an increase

[13] A follow-up study is tracking the impacts of the WSG on student debt and post-college outcomes.
[14] This is a common occurrence, as financial aid elements arrive at different times during the semester according to when funds become available. Private grants are often distributed after government grants.
[15] Institutional aid is also frequently removed, especially when government aid is available. However, because the FFWS prohibited this practice it did not occur with the WSG (National Scholarship Providers Association 2013; Turner 2013).
[16] The effects of aid displacement are rarely documented or examined by researchers (Amos et al. 2009; National Scholarship Providers Association 2013).

in cash-in-hand can be examined by comparing variation in the WSG's impacts according to students' pre-treatment out-of-pocket costs.

EDUCATIONAL SETTING: WISCONSIN'S PUBLIC UNIVERSITIES

Wisconsin has a diverse set of public postsecondary institutions led by two systems: the University of Wisconsin System (UW) and the Wisconsin Technical College System (WTCS). The UW System includes thirteen universities and thirteen 2-year branch campuses, while the WTCS has 16 technical college districts (many with multiple campuses). More than 80 percent of the state's undergraduate enrollment is in the public sector (nearly 45% of students attend public 4-year colleges, while another 39% attend public 2-year and technical colleges). In 2008, Wisconsin's total undergraduate enrollment in public universities was approximately 136,000 students, ranging from about 2,400 to 30,000 per school. As Table 1 indicates, the median undergraduate enrollment per university was just over 8,600 students.

Non-Hispanic white students predominate among public university students in the state. The System continually aims to increase its enrollment of targeted minority groups—African-American, Latino, Southeast Asian, and Native American—but in 2008-2009 in the total number of students from these racial/ethnic backgrounds comprised just over 10 percent of the undergraduate student body on average. Women outnumbered men among undergraduates (54 vs. 46%) and almost half of all undergraduates did not have a parent holding a bachelor's degree. Across the 13 universities, about one in five students received a Pell grant.

During the decade prior to the start of this study, tuition increased substantially in Wisconsin, a state historically known for its low tuition (Higher Educational Aids Board, 2010; Mianulli 2010). At the eleven comprehensive (non-research) universities it nearly doubled between 2000 and 2009 (from $2,594 to 5,084), and more than doubled at UW-Milwaukee and

Madison.[17] In 2008-2009, the cost of full-time attendance (including tuition and fees, books and supplies, room and board) at Wisconsin's public universities ranged from approximately $13,300 per year to about $19,000, with a median cost of $14,509. Full-time attendance required 12 credits and the costs per credit were the same from 12 up to 18 credits.[18]

Even after taking financial aid into account, the share of family income need to pay for college in Wisconsin was substantial. In 2008-2009, Wisconsin resident undergraduates received a total of $799.1 million in need-based aid from all sources (including loans) and yet 50,000 students had unmet need totaling $675.2 million (Pope, 2010). Apart from the Pell Grant, the Wisconsin Higher Education Grant (WHEG) was the largest source of need-based aid for residents and contributed 15 percent of all need-based aid received. But the state's allocation for the WHEG failed to meet demand—during the period of this study over 7,000 UW students each year found themselves without a WHEG despite being eligible. Moreover, institutional aid was scarce, representing just over one percent of need-based aid provided to students in the UW. The median amount of institution-funded grant aid available per student was just $124 a year (though the range was substantial, from $77 per student to $1140 per student). Thus, at the time, 69 percent of Wisconsin residents who earned a bachelor's degree from the UW System left with debt, with a per-person average of $23,789 (see Table 1).

Wisconsin is typical in its struggles to improve educational attainment and close achievement gaps while confronting declines in state support and affordability (Goldrick-Rab and Harris 2011). Among new freshmen enrolling in public universities full-time in fall 2008, students not receiving Pell Grants were five percentage points more likely to be retained to the

[17] See http://www.uwsa.edu/budplan/tuition
[18] However, costs accrued on a per-credit basis at one of the 13 universities.

second year of college than students receiving Pell (Table 1). Morover, at the time there was a 13-percentage-point gap in six-year bachelor's degree completion rates at the average institution. On average, only 55 percent of first-time, full-time freshman Pell Grant recipients who entered a Wisconsin public university earned a bachelor's degree within six years, compared to 68 percent of non-recipients.[19] That completion rate varied across universities, ranging from 30 to 77 percent.

SAMPLE AND DESCRIPTIVE STATISTICS

The study focuses on impacts for the WSG's first cohort of students, since the most detailed information is available for that sample. However, some estimates are also computed for students beginning college in fall 2009 and fall 2010. We include estimates from these cohorts because it provides for a greater sense of the reliability of the estimates, and also allows for the possibility that as the program matured, its effectiveness may have improved.[20] The number of potential students who could be eligible for the WSG fluctuated by cohort, depending on the number of Pell recipients in the state and the precision with which administrators followed program rules in identifying students meeting the criteria, but generally it seems that students offered the grant were drawn from a similar pool of potential recipients. In 2008 that pool included 3,157 new freshmen and that number grew each year. The number of grants the WSG offered also varied slightly by year according to the program's endowment, ranging from 550 to 600 per year. For comparison purposes, the control group includes all students who would have

[19] Six year degree completion rates are based on the entering class of 2003. The gap for the entering class of 2006 (the most recent available) is larger, with 47 percent of Pell recipients and 62 percent of non-Pell recipients completing degrees (University of Wisconsin System 2013).

[20] For cohorts other than 2008, only student-level information on treatment status, university attended, and outcomes was provided to the researchers, thus these samples cannot be characterized with the level of detail available for the cohort of 2008.

been offered the WSG if drawn in the lottery, except for the first cohort, for which a stratified random sample of 900 students (instead of the full pool) serves as the comparison group.[21] In selecting that comparison group, the list of non-recipients was blocked by university in order to facilitate the collection of an oversample of non-white students. Thus, the size of that group is 50 percent larger than the treatment group, and contains more students attending racially and ethnically diverse institutions. In analyses, inverse probability weights are employed due to unequal assignment probabilities among students across schools.

The analyses for the first cohort involve three samples of students, depending upon the required data sources. Table 2 provides information on the full sample, an "administrative data sample" that is used to analyze average treatment effects for selected academic outcomes and heterogeneous effects according to student demographic and institutional characteristics, and a "financial aid sample" used to examine how impacts varied by reduction in out-of-pocket costs. As the information in the table demonstrates, there are few meaningful differences across the Cohort 1 samples.

Given the requirements of the FFWS program, all students in the sample were Pell Grant recipients who graduated from a Wisconsin public high school, regardless of which university they initially attended. The average age was just over 18 and nearly all were dependents of their parents for tax purposes. Women constituted the majority (57%) and students of color were overrepresented when compared to the general student body: 27 percent were members of a

[21] Data could not be obtained for the entire group of non-recipients (N=2557) in the first cohort due to the initial data agreements and data collection costs, but note that there are diminishing statistical returns to control group size with a fixed treatment group (Bloom 2005).

racial/ethnic minority group (Table 2).[22] Three groups predominated among students of color, including African-Americans, Hispanics, and Southeast Asians, of whom the vast majority were Hmong. Twelve percent of students in the sample were either first-generation immigrants or children of immigrants. According to student surveys, the students had an average of three siblings, with two siblings being the modal response.

Almost two in five students in this study did not have a parent who completed any education after high school, and almost four in five did not have a parent with a bachelor's degree. In fall 2008, the average adjusted gross income of the parents was just under $30,000 and the average calculated expected family contribution based on the FAFSA was $1,631. Just over one-third of the sample came from families living below the poverty line for a family of four ($22,000 per year in 2008) and nearly all qualified as "working poor" because they earned less than 200 percent of the federal poverty threshold (Center on Wisconsin Strategy 2010).[23]

Pell Grant recipients qualify for the most need-based aid, and students with a zero expected family contribution qualify for the maximum Pell. In this sample, 31 percent of students fell into this category. When starting college, students in the sample received an average of just over $7,000 in grants and scholarships (including an average Pell of $3,200). Since the average institutional cost of attendance was just over $15,000, this left students with an average $8,367 in unmet financial need (defined as the cost of attendance less grant aid and the student's expected family contribution). But unmet need varied widely; the standard deviation

[22] Racial/ethnic minority groups include African-Americans, Native Americans, Hispanics, Southeast Asians, and multiracial students who are from at least one of these groups. Information on race was obtained from a student survey and administrative records, as it is not included in the FAFSA, and as such is only available for about 80% of the full sample.

[23] Twenty-seven percent of families in Wisconsin earned less than 200 percent of poverty in 2010, compared to 30 percent nationwide (Center on Wisconsin Strategy 2010).

was $3,029 and the range was from negative $7,500 (meaning that either the student received more grant aid than needed or professional judgment was exercised) to $17,900.[24] To put this into context, consider that covering this unmet need directly for the student would require the family to spend an additional 28 percent of income beyond what was needed to cover the expected family contribution.

Students could take loans to cover that need; at the time they could borrow subsidized Stafford loans amounting to $3,500 or the amount of their unmet need, whichever was less. In addition, they could borrow unsubsidized Stafford loans of up to a total of $5,500 in federal loans. On average, students in this sample accepted about $3,300 in loans (80% of which were subsidized). But 47 percent of students declined to take at least some of the loans offered to them, with 14 percent of students declining all loans (Goldrick-Rab and Kelchen 2013). As a result, more than 80 percent of students had remaining, uncovered out-of-pocket costs (defined as the cost of attendance less any type of financial aid received) when they started college. The average student faced out-of-pocket costs of $5,480, and more than one in four students still needed to cover greater than $8,000 in out-of-pocket costs in order to afford their first year of college.[25]

DATA

[24] Although students and their families are expected to cover the value of the EFC, this is often not feasible as the EFC may not represent the actual ability to pay. Rather, it represents a rough ranking of which students have the most financial need. Professional judgments occur when financial aid administrators adjust a student's EFC to better reflect the current financial circumstances. For example, an aid administrator can adjust an EFC to account for a parent losing her job midway through the tax year.

[25] In recent years, families have turned to Parent PLUS loans to reduce these out-of-pocket costs. One reason is that a growing number of Wisconsin's universities, like many across the nation, have begun including PLUS loans in students' aid packages rather than waiting for families to request them (Fishman 2014; Goldrick-Rab, Kelchen, and Houle 2014). But at the time of this study, very few students utilized these loans.

The State of Wisconsin does not have a student unit record data system for higher education. Therefore, in order to examine the college outcomes of students offered the Wisconsin Scholars Grant, data agreements were required between the state agency that possesses financial aid information, the University of Wisconsin System, each of the 13 public universities in that system, and the FFWS. Over time, data agreements changed, creating variation in data availability across cohorts.

Two data sources provide information on whether and where a student is enrolled in college each semester. For all three cohorts, data from the University of Wisconsin System record enrollments at the 13 universities and 13 two-year branch campuses in that system. In addition, for the first cohort, data from the National Student Clearinghouse (NSC) are available—the NSC is a centralized reporting system that collects publicly available directory information obtained from the colleges and universities attended by 92 percent of American undergraduates, to estimate impacts on transfer. All public universities in Wisconsin participate in the NSC.[26] Combining data from these two sources, enrollment and on-time (4-year) bachelor's degree completion information is available for all students in the study.

For all cohorts, the University of Wisconsin System measures credits and grades, but these data are available for different lengths of time.[27] This information is available for 78 percent of students in the first cohort (in Table 2 this is termed the "administrative data sample")

[26] Only 12 colleges in Wisconsin who participate in the IPEDS did not participate in the NSC as of 2008-2009. The largest of these is Herzing University, a for-profit institution with a student enrollment of under 1,500. Total enrollment at these 12 schools is just over 7,000 students.

[27] In order to observe completed credits and GPA, a student must have registered for and completed a credit and passed the class with a D or above. Credits for pass/fail classes, which are not included in GPA calculations, are not recorded with this measure. Credits derived from pre-college enrollment, including Advanced Placement tests, are also not included. We observe the first and second cohorts for three years using UW System data, and the third cohort for two years.

and all students in the second and third cohorts. If students offered the WSG left the UW System at different rates than other students, these analyses might be subject to bias, but estimates based on the first cohort suggest that there was no impact of the WSG on transfer rates outside of the System (analyses not presented but available upon request). Impacts on the total number of credits earned are considered along with estimates of impacts on completion of 12 or more credits per term since the WSG required full-time enrollment. The cumulative grade point average is reported by term for enrolled students, and for students who are not enrolled the GPA from the last term enrolled is reported, following Scott-Clayton (2011), while recognizing that estimation of causal effects on GPA is not as straightforward as with other academic outcomes.[28] Finally, impacts of the grant on whether students met the requirements for retaining all of their financial aid from term to term are reported, since continual receipt of financial aid may be important for ensuring degree completion.

Financial aid packages are measured and pre-treatment unmet need and out-of-pocket costs computed using financial aid packages provided by the universities. The data were difficult to obtain since it required that financial aid officers print screen-shots of each student's financial aid package before packaging the WSG.[29] The data are available for 10 of the 13 universities (49 percent of the sample).

Students' pre-college characteristics—demographic, academic, familial, and financial—are captured through the use of multiple data sources including their financial aid application, academic record provided by their university, and a survey fielded by researchers as students

[28] Students can only have grades if they are enrolled; thus if the grant influences enrollment, then this could give the false appearance that the program influenced GPA when in fact it may be that different students were enrolled and had grades observed.

[29] This effort was required because some data is overwritten in financial aid systems; thus some time-specific data had to be captured immediately.

began college. Information on the characteristics of universities in the study is obtained from University of Wisconsin System data reports and the federal Integrated Postsecondary Education Data System (University of Wisconsin System 2008; 2009a; 2009b; 2010).

ANALYTIC PLAN

Even in experimental studies, internal validity can be a concern and thus the first stage of the analysis considers the validity of the experimental and control groups, testing for equivalence in their characteristics before the program began and examining the potential impact of differential attrition in data sources utilized for analyses. As explained earlier, there are critical differences between WSG-offer and WSG-receipt, with the former arguably representing the most policy-relevant parameter and the one for which estimations in this study are most free from bias. The experimental analysis focuses on an intent-to-treat framework in which students offered the WSG are compared to students who would have been offered it if selected during random assignment. The fraction of students who were offered and actually received the grant in each term is reported for each semester in Table 4 so that attrition in receipt can be considered.

In Table 4, we examine the number of years which students assigned to be offered the Wisconsin Scholars Grant actually receive the grant. Additionally, we estimate the impact of WSG offer on on-time (four-year) bachelor's degree completion for student i in cohort 1 using the following OLS regression:

$$Y_i = \alpha_{0i} + \alpha_{1i} T_i + \alpha_{2i} C_i + \epsilon_i, \quad (1)$$

where Y_i represents the outcome of interest (graduation), T_i is an indicator for whether the student was assigned to receive the Wisconsin Scholars Grant, and C_i is a vector of college fixed effects.

The magnitudes of the impacts are reported in the tables according to percentage point differences and standardized mean difference effect sizes; the latter are provided in the text since they allow the reader to understand the impacts in relation to the amount of variation present in the sample (Lipsey et al 2012). Effect sizes are calculated using OLS regression for continuous outcomes. For binary outcomes, the Cox (1970) method is used, where the difference between treatment and control groups (after including covariates) is divided by 1.65. To aid in assessing whether those effect sizes are small, medium, or large, consider that the most critical outcome in this study, on-time (4-year) bachelor's degree completion, is a low incidence outcome that is difficult to change. Effect sizes of educational interventions on outcomes like these usually fall well below 0.20 (Harris 2013). In terms of statistical significance, results are reported where the p-value is at least marginally significant ($p<.10$) rather than at $p<.05$, given that some of the samples employed are small, and experimental analyses are uncommon in this field and yet have high internal validity.

In Table 5, we estimate treatment impacts on term-by-term persistence and achievement separately for cohort 1 and the combined second and third cohorts using equation (1). To determine effect sizes for binary outcomes, we use the same measure described for Table 4. For continuous outcomes (such as credit completion), we determine effect sizes by dividing the covariate-adjusted difference in means by the pooled sample standard deviation.

In Tables 6 and 7, we use interaction models to examine whether treatment effects on retention, credits earned in the fall of the third semester, and on-time graduation rates vary by pre-treatment out-of-pocket costs and student characteristics (race/ethnicity, gender, parental education, dependency status, family income, and immigration status). We use continuous and binary measures of out-of-pocket costs (with the cutoff being $3,500 in out-of-pocket costs, as

this is the value of the WSG) and ACT scores (where scores are broken into terciles); all other measures are binary. We use the following OLS regression to estimate treatment impacts:

$$Y_i = \alpha_{0i} + \alpha_{1i}T_i + \alpha_{2i}X_i + \alpha_{3i}(T_i * X_i) + \alpha_{4i}Ci + \epsilon_i, \quad (2)$$

where Y_i represents the outcome of interest, T_i is an indicator for whether the student was assigned to receive the Wisconsin Scholars Grant, X_i represents out-of-pocket costs or the demographic measure of interest, $(T_i * X_i)$ represents the interaction (continuous or binary), and C_i is a vector of college fixed effects. Effect sizes are determined similar to before, with logistic regression for retention and graduation and OLS regression for credits completed.

In Table 8, we use interaction models to examine potential differences in treatment impacts by institutional selectivity (binary), Pell graduation rates (continuous), and institutional aid available per student (continuous). The models are the same as in Tables 6 and 7, with the exception that college fixed effects are excluded due to all variation being across institutions.

In Appendix 2, we present unadjusted (college fixed effects only) and covariate-adjusted treatment impacts and effect sizes for term-by-term persistence and achievement outcomes. We adjust for race/ethnicity, gender, age, parental education, zero EFC, dependency status, parental income, immigration status, and college fixed effects in the covariate-adjusted model. The models are otherwise similar to equation (1), and all covariates are used to determine effect sizes.

INTERNAL VALIDITY

The primary threat to the internal validity of treatment impacts in this study stems from the potential for inadvertent non-equivalence in baseline equivalence of the samples, regardless of random assignment, and the potential differential observation of outcomes. Thus, prior to conducting each analysis, group differences in baseline characteristics are estimated and main

and differential attrition examined, following best practices in experimental research (What Works Clearinghouse 2013).

Table 3 and Appendix Table A1 present the results of regressions predicting student demographic characteristics with the indicator reflecting assignment to treatment. The coefficients from OLS regressions indicate whether and by how much the treatment group differed from the control group. In accordance with field standards, group differences raise concerns when they exceed 0.05 standard deviations, and differences larger than 0.25 standard deviations are especially problematic. The full samples for Cohorts 1, 2, and 3 sample are balanced. However, the treatment group in the Cohort 1 administrative data sample is disproportionately Southeast Asian (ES=0.33) and the treatment group in the Cohort 1 financial aid has more dependent students (ES=0.30), students over age 19 (ES=0.50), and Southeast Asian students (ES=0.35) when compared to the control group. To address these potential concerns, college fixed effects are included in all models for the first cohort except when testing for differences across institutional characteristics, and the unbalanced covariates are added when estimating impacts with those samples. Also, for the second and third cohorts, baseline equivalence can only be checked using measures of where the students attended college (Appendix 1). That simple check raises no cause for concern, but of course there is still potential for unmeasured bias in those samples.

Even when there are no group differences prior to the start of treatment, differential attrition from those samples can introduce bias. The full sample of Cohort 1 has no attrition. The administrative data sample includes 79 percent of the treatment group and 77 percent of the control group. The financial aid data sample includes 44 percent of the treatment group and 42 percent of the control group. While these differences in attrition by treatment status are small,

given the overall magnitude of attrition in the financial aid data sample, significant bias to the estimates could occur and thus those analyses should be treated as exploratory (What Works Clearinghouse 2013).

AVERAGE IMPACTS ON COLLEGE ACHIEVEMENT AND ATTAINMENT

As Table 4 indicates, the offer of the $3,500 WSG grant generated statistically significant and substantively important increases in on-time (4-year) bachelor's degree completion rates for students in the program's first cohort. While just 16 percent of students not offered the WSG completed a bachelor's degree at any institution in four years, about 21 percent of students offered the grant finished that degree (ES=0.21, $p<.05$). Data are not yet available to estimate impacts on degree completion for the second and third cohorts of students, but since degree completion stems from a process of academic achievement and attainment following college entry, we next examine impacts on a term-by-term basis across cohorts.

Students received notification that they were offered the WSG early during their first semester of college. While this followed the registration period, making it impossible for the treatment to change decisions about whether students registered that term or how many credits they took, it is possible that the notice of $3,500 in pending grant aid could have affected how many credits they completed, or improved their grades. Funds from the grant reached the students' financial aid packages by the end of that first semester and were received by the start of the second term. Following that time, students were eligible to continue receiving the grant during subsequent semesters as long as they continued to enroll in school, maintained Pell eligibility (which required making SAP), and registered for at least 12 credits per term. In Table 5 we report impacts on enrollment, credit completion, and grades by semester.

All students were enrolled during the first semester of the study, but almost seven percent of those students left college after one term, nearly 20 percent were gone after two terms, and by the end of three academic years (5 semesters) following their initial start date, just over 70 percent of students remained enrolled. As Table 4 indicates, the percent of the treatment group receiving the WSG also diminished over time (partly due to attrition from college but also due to failure to meet the requirements). For example, while 92 percent of students offered the grant received it in the first year, that fraction dropped to 71 percent by year two, and just 47 percent in year three.[30]

Looking across impacts for the first three cohorts served by the FFWS program (Table 5), it appears that the WSG offer boosted retention rates among university students by one to three percentage points per term (translated into effect sizes, these impacts rate from about 0.1 to 0.3 standard deviation improvements). The impact estimates are larger and the standard errors smaller for the second and third cohorts; the latter is unsurprising given the much larger sample used in those estimations. But the trends are generally the same across cohorts, with the largest impacts on retention occurring during the third semester—one term following the receipt of the grant funds—and waning after that point. By the sixth semester following college entry, less than half of students offered the WSG were still receiving the grant, and impacts on retention were indistinguishable from zero.

The students began college registered for at least 12 credits, the minimum threshold for full-time enrollment. While the funds from the grant did not arrive until December or the start

[30] These changes may be been partly related to shifts in students' family income and Pell eligibility, but that is clearly not the only reason for the decline in the number of students receiving the grant over time. Most students did not see large changes in their household income over three years, as the correlation in parental income between the first and third years of college is 0.59. Eighty-nine percent of continuously enrolled students were eligible to receive the Pell Grant during their second year of college and 86% during their third year.

of the second semester (in some cases), there is limited evidence that impacts occurred during the semester in which students were first notified. Specifically, Table 5 indicates that students offered the WSG finished that term with a slightly higher cumulative GPA (just over a 2.7 rather than a 2.6). The impact estimates are similar across cohorts and hold steady in magnitude (effect size=0.09) across the first four semesters of college before diminishing slightly and becoming statistically indistinguishable from zero.[31] While an impact of this size is rather small, it may be notable given that the cumulative GPAs of these Pell recipients hovered so close to a C+ average, while continued financial aid receipt hinged on maintaining at least a C (more on this below).

Moreover, students receiving the WSG seem to have earned modestly better grades while completing more credits. On average, the treatment impact on completed credits was about 0.3 to 0.5 credits per term; this includes zero credits for all non-enrolled students. Like the trend for GPA, impacts faded by the start of the third year of college. In total, across the three years for which we can measure credits and grades, the offer of the WSG increased the completed credits by one or two and generated an improvement in GPA of about 0.08.

These modest improvements in credit completion and grades may have contributed to overall educational attainment directly, but might have also enhanced on-time degree completion by increasing students' likelihood of retaining their financial aid. Throughout college, students are at risk of losing some or all of their financial aid by shifting from full-time to part-time enrollment or failing to make SAP. This affects the distribution of the Pell Grant and also

[31] It is impossible to determine from the available data whether the estimated effects waned over time because the fraction of students receiving the grant diminished (which clearly occurred), or because students become less financially needy (or less sensitive to financial aid) as they move through school. While it would be informative to know more about variation in the impacts of aid according to timing of delivery, this is a task for future research.

affected the distribution of the WSG, which required continued Pell receipt and continued full-time enrollment. The results indicate that offering students the WSG increased their chances of making SAP and thus retaining their aid. In this critical sense, money may beget money—in other words students with more financial resources may have the greater support required complete more credits and earn better grades, thus retaining their aid.[32]

The most important finding in this regard is that large numbers of students do not meet these standards, completing 12 credits while maintaining at least a C average cumulative GPA (Table 5). In each term, between 20 and 30 percent of enrolled students did not meet the academic thresholds required to retain their need-based financial aid. But students offered the WSG were more likely to meet the academic requirements necessary to keep their need-based aid. Estimates from the second and third cohorts suggest that the WSG offer increased by about three percentage points the likelihood that students would make SAP (a 2.0 GPA) and complete at least 12 credits per term (ES= 0.08-0.10). These impacts were not apparent for the program's first cohort of students.[33] About one in three students in the first cohort and 45 percent of

[32] It is unlikely that the WSG provided students with an incentive to make SAP based on its requirements, given the evidence that from surveys and interviews that many students were unaware of the grant's requirements. Like many government programs, the WSG's program rules were unevenly followed and in some cases misunderstood by students. Students in the first cohort were not regularly reminded about the grant's renewal criteria, and surveys administered to that cohort in the months after the program began and again a year later showed that barely half of students offered the grant knew that it was part of their financial aid package (in contrast 80% of these Pell recipients knew they received a Pell). Some students were also confused about the grant's academic requirements, required for retention of the funds. On surveys, 83 percent of students assigned to treatment revealed that they misunderstood the grant's requirements, and recipients of the federal Academic Competitiveness Grant, which required a 3.0 average, seem to have mistakenly thought that the Wisconsin grant demanded full-time enrollment and a 3.0 average. In addition, the WSG required that students continue to receive the Pell Grant each year, and some students did not understand this and were surprised when their family income changed or they did not re-file the FAFSA and thus their WSG was discontinued.

[33] As noted in footnote 29, surveys and interviews conducted with the first cohort provide a possible explanation, indicating that students were confused about the WSG's requirements and thought that the grant required a 3.0 GPA instead of a 2.0. Many of these students also had a now-defunct Academic Competitiveness Grant from the federal government, which did require a 3.0. Students attempting to earn a 3.0 GPA while enrolling full-time (to keep the

students in the second and third cohorts made SAP each semester they were observed (six semesters for cohorts 1 and 2, four semesters for cohort 3). Treatment students in later cohorts were three percentage points more likely to make SAP every semester (ES=0.08).

VARIATION IN IMPACTS BASED ON OUT-OF-POCKET COSTS

As explained earlier, the impacts of the WSG offer could vary depending on the out-of-pocket students faced at the start of college. Those out-of-pocket costs are not randomly distributed but were determined prior to the assignment of the WSG offer, and thus can be added as regression controls. However, the ability to observe the data needed to conduct this analysis of effect heterogeneity does appear to be linked to treatment status, and thus there is reason to suspect bias is affecting the estimation of the results.

In general, students with higher out-of-pocket costs as they began college were slightly less likely to persist for a second year of college and they earned somewhat fewer credits (Table 6). As described earlier, due to packaging results, offering students the WSG tended to lead to loan reduction for students with lower out-of-pocket costs while adding to the amount of cash-in-hand available for students facing higher out-of-pocket costs. For example, for students whose out-of-pocket costs were less than $3,500 when beginning college, the WSG offer led to loan reduction for 69 percent of students, with an average reduction of $2,612 in their first year of college. Just 38 percent of those students had their out-of-pocket costs reduced by at least $1,000. In contrast, for 89 percent of students whose out-of-pocket costs at the start of college exceeded $3,500, the WSG offer increased the amount of cash-in-hand by at least $1,000. Just 27 percent of these students had their loans reduced on average by $1,498.

WSG) may have failed, leading to dropping either credits or getting worse grades. The FFWS consistently increased and improved communications with schools and universities over time, and this problem may have been resolved.

Analyses of effect heterogeneity suggest students with higher out-of-pocket costs received larger benefits from the WSG offer in terms of impacts on retention and credits in the second year of college. For each additional $1,000 in out-of-pocket costs students faced as they started college (and thus the amount reduced due to the WSG), the additional impact of the WSG offer on retention to the second year of college was 1.3 percentage points ($p<.10$), for a total impact of 4.5 percentage points for a student with $3,500 in out-of-pocket costs. The impacts are even larger for students with out-of-pocket costs exceeding the size of the WSG; students needing to cover at least $3,500 in order to make ends meet received an additional 11.5 percentage point boost in retention to the second year of college ($p<.05$), for a total impact of 14.7 percentage points.[34] However, similar impacts on completion are not observed; it may be the case that compensating for such significant out-of-pocket costs helped students stay in school but the factors contributing to those higher costs in the first place may inhibit any acceleration in degree completion.

[34] Falsification tests available from the authors suggest that the impacts are non-linear, with greater benefits accruing to students with at least $2,000 of unmet need and accelerating somewhat around the amount of the grant.

VARIATION IN IMPACTS BASED ON OTHER STUDENT CHARACTERISTICS

We also identify some variations in the impacts of the WSG offer according to students' demographic characteristics and their levels of pre-college academic preparation (Table 7). While gender, racial/ethnic, and income variations in effects was not detected (the most common aspects of effect heterogeneity identified in prior research), there were sizable differences in the impacts of the WSG offer according to parental education. Specifically, students who were the first in their family to attend college do not appear to have accrued positive benefits of the WSG offer in terms of degree completion over four years. Those benefits seem to have been limited to students with college-going parents. Since first-generation students often take longer to complete college, it will be important to re-examine these results in several years when data are available over a longer period of time and for additional cohorts of students.

There is also evident effect heterogeneity based on how prepared students were for college, such that larger positive benefits of the WSG offer are detected for students with less academic preparation. Positive impacts on retention, credits, and degree completion are larger for students whose high school transcripts did *not* qualify them for the federal Academic Competitiveness Grant – a program designed to give more financial aid to students considered to be academically-deserving. Instead, the results presented here indicate that investments in students with lower odds of success may generate greater payoffs.

INSTITUTIONAL VARIATION IN IMPACTS

The decision about where to attend college occurred before students came into contact with the WSG and therefore we consider whether the impacts of the WSG offer varied according to characteristics of the university a student attended (Table 8). Specifically, estimates based on

institutional selectivity (using median ACT scores), Pell recipient 6-year graduation rates, and institutional aid budgets are presented.[35] Impact variation on three outcomes is considered: rates of retention to the second year of college (when the fraction of students offered the WSG who were still receiving the grant was still fairly high), credits obtained by the second year of college, and on time (4-year) bachelor's degree completion rates for the first cohort of students.

The evidence regarding the interaction between institutional selectivity and the impacts of the WSG offer is weak. For the first cohort served by the program, it appears that students at less-selective institutions may have received somewhat larger positive benefits from the program in terms of retention to the second year of college, but there is no evidence of differential impacts on degree completion rates or for the second and third cohorts of students served. The point estimate for the impacts on degree completion for the first cohort is negative and not statistically significant, and impacts on degree completion are not measured for the second and third cohorts.

Was the WSG more effective at boosting college persistence and degree completion rates for students attending universities where Pell recipients are generally already doing well? Higher rates of Pell student success could be another proxy for selectivity but it might also indicate a more supportive environment for these students. The results suggest that for the first cohort of students, the grant offer generated larger impacts on on-time degree completion rates at institutions where the institutional graduation rate (over 6 years) for Pell recipients was higher. Specifically, for a 10 percentage point increase in a university's 6-year degree completion rate for Pell recipients, the impact of the WSG offer on 4-year degree completion rates increased by

[35] Institutions are classified as being more selective if the median ACT score is 25 or higher (n=3) and are compared to the 10 less-selective institutions. The control group retention rates are pooled among students in the first three cohorts not offered the WSG. Finally, the institutional aid per student measure is the institutional grant aid budget in the 2008-09 academic year (according to the University of Wisconsin System) divided by the number of undergraduate students in the fall 2008 semester.

about 4.7 percentage points. But similar impacts are not observed for retention rates or credits, and these estimates cannot be confirmed with the second and third cohorts of students at this point. Moreover, the results provide no evidence of variation in treatment impacts based on the institutional financial aid budget—one factor that might be supportive of higher Pell recipient graduation rates.

DISCUSSION

College-going in the twenty-first century is normative, yet college completion is not. Income inequalities in K-12 education are largely reproduced in postsecondary education, generating skepticism about the capacity of tertiary education to do much more than perpetuate stratification. Almost fifty years ago, policymakers began investing in need-based financial aid as a strategy for reducing income inequality in college attainment. While the effectiveness of financial aid is often assessed in terms of college attendance, higher education's ability to affect social mobility hinges in part on students from low-income families *completing* college. This study provides new experimental evidence indicating that need-based grant aid is effective at inducing students to remain enrolled in college, earn slightly more credits, and get somewhat better grades, contributing to improved rates of on-time (4-year) bachelor's degree completion. Moreover, grant aid contributes to the attenuation of inequality in college outcomes. We find that before the introduction of the Wisconsin Scholars Grant, the expected gap in the on-time (4-year) bachelor's degree completion rate between the Pell Grant recipients in this sample (16%) and the average on-time (4-year) degree completion rate in the University of Wisconsin System (30%)

was fourteen percentage points—but the offer of $3,500 in additional grant aid raised graduation rates to 21 percent, cutting that gap to nine percentage points.[36]

While this study focuses on a group of Wisconsin undergraduates, the point estimates are similar to those obtained elsewhere. For example, in Florida, eligibility for $1,300 of need-based grant aid led to a 22 percent increase in bachelor's degree completion over six years (Castleman and Long 2013), while in Wisconsin the offer of a $3,500 grant boosted odds of on-time (4-year) degree completion by 29 percent (4.7 percentage points from a control group mean of 16.3%). In addition, it is worth noting that this study examined a program operated as it would in real life, rather than a trial program created for demonstration purposes. This further helps to enhance the generalizability of the results we obtain (Heckman 2005). It seems reasonable to suggest that the findings indicate that policymakers could improve rates of college completion (and perhaps reduce time-to-degree) among some students from low-income families by increasing the amount of grant aid offered.

The estimated differential impacts according to students' out-of-pocket costs before the WSG was awarded, and in turn how much additional cash-in-hand they received from the grant offer, suggest that students from low-income families benefit from having additional resources to cover their costs. Replacing loans dollar for dollar with grant aid appears less effective than adding to the number of dollars in students' aid packages, thus reducing their out-of-pocket costs. Of course, the impacts of loans versus grants may be different for loan-averse students, even as it appears to matter little for those who are willing (or can be convinced) to accept them. Moreover, these relationships could have been affected by the Great Recession, which was

[36] We would prefer to use the on-time (4-year) graduation rate for non-Pell recipients in UW System, rather than the average student, in this calculation but that information is unavailable.

occurring as these students pursued degrees. There were very few resources available for families to use to cover college costs during this time; a disproportionate number leaned on loans and even the poorest families had little resources from the safety net to turn towards.

The findings also suggest that the effects of additional economic capital may be mediated by the presence of social and/or cultural capital. For example, students with college-educated parents appear to have benefitted more from the offer of the WSG. It may be that with their greater knowledge about how to navigate college, they were better equipped to strategize about how to translate the increased resources into a shorter time-to-degree. On the other hand, students with less academic preparation appear to have benefitted more from the grant offer, perhaps because the impact of purchasing books or supplies with the new resources, or reducing work hours, was more helpful in their academic success. This finding may also suggest that programs with academic merit requirements for needy students may be reducing the effectiveness of their investments, which could be larger if targeted to those who just miss those requirements. This finding is consistent with several other recent studies in Florida (Castleman and Long 2013) and Louisiana (Crockett, Heffron, and Schneider 2011).

The evidence presented in this paper also suggests the importance of considering how program impacts evolve over time and across cohorts, replicating analyses with additional cohorts of students whenever possible. The short-term effects of the WSG on retention for the first cohort of recipients suggested a much more limited set of impacts that did not reveal the

positive benefits for degree completion, while more years of data and comparisons to the results for the second and third cohorts of students indicate that more robust effects took place.[37]

As with all studies, the analyses in this paper have several limitations. First, there is a possibility of some bias in the analysis of heterogeneous effects since randomization was not blocked by either institutional selectivity or a student's unmet financial need, and there is some differential attrition in the sample used. Second, several of the analyses may be underpowered, particularly for sub-samples. Third, the results are based on a group of Wisconsin Pell Grant recipients who began college full-time despite having substantial unmet financial need. The impacts of the WSG might be stronger if delivered prior to when the college decision is made and/or if it were directed to part-time or otherwise needier students.

For researchers, this study raises critical questions about the mechanisms through which those impacts operate and the factors moderating them (Harris and Goldrick-Rab 2012). The results regarding variability in the impacts of the WSG offer provide the most fertile ground for theory development and empirical testing. It is one thing to identify differential effects of a program like grant aid, and quite another to account for them. Effect heterogeneity should be examined within the experimental framework whenever possible, ideally by stratifying the pre-treatment sample by subgroup (Brand and Thomas 2013). It is also important to find ways to rigorously examine the potential mediators of effects of grant aid, for example by considering alternative approaches to reducing students' work hours and then estimating impacts on academic outcomes.

[37] The parent project for this study included a mixed-methods data collection strategy and while analysis of the qualitative data is beyond the scope of this paper, there is some evidence that program implementation could have affected the impacts of the grant, especially for the first cohort. Interviews with financial aid officers revealed variation in their understandings of the criteria regarding who was eligible for the grant, the conditions under which it could be renewed, and what messages they were to provide students about the award.

Quite apart from the documentation of impacts, the question of how to translate research findings like these into policy recommendations is a very difficult one (Kelly and Goldrick-Rab 2014). While some scholars have encouraged the greater use of targeting of financial aid (Alon 2011), that strategy is often accompanied by significant tradeoffs. Means testing creates divisions in political support for programs, and the politics of differentiating among poor people is fraught (Soss, Fording, and Schram 2011). It may be more possible to distribute financial aid to educational institutions based on their admissions policies, to encourage broader access and enhance the achievement of students with lower prospects of graduation (Goldrick-Rab, Schudde, and Stampen 2014). But given the current emphasis of the Higher Education Act on facilitating college choice among all varieties of institutions (public, private, for-profit) and debates over entitlement programs, rethinking the rules of aid programs rather than shoring up investments in those programs may be unadvisable. This political economy of financial aid and higher education policy is deserving of far greater attention among sociologists, since it as at least as important to the future of means-tested financial grants as the rigorous estimation of program impacts like that reported here.

Furthermore, while financial grant aid may reduce income inequality in college attainment rates, that does not necessarily imply that in turn income inequality among individuals will be similarly affected (Bowles and Gintis 2011). Since policy ambitions for higher education among political leaders often rest on the latter outcome, but the need for financial grant aid will not diminish if real family incomes do not rise, it is unclear whether investing in need-based financial aid is a sustainable strategy. Deserving of greater consideration are the personal and societal consequences of the current financial aid system, which reflects the norms of today's capitalist economy by utilizing grants as vouchers to discount college costs, relying heavily on

individual action and responsibility. Structuring the finance of higher education in this way may exert some positive effects for some students, while exacting broader implications in terms of how college is valued and who is responsible for its success. Alternatives such as providing some form of postsecondary education at no cost to families might be explored both in terms of their benefits for individual education attainment and for the labor market demand and wage premium accruing to college degrees—both of which contribute to income inequality (Goldrick-Rab, Schudde and Stampen 2014).

REFERENCES

Alon, Sigal. 2005. "Model Mis-Specification in Assessing the Impact of Financial Aid on Academic Outcomes." *Research in Higher Education*. Vol. 46, No. 1. February, 109-125.

Alon, Sigal. 2009. "The Evolution of Class Inequality in Higher Education: Competition, Exclusion and Adaptation." *American Sociological Review*. 74:731–755.

Alon, Sigal. 2011. "Who Benefits Most From Financial Aid? The Heterogeneous Effect of Need-Based Grants on Students' College Persistence." *Social Science Quarterly*, 92(3): 807-829.

Amos, Lauren, Amy Windham, Iliana Brodziak de los Reyes, Wehmah Jones, and Virginia Baran. 2009. *Delivering on the Promise: An Impact Evaluation of the Gates Millennium Scholars Program*. Washington, DC: American Institutes for Research.

Angrist, Joshua D., Daniel Lang, and Philip Oreopoulos. 2009. "Incentives and Services for College Achievement: Evidence from a Randomized Trial." *American Economic Journal: Applied Economics*, 1(1): 136-63.

Angrist, Joshua D., Philip Oreopoulos, and Tyler Williams. 2010. *When Opportunity Knocks, Who Answers? New Evidence on College Achievement Awards.* NBER Working Paper 16643.

Attewell, Paul, Scott Heil and Liza Reisel. 2011. "Competing explanations for undergraduate noncompletion." *American Educational Research Journal.* 48(3): 536-559.

Attewell, Paul, Scott Heil and Liza Reisel. 2012. "What is academic momentum? And does it matter?" *Educational Evaluation and Policy Analysis.* 34(1): 27-44.

Attewell, Paul and David Lavin. 2007. *Passing the Torch: Does Higher Education Pay Off Across the Generations?* Russell Sage Foundation: NY.

Bailey, Martha J. and Susan Dynarski. 2011. "Inequality in Postsecondary Education." In *Wither Opportunity?"* Greg Duncan and Richard Murnane (Editors), 117-132. New York, NY: Russell Sage Foundation.

Bastedo, Michael N., and Ozan Jacquette. 2011. "Running in Place: Low-Income Students and the Dynamics of Higher Education Stratification." *Educational Evaluation and Policy Analysis.* 33(3): 318-339.

Bettinger, Eric P. 2004. "How Financial Aid Affects Persistence." In *College Choices: The Economics of Where to Go, When to Go, and How To Pay for It*, ed. Caroline Hoxby, 207-37. Chicago, IL: University of Chicago Press.

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

Bettinger, Eric P. 2011. *Financial Aid: A Blunt Instrument for Increasing Degree Attainment*. Washington, D.C.: American Enterprise Institute.

Bettinger, Eric P. and Betsy Williams. 2013. "Federal and State Financial Aid During the Great Recession." In J. Brown and C. Hoxby (Editors), *How the Financial Crisis and Great Recession Affected Higher Education.*

Bettinger, Eric P., Bridget T. Long, Philip Oreopoulos, and Lisa Sanbonmatsu. 2012. "The role of application assistance and information in college decisions: Results from the H&R Block FAFSA experiment." *The Quarterly Journal of Economics, 127*(3), 1205-1242.

Bloom, Howard S. 2005. *Learning More from Social Experiments: Evolving Analytic Approaches.* New York, NY: Russell Sage.

Bound, John, and Sarah Turner. 2002. "Going to War and Going to College: Did World War II and the G.I. Bill Increase Educational Attainment for Returning Veterans?" *Journal of Labor Economics*, 20(4): 784-815.

Bourdieu, Pierre. 1973. "Cultural Reproduction and Social Reproduction." In R. Brown (ed.) *Knowledge, Education and Cultural Change: Papers in the Sociology of Education*. London: Tavistock. Pp.71-112.

Bowen, William G., Matthew M. Chingos, and Michael S. McPherson. 2009. *Crossing the Finish Line: Completing College at America's Public Universities*. Princeton, NJ: Princeton University Press.

Bowles, Samuel and Herbert Gintis. 2011 (1976). *Schooling in Capitalist America: Educational Reform and the Contradictions of Economic Life.* Haymarket Books: Chicago, IL.

Bozick, Robert. 2007. "Making It Through the First Year of College: The Role of Students' Economic Resources, Employment, and Living Arrangements," *Sociology of Education*, 80:261-285, 2007.

Brand, Jennie E. 2010. "Civic Returns to Higher Education: A Note on Heterogeneous Effects." *Social Forces* 89(2): 417-434.

Brand, Jennie E. and Dwight Davis. 2011. "The Impact of College Education on Fertility: Evidence for Heterogeneous Effects." *Demography,* 48(3): 863-887.

Brand, Jennie E. and Yu Xie. 2010. "Who Benefits Most From College? Evidence for Negative Selection in Heterogeneous Economic Returns to Higher Education." *American Sociological Review,* 75(2): 273-302.

Brand, Jennie E. and Juli Simon Thomas. 2013. "Causal Effect Heterogeneity." In S. Morgan (Ed), *Handbook of Causal Analysis for Social Research.* 189-213.

Brookings Institution. 2012. *Beyond Need and Merit: Strengthening State Grant Programs.* Washington, DC.

Bruch, Sarah K., Myra Marx Ferree, and Joe Soss. 2010. "From Policy to Polity: Democracy, Paternalism, and the Incorporation of Disadvantaged Citizens." *American Sociological Review.* 75 (2): 205-226.

Castleman, Benjamin L. and Bridget T. Long. 2013. *Looking Beyond Enrollment: The Causal Effect of Need-Based Grants on College Access, Persistence, and Graduation*. NBER Working Paper No. 19306, August.

Cellini, Stephanie R. 2008. "Causal Inference and Omitted Variable Bias in Financial Aid Research: Assessing Solutions." *Review of Higher Education*, 31(3): 329.

Center on Wisconsin Strategy. 2010. "Wisconsin Jobs and Low-Income Working Families." Retrieved September 19, 2012 from http://www.workingpoorfamilies.org/pdfs/comprehenvie_rp-LIWF.pdf

Chen, Rong and Stephen DesJardins. 2010. "Investigating the impacts of financial aid on student dropout risks: Racial and ethnic differences." *Journal of Higher Education.* 81(2): 179-208.

Cheston, Duke. 2013. Commentary: Pell-Running**:** Taxpayers lose $1 billion or more a year to fraudulent use of Pell grants. The John William Pope Center. http://www.popecenter.org/commentaries/article.html?id=2811

Clydesdale, Tim. 2007. *The first year out: Understanding American teens after high school*. University of Chicago Press.

Coleman, James. 1988. "Social Capital in the Creation of Human Capital." *American Journal of Sociology*, 94: S95-S120.

Conley, Dalton. 2001. "Capital for college: Parental assets and postsecondary schooling." *Sociology of Education, 74*(1), 59-72.

Corak, Miles. 2013. "Income Inequality, Equality of Opportunity, and Intergenerational Mobility." *Journal of Economic Perspectives.*27(3): 79-102.

College Board. 2013. *Trends in Student Aid 2013.* New York, NY.

Cornwell, Christopher, Kyung Hee Lee, and David Mustard. 2005. "Student Responses to Merit Scholarship Retention Rules." *Journal of Human Resources,* 40(4): 895-917.

Cox, David R. 1970. *The Analysis of Binary Data.* New York, NY: Chapman & Hall.

Crockett, Kevin, Mark Heffron, and Mark Schneider. 2011. *Targeting Financial Aid for Improved Retention Outcomes: The Potential Impact of Redistributing State Gift Aid on Student Retention Among Pell Grant Recipients in Louisiana's Statewide and Regional Universities.* American Institutes for Research, Washington DC.

Deil-Amen, Regina and Stefanie DeLuca. 2010. "The Underserved Third: How Our Educational Structures Populate an Educational Underclass." *Journal of Education for Students Placed at Risk* 15:27-50

Deming, David, and Susan Dynarski. 2010. "Into College, Out of Poverty? Policies to Increase the Postsecondary Attainment of the Poor." In *Targeting Investments in Children: Fighting Poverty When Resources are Limited*, ed. Philip Levine and David Zimmerman, 283-302. Chicago, IL: University of Chicago Press.

DesJardins, Stephen L., Dennis A. Ahlburg, and Brian P. McCall. 2002. "Simulating the Longitudinal Effects of Changes in Financial Aid on Student Departure from College." *The Journal of Human Resources*, 37(3): 653-79.

DesJardins, Stephen L and Brian McCall. 2010. Simulating the effects of financial aid packages on college student stopout, reenrollment spells, and graduation chances. *The Review of Higher Education,* 33(4), 513-541.

DesJardins, Stephen L., and Robert K. Toutkoushian. 2005. "Are Students Really Rational? The Development of Rational Thought and Its Application to Student Choice." Pp. 191-240 in *Higher Education: Handbook of Theory and Practice,* Vol. XX, edited by John Smart. The Netherlands: Springer.

Dowd, Alicia C. 2004. "Income and Financial Aid Effects on Persistence and Degree Attainment in Public Colleges." *Education Policy Analysis Archives*. 12(21). May.

Dowd, Alicia C. 2008. "Dynamic Interactions and Intersubjectivity: Challenges to Causal Modeling in Studies of College Student Debt." *Review of Educational Research*. 78(2): 232–259.

Duncan, Greg and Richard Murnane. 2011. *Wither Opportunity?* 117-132. New York, NY: Russell Sage Foundation.

Dynarski, Susan. 2003. "Does Aid Matter? Measuring the Effects of Student Aid on College Attendance and Completion." *American Economic Review,* 93(1): 279–88.

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

Dynarski, Susan, and Judith Scott-Clayton. 2007. "The Feasibility of Streamlining Aid for College Using the Tax System." *National Tax Association Papers and Proceedings,* 99: 250-62.

Dynarski, Susan and Mark Wiederspan. 2012. *Student aid simplification: Looking back and looking ahead*. National Bureau of Economic Research working paper no. 17834. Cambridge, MA: National Bureau of Economic Research.

Ellwood, David T., and Thomas J. Kane. 2000. "Who is Getting a College Education: Family Background and the Growing Gaps in Enrollment." Pp. 283-324 in *Securing the Future: Investing in Children from Birth to College,* edited by Sheldon Danziger & Jane Waldfogel. New York, NY: Russell Sage Foundation.

Feeney, M., & Heroff, J. 2013. "Barriers to need-based financial aid: Predictors of timely FAFSA completion among low-income students." *Journal of Student Financial Aid, 43*(2), 65-85.

Field, Kelly. 2011. "Education Department Chases 'Pell Runners' Who Threaten Aid Program." *Chronicle of Higher Education.* August 28.

Fishman, Rachel. 2014. *The Parent Trap.* Washington DC: New America Foundation.

Goldin, Claudia, and Lawrence F. Katz. 2008. *The Race Between Education and Technology*. Cambridge, MA: Harvard University Press.

Goldrick-Rab, Sara. 2006. "Following Their Every Move: How Social Class Shapes Postsecondary Pathways." *Sociology of Education.* January, v79n1. pp. 61-79.

Goldrick-Rab, Sara. 2010. "Challenges and Opportunities for Improving Community College Student Outcomes." *Review of Educational Research.* 80(3): 437-469.

Goldrick-Rab, Sara. 2013. "The Real College Barrier for the Working Poor." *Inside Higher Ed.*, December 10.

Goldrick-Rab, Sara and Douglas N. Harris. 2011. *Higher Education in Wisconsin: A 21st Century Status Report.* Wisconsin Covenant Foundation, Madison WI.

Goldrick-Rab, Sara and Nancy Kendall. 2014. *Redefining College Affordability: Securing America's Future With a Free Two Year College Option.* Lumina Foundation.

Goldrick-Rab, Sara, Douglas N. Harris, and Philip A. Trostel. 2009. "Why Financial Aid Matters (or Doesn't) for College Success." In *Higher Education: Handbook of Theory and Research* (Vol. 24), ed. John C. Smart, 1-45.

Goldrick-Rab, Sara and Robert Kelchen. 2013. *Making Sense of Loan Aversion: Evidence from Wisconsin*." Presented at Conference on Consumer Financial Decision-Making, Boulder, CO.

Goldrick-Rab, Sara and Fabian Pfeffer. 2009 "Beyond Access: Explaining Social Class Differences in College Transfer." *Sociology of Education*. 82(2), 101–125.

Goldrick-Rab, Sara, Robert Kelchen, and Jason Houle. 2014. *The Color of Student Debt.* UCLA Civil Rights Project, Los Angeles, CA.

Goldrick-Rab, Sara, Lauren Schudde, and Jacob Stampen. 2014. "Creating Cultures of Affordability: Can Institutional Incentives Improve the Effectiveness of Financial Aid?" In Andrew Kelly and Sara Goldrick-Rab (Editors), *Reinventing Financial Aid: Charting a New Course to College Affordability.* Harvard Education Press, Cambridge, MA.

Grodsky, Eric and Melanie T. Jones. 2007. Real and imagined barriers to college entry: Perceptions of cost. *Social Science Research, 36*, 745-766.

Harris, Douglas N. 2013. Applying cost-effectiveness analysis in higher education. In *Stretching the Higher Education Dollar*. Washington, DC: American Enterprise Institute.

Harris, Douglas N. and Sara Goldrick-Rab. 2012. "Improving the Productivity of Education Experiments: Lessons from a Randomized Study of Need-Based Financial Aid." *Educational Finance and Policy*, 7(2): 143-69.

Haskins, Ron, Harry Holzer, and Robert Lerman. 2009. *Promoting Economic Mobility by Increasing Postsecondary Education.* Pew Charitable Trusts, Philadelphia, PA.

Haveman, Robert and Timothy Smeeding. 2006. "The Role of Higher Education in Social Mobility." *The Future of Children* 16(2): 125-150.

Hechter, Michael and Satoshi Kanazawa. 1997. "Sociological Rational Choice Theory." *American Journal of Sociology*. 23: 191-214.
Heckman, James J. 2005. "Rejoinder: Response to Sobel." *Sociological Methodology,* 35(1): 135-62.
Heller, Donald E. 1999. The effects of tuition and state financial aid on public college enrollment. *Review of Higher Education*, 23(1), 65-89.
Heller, Donald E. 1997. Student price response in higher education: An update to Leslie and Brinkman. *Journal of Higher Education*, 68(6), 624-659.
Higher Educational Aids Board. 2010. *Wisconsin State Student Financial Aid Data: 2008-2009.* Board Report 10-19, February 3.
Hout, Michael. 2012. "Social and Economic Returns to College Education in the United States." *Annual Review of Sociology,* 38: 379-400.
Kane, Thomas J. 1994. "College Entry by Blacks since 1970: The Role of College Costs. Family Background, and the Returns to Education." *The Journal of Political Economy*, 102(5): 878-911.
Kane, Thomas J. 2007. "Evaluating the Impact of the D.C. Tuition Assistance Grant Program." *Journal of Human Resources,* 42(3): 555-82.
Katz, Michael. 2013 (1989). *The Undeserving Poor: America's Enduring Confrontation with Poverty: Fully Updated and Revised.* Oxford University Press.
Katz, Michael and Mike Rose. 2013. *Public Education Under Siege.* University of Pennsylvania Press, Philadelphia.
Kelly, Andrew and Sara Goldrick-Rab. 2014. *Reinventing Financial Aid: Charting a New Course to College Affordability.* Harvard Education Press, Cambridge, MA.
Kerr, Clark, John T. Dunlop, Fredrick H. Harbison, and Charles A. Myers. 1960. *Industrialism and Industrial Man*. Cambridge, MA: Harvard University Press.
Klasik, Daniel. 2012. The college application gauntlet: A systematic analysis of the steps to four-year college enrollment. *Research in Higher Education, 53*(5), 506-549.
Lareau, Annette and Amanda Cox. 2011. "Social Class and the Transition to Adulthood." Pp. 134-164 In Marcy Carlson and Paula England (Ed.), *Social Class and Changing Families in an Unequal America*. Stanford: Stanford University Press.
Lederman, Doug. 2011. "Is Pell Too Big?" *Inside Higher Ed.* March 15.
Leslie, Larry L., and Paul T. Brinkman. 1987. "Student Price Response in Higher Education: The Student Demand Studies." *The Journal of Higher Education.* 58(2): 181-204.
Lleras-Muney, Adriana and David Cutler. 2010. "Understanding Health Differences by Education," *Journal of Health Economics*, Vol. 29, No. 1: 1-28.
Light, Audrey, and Wayne Strayer. 2000. "Determinants of College Completion: School Quality or Student Ability?" *Journal of Human Resources,* 35(2): 299-332.
Linsenmeier, David M., Harvey S. Rosen, and Cecilia E. Rouse. 2006. "Financial Aid Packages and College Enrollment Decisions: An Econometric Case Study." *The Review of Economics and Statistics.* 88(1): 126-145.
Lipsey, M.W., Puzio, K., Yun, C., Hebert, M.A., Steinka-Fry, K., Cole, M.W., Roberts, M., Anthony, K.S., Busick, M.D. 2012. *Translating the Statistical Representation of the Effects of Education Interventions into More Readily Interpretable Forms*. (NCSER 2013-3000). Washington, DC: National Center for Special Education Research, Institute of Education Sciences, U.S. Department of Education.

Long, Mark C., Dylan Conger and Patricia Iatarola. 2012. "Effects of high school course-taking on secondary and postsecondary success." *American Educational Research Journal, 49*(2), 285-322.

Lucas, Samuel. 1999. *Tracking Inequality: Stratification and Mobility in American High Schools.* New York: Teachers College Press.

Luna de la Rosa, Maria. 2006. Is opportunity knocking? Low-income students' perceptions of college and financial aid. *American Behavioral Scientist, 49*(12), 1670-1686.

Mianulli, Kyle. 2010. "As state funding falls, students bear burden of rising tuition costs, debt." *Badger Herald.* April 7.

McLeod, Jay. 1987. *Ain't No Makin' It: Aspirations and Attainment in a Low-Income Neighborhood.* Westview Press, CT.

McPherson, Michael S., and Morton O. Shapiro. 1991. *Keeping College Affordable: Government and Educational Opportunity*. Washington, D.C.: Brookings Institution.

Mettler, Suzanne. 2005. *Soldiers to Citizens: The G.I. Bill and the Making of the Greatest Generation.* New York: Oxford University Press.

McCall, Leslie and Christine Percheski. 2010. "Income Inequality: New Trends and Research Directions." *Annual Review of Sociology*, 36: 329-347.

McCluskey, Neal. 2008. "Higher Math." *Washington Times.* July 31.

McCready, Randall. 2001. *The Correlation Between the Allocation of Institutional Funds Used for Financial Aid and Student Persistence at a Comprehensive Midwestern State University*. Unpublished doctoral dissertation, Kent State University.

McDonough, Patricia. 1997. *Choosing Colleges: How Social Class and Schools Structure Opportunity.* NY: State University of New York Press.

McDonough, Patricia and Shannon Calderone. 2006. "The Meaning of Money: Perceptual Differences Between College Counselors and Low-Income Families About College Costs and Financial Aid." *American Behavioral Scientist,* 49(12): 1703-1718.

Morgan, Stephen and Christopher Winship. 2007. *Counterfactuals and Causal Inference: Methods and Principles for Social Research*. Cambridge: Cambridge University Press.

Murdock, Tullisse A. 1987. "It Isn't Just Money: The Effects of Financial Aid on Student Persistence." *Review of Higher Education.* 11(1): 75-101.

National Scholarship Providers Association. 2013. *Impact of Award Displacement on Students and their Families: Recommendations for Colleges, Universities, Policymakers and Scholarship Providers.* Retrieved December 10, 2013 from http://www.scholarshipproviders.org/Content/Content/731/Documents/NSPA%20White%20Paper%20FINAL%209.17%20Corrected.pdf

Nelson, Libby. 2013. "Two Pell Grants?" *Inside Higher Ed.* April 9.

Oreopoulos, Philip and Uros Petronijevic. 2013. "Making College Worth It: A Review of the Returns to Higher Education." *Future of Children.* 23(1): 41-65.

Owen, Stephanie and Isabel Sawhill. 2013. *Should Everyone Go to College?* Center for Children and Families at the Brookings Institution, Washington DC.

Parsons, Talcott. 1970. "Equality and Inequality in Modern Society, or Social Stratification Revisited." Pp. 13–72 in *Social Stratification: Research and Theory for the 1970s*, edited by E. Laumann. Indianapolis, IN: Bobbs-Merrill.

Patel, Reshma, and Lashawn Richburg-Hayes. 2012. *Performance-Based Scholarships: Emerging Findings from a National Demonstration*. New York, NY: MDRC.

Paulsen, Michael B., and Edward P. St. John. 2002. "Social Class and College Costs: Examining the Financial Nexus between College Choice and Persistence." *The Journal of Higher Education*, 73(2): 189–236.

Perna, Laura. 1998. "The Contribution of Financial Aid to Undergraduate Persistence." *Journal of Student Financial Aid*, 28(3): 25-40.

Pfeffer, Fabian T., Sheldon H. Danziger, and Robert F. Schoeni. 2013. "Wealth Disparities Before and After the Great Recession." *Annals of the American Academy of Political and Social Science*. 650(1): 98-123.

Piven, Frances Fox and Richard Cloward. 1993. *Regulating the Poor: The Functions of Public Welfare.* NY: Vintage.

Plank, Stephen B. and William J. Jordan. 2001. "Effects of information, guidance, and actions on postsecondary destinations: A study of talent loss." *American Educational Research Journal, 38*(4), 947-979.

Pope, Emily. 2010. *An Overview of Student Financial Aid*. Presentation to the Wisconsin Legislative Council Study Committee on Student Financial Aid Programs, August 17, Madison, WI.

Raftery, Adrian E. and Michael Hout. 1993. "Maximally maintained inequality: Expansion, reform and opportunity in Irish education, 1921-1975." *Sociology of Education, 66,* 41-62.

Reardon, Sean and Kendra Bischoff. 2011. "Income Inequality and Income Segregation." *American Journal of Sociology*. 116(4): 1092-1193.

Roderick, Melissa, Jenny Nagaoka J and Vanessa Coca. 2009. "College readiness for all: The challenge for urban high schools." *The Future of Children, 19*(1), 185-210.

Roksa, Josipa. 2012. "Race, Class and Bachelor's Degree Completion in American Higher Education." In *Social Class and Education: Global Perspectives*, edited by Lois Weis and Nadine Dolby. New York: Routledge, pp. 51-70

Roksa, Josipa, and Daniel Potter. 2011. "Parenting and Academic Achievement: Intergenerational Transmission of Educational Advantage." *Sociology of Education* 84:299-321.

Roksa, Josipa, and Melissa Velez. 2010. "When Studying Schooling is not enough: Incorporating Employment in Models of Educational Transitions." *Research in Social Stratification and Mobility* 28:5-21.

Roksa, Josipa, and Melissa Velez. 2012. "A Late Start: Delayed Entry, Life Course Transitions and Bachelor's Degree Completion." *Social Forces.* 90(3): 769-794.

Rosenbaum, James E. 2001. *Beyond college for all: Career paths of the forgotten half.* New York, NY: Russell Sage.

Rosenbaum, James E., Regina Deil-Amen, and Ann Person. 2006. *After admission: From college access to college success.* New York, NY: Russell Sage.

Saez, Emmanuel and Thomas Piketty. 2014. "Inequality in the Long Run." *Science* 34(6186): 838-843.

Sawhill, Isabel. 2013. *Higher Education and the Opportunity Gap.* Brookings Institution, Washington DC.

Schwartz, Christine R. 2013. "Trends and Variation in Assortative Mating: Causes and Consequences." *Annual Review of Sociology* 39:23.1-23.20.

Scott-Clayton, Judith. 2011. "On Money and Motivation: A Quasi-Experimental Analysis of Financial Incentives for College Achievement." *Journal of Human Resources*, 46(3): 614-46.

Seftor, Neil S., and Sarah E. Turner. 2002. "Back to School: Federal Student Aid Policy and Adult College Enrollment." *Journal of Human Resources*, 37(2): 336-52.
Sewell, William. 1971. "Inequality of Opportunity for Higher Education." *American Sociological Review,* 36:793–806.
Shavit, Yossi and Peter Bloesfeld (Eds). 1993. *Persistent Inequality: Changing Educational Attainment in Thirteen Countries.* Boulder: Westview Press
Shavit, Yossi, Richard T. Arum, and Adam Gamoran, with Gila Menahem, Editors. 2007. *Stratification in Higher Education: A Comparative Study*. Stanford, CA: Stanford University Press.
Singell, Larry D. 2004. "Come and Stay a While: Does Financial Aid Effect Enrollment and Retention at a Large Public University?" *Economics of Education Review*, 23(5): 459-71.
Singell, Larry, and Mark Stater. 2006. "Going, Going, Gone: The Effects of Aid Policies on Graduation at Three Large Public Institutions." *Policy Science*, 39(4): 379-403.
Soss, Joe, Richard Fording, and Sanford Schram. 2011. *Disciplining the Poor: Neoliberal Paternalism and the Persistent Power of Race.* University of Chicago Press.
St. John, Edward P., Shouping Hu, and T. Tuttle. 2000. Persistence by undergraduates in an urban public university: understanding the effects of financial aid. *Journal of Student Financial Aid.* 30(2), 23-37.
St. John, Edward P., Shouping Hu, and J. Weber. 2001. State policy and the affordability of public higher education: The influence of state grants on persistence in Indiana. *Research in Higher Education.* 42: 401-428.
Stater, Mark. 2009. "The Impact of Financial Aid on College GPA at Three Flagship Public Institutions." *American Educational Research Journal*, 46(3): 782-815.
Stinebrickner, Todd R., and Stinebricker, Ralph. 2003. "Understanding Educational Outcomes of Students from Low-Income Families," *Journal of Human Resources* 38(3): 591-617.
Terkel, Amanda. 2011. "Rep. Denny Rehberg: Pell Grants Are Becoming 'The Welfare Of The 21st Century'." *Huffington Post.* April 1.
The Institute for College Access and Success. 2011. *Pell Grant Provisions Prevent Abuse.* July 18. http://www.ticas.org/files/pub/Protections_against_Pell_abuse_one-pager_July_18-_updated.pdf
Torche, Florencia. 2011. "Is a College Degree Still the Great Equalizer? Intergenerational Mobility across Levels of Schooling in the US" *American Journal of Sociology 117(3): 763-807.*
Treiman, Donald. 1970. "Industrialization and Social Stratification." Pp. 373–94 in *Social Stratification: Research and Theory for the 1970s*, edited by E. O. Laumann. Indianapolis, IN: Bobbs-Merrill.
Turner, Sarah. 2004. Going to College and Finishing College: Explaining Different Educational Outcomes. In *College Decisions: How Students Actually Make Them and How They Could*, Caroline Hoxby (Ed). University of Chicago Press.
Turner, Lesley. 2013. *The Road to Pell is Paved with Good Intentions: The Economic Incidence of Federal Student Grant Aid*. University of Maryland. Retrieved December 10, 2013 from http://econweb.umd.edu/~turner/Turner_FedAidIncidence.pdf
University of Wisconsin System. 2008. *Informational Memorandum: The New Freshman Class: Fall 2008*. Retrieved January 13, 2014 from www.uwsa.edu/opar/orb-im/im/new_freshman/nfcf08.pdf

University of Wisconsin System. 2009a. *Fact Book 09-10*. Retrieved January 13, 2014 from www.uwsa.edu/cert/publicat/archive/factbook2009.pdf

University of Wisconsin System. 2009b. *Informational Memorandum: The New Freshman Class: Fall 2009*. Retrieved January 13, 2014 from www.uwsa.edu/opar/orb-im/im/new_freshman/nfcf09.pdf

University of Wisconsin System. 2010. *Informational Memorandum: Retention and Graduation: 2009-10*. Retrieved January 13, 2014 from www.uwsa.edu/opar/orb-im/im/ret_grad/rg09-10.pdf

University of Wisconsin System. 2013. *Informational Memorandum: Retention and Graduation: 2012-13*. Retrieved January 13, 2014 from http://www.uwsa.edu/opar/orb-im/im/ret_grad/rg12-13.pdf

Van der Klaauw, Wilbert. 2002. "Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression-Discontinuity Approach." *International Economic Review*, 43(4): 1249-88.

What Works Clearinghouse. 2013. *WWC Procedures and Standards Handbook.* Washington, DC: Institute of Education Sciences.

Willis, Paul. 1977. *Learning to Labor: How Working Class Kids Get Working Class Jobs.* Columbia University Press, NY.

Table 1. Descriptive characteristics of the 13 universities in the University of Wisconsin System.

	MEAN	SD	MEDIAN	MIN	MAX
UNDERGRADUATE ENROLLMENT					
Total undergraduate enrollment (*N)*	10576	7904	8641	2440	30362
Wisconsin resident (*%)*	79	16	82	50	97
Pell grant recipients (%)	21	6	21	10	34
Female (*%)*	54	7	54	34	62
First-generation (*% no parent w/BA degree)*	49	9	48	26	60
Race/ethnicity (*%)*					
Non-Hispanic White	88	8	90	68	94
African-American	3	4	1	1	14
Hispanic	2	2	1	1	8
Southeast Asian	2	1	2	0	3
Other Asian	1	1	1	0	3
Native American/Pacific Islander/Alaskan Native	1	1	1	0	3
UW System Targeted Students of Color	11	7	7	6	31
FINANCING					
Cost of attendance ($)	15171	1619	14509	13258	18973
Tuition and fees ($)	6523	572	6220	6037	7584
Instructional expenditures per undergraduate ($)	6055	2030	5399	4652	12466
Institutional grant aid per undergraduate ($)	279	312	124	77	1140
Average debt of graduates ($)	16480	2271	15365	13949	19956
ENROLLMENT MANAGEMENT					
Selectivity (*% of applicants admitted)*	79	--	88	59	99
Composite ACT score	23	--	22	20	28
1-year retention rate (Non-Pell recipients)	81	--	76	64	94
1-year retention rate (Pell recipients)	76	--	75	66	91
4-year BA completion rate (all undergraduates)	30	--	25	9	55
6-year BA completion rate (Non-Pell recipients)	68	--	65	35	84
6-year BA completion rate (Pell recipients)	55	--	56	30	77

Source: University of Wisconsin System reports, except instructional expenditures (Integrated Postsecondary Education Data System).

Notes:

(1) All characteristics are for the 2008-09 academic year, except for first-generation, which is 2009-10.

(2) All characteristics in the undergraduate enrollment section are for first-year students only, with the exception of total enrollment.

(3) The UW System's definition of "targeted students of color" excludes East Asian students.

(4) The first-generation student measure is for Wisconsin residents only.

(5) Institutional grant aid per student is calculated by dividing discretionary grant aid controlled by institutions by the number of undergraduate students.

(6) The average debt of graduates is unconditional on having taken out loans.

(7) Means for the enrollment management section are enrollment-weighted; others are institutional averages.

Table 2. Descriptive characteristics of Cohort 1 samples.

Characteristic	Full Sample *(N=1500)*	Admin Sample *(N=1167)*	Financial Aid Sample *(N=639)*
Assigned to treatment (%)	40	41	41
DEMOGRAPHIC CHARACTERISTICS			
Wisconsin Resident (%)	100	100	100
Pell Grant receipt (%)	100	100	100
Financially dependent for tax purposes (%)	97	97	97
Age (% 19 or younger)	97	98	97
Female (%)	57	58	61
Parental Education (%)			
No college (neither parent)	39	40	41
Some college or associate's degree (at least 1 parent	38	38	36
Bachelor's degree or higher (at least 1 parent)	23	23	23
Race/ethnicity (%)			
Non-Hispanic White	73	75	73
African-American	7	7	8
Hispanic	6	5	6
Southeast Asian	8	8	8
Native American	4	4	3
First or second generation immigrant (%)	12	10	16
Number of siblings	3	3	3
HIGH SCHOOL PREPARATION			
ACT score (composite)	--	22	22
Received Academic Competitiveness Grant (%)	--	81	78
FINANCIAL RESOURCES			
Parent(s)' adjusted gross income ($)	29918	29567	30644
Below poverty line for family of four (%)	33	34	32
FINANCIAL AID (pre-treatment, start of college)			
Expected family contribution ($)	1631	1629	1716
Zero expected family contribution (%)	31	31	29
Grants and scholarships ($)	--	--	6666
Unmet financial need (COA-grant aid-EFC) ($)	--	--	8367
Accepted loans (%, if offered)	--	--	86
Average loans ($)	--	--	3769
Out-of-pocket (OOP) costs ($)	--	--	4097
OOP exceeding WSG ($3500) (%)	--	--	50

SOURCES: Fall 2008 WSLS survey (parental education, number of siblings), UW System (college-level measures, ACG receipt, ACT score), FAFSA (all other measures).

Notes:

(1) Academic Competitiveness Grant is a federal award based on rigorous high school course completion.

(2) Out-of-pocket costs are calculated as the cost of attendance less all forms of aid received pre-treatment and the student's expected family contribution.

(3) The cost of attendance (COA) includes tuition and fees, room, board, books, travel, and miscellaneous expenses.

(4) High school preparation measures are available only for the administrative and financial aid samples, while most financial aid measures are only available for the financial aid sample.

(5) The only differences across samples (at $p<.05$) are female and received ACG (financial aid sample), white and Hispanic (administrative data sample), and first/second generation immigrant (both samples).

Table 3: Impact of student characteristics on assignment to treatment (Cohort 1).

	Full Sample *(N=1500)*		Admin Sample *(N=1167)*		Financial Aid Sample *(N=639)*	
Characteristic	Coeff.	ES	Coeff.	ES	Coeff.	ES
Financially dependent for tax purposes (%)	0.4	0.095	0.6	0.145	1.4	0.302
	(0.9)		(1.0)		(1.3)	
Age (% 19 or younger)	0.8	0.216	1.0	0.287	2.1	0.501
	(0.8)		(0.9)		(1.4)	
Female (%)	1.6	0.041	5.1 +	0.130	3.5	0.091
	(2.7)		(3.1)		(4.1)	
Parental Education (%)						
No college (neither parent) (omitted)	7.5 *	0.196	6.7 +	0.174	6.5	0.168
	(3.1)		(3.6)		(4.2)	
Some college or associate's degree	-8.6 **	-0.228	-7.9 *	-0.208	-4.2	-0.111
(at least 1 parent)	(3.1)		(3.6)		(4.1)	
Bachelor's degree or higher	1.1	0.041	1.2	0.045	-2.3	-0.085
(at least 1 parent)	(2.6)		(3.1)		(3.5)	
Race/ethnicity (%)						
Non-Hispanic White (omitted)	-0.4	-0.014	-1.2	-0.043	1.8	0.059
	(2.7)		(3.0)		(3.6)	
African-American	-1.8	-0.189	-1.9	-0.207	-2.1	-0.200
	(1.4)		(1.6)		(2.0)	
Hispanic	-0.5	-0.048	-0.9	-0.126	-0.5	-0.049
	(1.5)		(1.5)		(2.0)	
Southeast Asian	2.3	0.185	3.8 +	0.327	4.1 +	0.347
	(1.7)		(2.0)		(2.3)	
Native American	0.3	0.043	0.6	0.106	-0.8	-0.155
	(1.2)		(1.4)		(1.5)	
First or second generation immigrant (%)	2.3	0.139	3.1	0.205	1.6	0.077
	(1.7)		(1.9)		(3.0)	
Number of siblings	0.1	0.050	0.3	0.119	0.3	0.110
	(0.2)		(0.2)		(0.2)	
ACT composite score	0.1	0.019	0.1	0.019	0.1	0.028
	(0.2)		(0.2)		(0.3)	
Received ACG (%)	0.2	0.009	0.2	0.009	1.6	0.065
	(2.6)		(2.6)		(3.3)	
Parent(s)' adjusted gross income (%)	1184	0.066	1332	0.074	1471	0.079
	(1000)		(1127)		(1543)	
Below poverty line for family of 4 (%)	-2.5	-0.071	-1.0	-0.029	-2.3	-0.067
	(2.6)		(3.0)		(4.0)	
Expected family contribution ($)	58	0.026	38	0.017	-136	-0.065
	(127)		(146)		(170)	
Zero expected family contribution (%)	-2.7	-0.080	-3.1	-0.092	-6.9 +	-0.221
	(2.5)		(2.9)		(3.7)	

SOURCES: Fall 2008 WSLS survey (parental education, number of siblings), UW System (college-level measures, ACG receipt, ACT score), FAFSA (all other measures).

Notes:

(1) + represents p<.10, * represents p<.05, and ** represents p<.01, and *** represents p<.001.

(2) All estimates are the results of regressions with institutional fixed effects.

(3) Standard errors from the regressions are listed below the regression coefficients.

(4) Effect sizes are calculated using OLS for continuous outcomes and logistic regression for binary outcomes.

Table 4. Treatment receipt rates and average impacts on graduation (Cohort 1).

	Control Mean	Treatment Impact		Effect Size
TREATMENT RECEIPT				
Receipt of the WSG: Average (%)				
1 year of receipt	0	92.4		--
2 years of receipt	0	70.7		--
3 or more years of receipt	0	47.4		--
ON-TIME (4-YEAR) BACHELOR'S DEGREE COMPLETION				
Degree completion	16.3	4.7	*	0.213

SOURCES: University of Wisconsin System (WSG receipt), National Student Clearinghouse (degree completion).

NOTES:

(1) + represents p<.10, * represents p<.05, and ** represents p<.01, and *** represents p<.001.

(2) The degree completion measure observes students' graduation records, regardless of whether they remained within the UW System.

(3) Effect sizes are calculated using OLS for continuous outcomes and logistic regression for binary outcomes.

Table 5. Term-by-term impacts on college persistence and achievement (Cohorts 1, 2, and 3).

	Cohort 1 Admin Sample			Cohorts 2 and 3			
	Control Mean	Treatment Impact	Effect Size	Control Mean	Treatment Impact		Effect Size
SEMESTER 1 (Treatment begins- 91% of treatment group received WSG)							
Total credits completed	14.0	0.2	0.059	13.8	0.1		0.032
		(0.2)			(0.1)		
% completing 12+ credits	88.0	0.3	0.021	88.7	1.1		0.077
		(1.8)			(1.0)		
Cumulative GPA	2.54	0.08	0.078	2.70	0.09	***	0.099
		(0.06)			(0.03)		
12+ credits and 2.0 GPA (%)	71.6	-0.5	-0.017	74.5	2.7	*	0.095
		(2.7)			(1.4)		
SEMESTER 2 (88% of treatment group received WSG)							
Enrollment (%)	93.7	1.5	0.176	93.9	2.2	**	0.265
		(1.4)			(0.7)		
Total credits completed	12.1	0.3	0.067	12.7	0.3	**	0.078
		(0.3)			(0.1)		
% completing 12+ credits	73.7	0.8	0.029	80.0	3.4	**	0.145
		(2.7)			(1.2)		
Cumulative GPA	2.49	0.07	0.076	2.65	0.07	**	0.084
		(0.05)			(0.03)		
12+ credits and 2.0 GPA (%)	66.2	-2.0	-0.059	71.4	3.5	*	0.115
		(2.9)			(1.4)		
SEMESTER 3 (69% of treatment group received WSG)							
Enrollment (%)	80.9	2.5	0.110	82.6	3.0	**	0.138
		(2.4)			(1.2)		
Total credits completed	10.7	0.3	0.053	11.2	0.5	*	0.080
		(0.4)			(0.2)		
% completing 12+ credits	65.7	2.7	0.080	69.2	3.0	*	0.093
		(2.9)			(1.5)		
Cumulative GPA	2.47	0.06	0.070	2.64	0.08	**	0.089
		(0.05)			(0.03)		
12+ credits and 2.0 GPA (%)	61.3	0.8	0.023	65.3	3.1	*	0.091
		(3.0)			(1.5)		
SEMESTER 4 (64% of treatment group received WSG)							
Enrollment (%)	76.0	1.8	0.067	78.2	2.2	+	0.084
		(2.6)			(1.3)		
Total credits completed	9.9	-0.1	-0.020	10.3	0.5	*	0.075
		(0.4)			(0.2)		
% completing 12+ credits	61.7	-4.1	-0.113	63.9	3.5	*	0.101
		(3.0)			(1.5)		
Cumulative GPA	2.47	0.06	0.070	2.64	0.08	**	0.096
		(0.05)			(0.03)		
12+ credits and 2.0 GPA (%)	58.5	-4.5	-0.121	61.5	3.1	*	0.086
		(3.0)			(1.5)		
Sample Size	692	475		7862	1035		

Table 5 (Continued). Term-by-term impacts on college persistence and achievement (Cohorts 1-3).

	Cohort 1 Admin Sample			Cohorts 2 and 3			
	Control Mean	Treatment Impact	Effect Size	Control Mean	Treatment Impact		Effect Size
SEMESTER 5 (49% of treatment group received WSG)							
Enrollment (%)	71.2	-0.0	-0.000	73.3	1.9		0.063
		(2.8)			(2.1)		
Total credits completed	9.1	0.3	0.043	9.7	0.4		0.059
		(0.4)			(0.3)		
% completing 12+ credits	53.8	2.6	0.071	59.4	3.7		0.101
		(3.0)			(2.3)		
Cumulative GPA	2.48	0.06	0.066	2.64	0.06		0.069
		(0.05)			(0.04)		
12+ credits and 2.0 GPA (%)	52.7	1.6	0.043	57.9	3.5		0.095
		(3.1)			(2.3)		
SEMESTER 6 (45% of treatment group received WSG)							
Enrollment (%)	69.0	-1.4	-0.041	71.1	1.7		0.055
		(2.9)			(2.1)		
Total credits completed	8.8	-0.2	-0.035	9.3	0.1		0.013
		(0.4)			(0.3)		
% completing 12+ credits	55.4	-2.4	-0.065	57.7	0.6		0.017
		(3.1)			(2.4)		
Cumulative GPA	2.49	0.07	0.074	2.65	0.05		0.063
		(0.05)			(0.04)		
12+ credits and 2.0 GPA (%)	53.9	-3.0	-0.078	56.5	0.4		0.011
		(3.1)			(2.3)		
Sample Size	692	475		3582	495		
CUMULATIVE OUTCOMES (3 years Cohort 1 & 2, 2 years Cohort 3)							
Total credits completed	65.8	0.9	0.032	57.6	2.1	**	0.089
		(1.7)			(0.7)		
Cumulative GPA	2.49	0.07	0.074	2.65	0.08	**	0.093
		(0.05)			(0.03)		
12+ credits each semester (%)	35.1	0.3	0.008	45.1	2.5		0.066
		(2.9)			(1.6)		
12+ credits and 2.0 GPA each semester (%)	33.3	1.2	0.036	43.1	3.1	+	0.082
		(2.9)			(1.6)		
Maximum Sample Size	692	475		7862	1035		

SOURCE: University of Wisconsin System.

Notes:

(1) + represents p<.10, * represents p<.05, ** represents p<.01, and *** represents p<.001.

(2) Standard errors from the regression are listed below the regression coefficients.

(3) Enrollment includes any of the 13 four-year University of Wisconsin System universities, as well as the 13 two-year University of Wisconsin Colleges.

(4) If a student was not enrolled in a given semester, the cumulative GPA from the previous semester is reported.

(5) There are only four semesters of data for Cohort 3.

(6) All estimates include university fixed effects.

(7) Effect sizes are calculated using OLS for continuous outcomes and logistic regression for binary outcomes.

Table 6. Heterogeneous impacts on college retention, credits over 1 year, and 4-year degree completion rates according to pre-treatment out-of-pocket costs (Cohort 1).

	Cohort 1 Financial Aid Sample					
	Retention		Credits		4-year BA	
Variation by pre-treatment out-of-pocket costs						
Assigned to treatment	-2.5		-0.7		8.8	+
Out-of-pocket costs ($1,000)	-1.3	+	-0.2	*	0.2	
Treatment*out-of-pocket costs	1.5	+	0.3	+	-0.9	
Sample size			639			
Variation by pre-treatment out-of-pocket costs						
Assigned to treatment	-2.3		-0.4		8.1	+
Out-of-pocket costs (over $3,500)	-10.8	*	-1.5	*	-1.7	
Treatment*high out-of-pocket costs	11.5	*	1.6	+	-5.8	
Sample size			639			

SOURCE: University of Wisconsin System (retention and credits), National Student Clearinghouse (4-year graduation).

NOTES:

(1) + represents p<.10, * represents p<.05, and ** represents p<.01, and *** represents p<.001.

(2) Out-of-pocket costs are defined as the cost of attendance less all pre-treatment financial aid and the student's expected family contribution.

Table 7. Heterogeneous impacts on college retention, credits over 1 year, and 4-year degree completion rate according to student characteristics (Cohort 1)

	Cohort 1 Admin Sample			Cohort 1 Financial Aid Sample		
	Retention	Credits	4-yr BA	Retention	Credits	4-yr BA
Variation by gender						
Assigned to treatment	-3.1	-0.5	4.7	-0.4	-0.2	6.8
Female	-5.2	-0.3	3.2	-7.6 *	-0.5	6.7
Treatment*male	7.2	1.0	0.0	6.8	0.9	-3.0
Sample size	1163			639		
Variation by parental education						
Assigned to treatment	3.8	0.8	12.2 **	7.4 *	1.2 +	15.1 ***
Parent education HS or less	-1.2	-0.4	1.2	2.4	-0.0	5.6
Treatment*parental education	-6.3	-1.4	-18.0 **	-9.5	-1.7 +	-24.2 ***
Sample size	811			634		
Variation by race/ethnicity						
Assigned to treatment	1.7	0.2	6.8 +	5.6 +	0.7	6.7 +
Targeted minority	-2.8	-1.5 *	-7.7 +	2.0	-0.7	-5.3
Treatment*minority	-2.1	0.1	-5.3	-7.8	-1.1	-5.9
Sample size	819			639		
Variation by immigrant/non-immigrant						
Assigned to treatment	1.3	0.0	4.0 +	4.6	0.4	4.8
First/second generation immigrant	2.5	-0.1	-5.9	7.8 +	0.6	-6.4
Treatment*immigrant	-0.8	1.0	8.8	-7.3	-0.2	2.8
Sample size	1167			639		
Variation by parental income above sample median ($29,055) (dependents only)						
Assigned to treatment	2.1	0.0	1.7	7.4 +	0.8	6.8
Parental income>=sample median	5.2	1.4 *	-0.4	4.7	1.2 +	1.1
Treatment*higher parental income	-2.5	-0.1	6.2	-7.8	-1.1	-3.4
Sample size	1121			611		
Variation by academic preparation (ACT score)						
Assigned to treatment	5.1	-2.9	-13.2	-7.9	-3.7	-14.6
ACT score	1.0 +	0.2 *	1.2 *	0.6	0.2 +	0.9
Treatment*ACT	-0.2	0.1	0.8	0.5	0.2	0.9
Sample size	818			630		
Variation by academic preparation (ACT score)						
Assigned to treatment	5.3	0.9	5.8	8.8 *	1.1	4.2
ACT score 25+	4.4	0.8	7.3	4.6	0.5	2.7
Treatment*ACT 25+	-11.6 +	-1.0	4.7	-10.6	-0.8	6.4
ACT score 20 or below	-2.8	-0.8	-0.8	-0.7	-0.9	-1.3
Treatment*ACT 20 or below	-4.4	-1.2	-4.3	-7.9	-1.4	-2.3
Sample size	818			630		
Variation by academic preparation (ACG)						
Assigned to treatment	17.0 **	2.0 *	14.0 *	17.8 *	1.7	13.1 *
ACG receipt	15.0 **	2.9 ***	9.8 **	14.5 *	2.6 **	9.0 *
Treatment*ACG	-19.5 **	-2.3 *	-10.5 +	-18.3 *	-1.8	-10.1
Sample size	828			639		

SOURCE: University of Wisconsin System (retention and credits), National Student Clearinghouse (4-year BA).

NOTES:

(1) + represents p<.10, * represents p<.05, and ** represents p<.01, and *** represents p<.001.

(2) 4-year graduation data from the National Student Clearinghouse is available for cohort 1 only.

(3) The Academic Competitiveness Grant is awarded to students who completed a rigorous high school curriculum.

(4) Targeted minority groups include: African-Americans, Latinos, Southeast Asians, Native Americans, and multiracial. "Targeted" refers to a policy of the University of Wisconsin System.

Table 8: Heterogeneous impacts on college retention, credits over 1 year, and 4-year degree completion rates according to institutional characteristics (Cohorts 1-3)

	Cohort 1 Admin Sample			Cohort 1 Financial Aid Sample			Cohorts 2-3	
	Retention	Credits	4-yr BA	Retention	Credits	4-yr BA	Retention	Credits
Variation by institutional selectivity								
Assigned to treatment	-5.2	0.1	10.2	-1.8	0.7	17.2 +	1.2	0.3
Less-selective college	-19.5 ***	-3.1 ***	-12.7 ***	-16.8 ***	-2.9 ***	-13.0 *	-12.8 ***	-2.7 ***
Treatment*Less-selective college	9.7 *	0.3	-6.6	6.7	-0.4	-14.4	2.3	0.2
Sample size		1167			639		8839	
Variation by Pell graduation rate at institutions								
Assigned to treatment	13.5	0.3	-20.1 *	18.9 +	1.2	-22.5 *	8.9 +	1.5 +
Pell graduation rate (6-year)	.52 ***	-.10 ***	.32 ***	.58 ***	.11 ***	0.32 *	.47 ***	.11 ***
Treatment*institutional Pell grad rate	-.21	-.001	.47 ***	-.29	-.02	0.52 *	-.11	-.019
Sample size		1167			639		8839	
Variation by institutional aid per student								
Assigned to treatment	1.1	0.0	4.5	4.1	0.3	6.2	2.6 +	0.3
Institutional aid per student ($1,000s)	6.0	1.0	15.2 **	6.9	1.1	15.6 *	8.5 ***	1.3 ***
Treatment*institutional aid	6.4	1.3	2.1	-0.5	0.6	-2.7	0.8	0.4
Sample size		1167			639		8839	

SOURCE: University of Wisconsin System (retention and credits), National Student Clearinghouse (4-year graduation).

NOTES:

(1) + represents p<.10, * represents p<.05, and ** represents p<.01, and *** represents p<.001.

(2) Pell graduation rate is measured in percentage points.

(3) 4-year graduation data from the National Student Clearinghouse is available for cohort 1 only.

(4) Institutional selectivity is determined by median ACT score. Ten of 13 universities had median ACT scores of 23 or below and are classified as less-selective.

Appendix 1. Descriptive statistics and baseline equivalence by institutional characteristics (Cohorts 1-3).

	Cohort 1 (N=1500)			Cohorts 2-3 (N=8897)		
Characteristic	Sample Mean	Treatment Difference	Effect Size	Sample Mean	Treatment Difference	Effect Size
Median ACT score	22.8	0.0	0.000	23.0	-0.0	-0.015
		(0.1)			(0.1)	
Percent admitted (%)	83.7	0.0	0.000	83.1	0.3	0.027
		(0.6)			(0.4)	
Attending less-selective college (%)	80.3	0.0	-0.001	77.0	1.1	0.039
		(2.2)			(1.4)	
Pell recipients (%)	20.4	0.0	0.000	19.7	0.0	0.002
		(0.3)			(0.2)	
6-yr Pell graduation rate (%)	53.1	0.0	0.000	53.7	-0.2	-0.018
		(0.6)			(0.4)	
Institutional aid/student ($)	239	0	0.000	278	6	0.019
		(12)			(10)	

SOURCE: University of Wisconsin System.

Notes:

(1) + represents p<.10, * represents p<.05, and ** represents p<.01, and *** represents p<.001.

(2) All estimates are the results of regressions without institutional fixed effects.

(3) Standard errors from the regressions are listed below the regression coefficients.

(4) Cohort 1 had 2557 students in the control group and 600 in the treatment group, but due to data agreements we are unable to observe the full sample.

(5) Effect sizes are calculated using OLS for continuous outcomes and logistic regression for binary outcomes.

Appendix 2. Unadjusted and covariate-adjusted term-by-term impacts on college persistence and achievement, financial aid data sample (N=628).

		Unadjusted		Covariate-Adjusted	
	Control Mean	Treatment Impact	Effect Size	Treatment Impact	Effect Size
Semester 1 (treatment began)					
Credits earned	14.1	-0.0	-0.025	0.3	0.083
		(0.3)		(0.2)	
Earned 12+ credits (pct)	88.1	-0.5	-0.033	-0.9	-0.111
		(2.5)		(2.4)	
Cumulative GPA	2.67	0.02	0.023	-0.01	-0.009
		(0.08)		(0.07)	
12+ credits and 2.0 GPA (pct)	76.0	-3.7	-0.122	-4.8	-0.217
		(3.6)		(3.3)	
Semester 2					
Enrollment (pct)	96.0	-0.3	-0.052	-0.1	-0.005
		(1.7)		(1.7)	
Credits earned	12.6	-0.0	-0.001	-0.1	-0.022
		(0.4)		(0.4)	
Earned 12+ credits (pct)	77.2	-4.0	-0.137	-5.0	-0.220
		(3.5)		(3.2)	
Cumulative GPA	2.62	0.05	0.006	0.02	0.025
		(0.07)		(0.06)	
12+ credits and 2.0 GPA (pct)	70.0	-4.8	-0.137	-5.7	-0.224
		(3.9)		(3.6)	
Semester 3					
Enrollment (pct)	85.3	3.3	0.162	-3.1	0.148
		(2.9)		(2.9)	
Credits earned	11.3	0.4	0.063	0.3	0.044
		(0.5)		(0.5)	
Earned 12+ credits (pct)	69.4	4.7	0.135	4.0	0.117
		(3.9)		(3.7)	
Cumulative GPA	2.60	0.06	0.070	0.03	0.033
		(0.07)		(0.06)	
12+ credits and 2.0 GPA (pct)	65.0	1.9	0.050	0.4	-0.002
		(4.1)		(3.8)	
Semester 4					
Enrollment (pct)	79.8	1.6	0.061	1.7	0.058
		(3.4)		(3.4)	
Credits earned	10.4	-0.2	-0.036	-0.2	-0.040
		(0.5)		(0.5)	
Earned 12+ credits (pct)	63.9	-5.1	-0.133	-5.1	-0.155
		(4.1)		(4.0)	
Cumulative GPA	2.60	0.06	0.072	0.03	0.035
		(0.07)		(0.06)	
12+ credits and 2.0 GPA (pct)	61.4	-5.6	-0.143	-6.0	-0.185
		(4.2)		(4.0)	

Appendix 2. Unadjusted and covariate-adjusted term-by-term impacts on college persistence and achievement, financial aid data sample (N=628).

		Unadjusted			Covariate-Adjusted	
	Control Mean	Treatment Impact		Effect Size	Treatment Impact	Effect Size
Semester 5						
Enrollment (pct)	74.0	0.9		0.028	0.9	0.021
		(3.7)			(3.6)	
Credits earned	9.7	0.5		0.069	0.4	0.062
		(0.6)			(0.6)	
Earned 12+ credits (pct)	59.2	6.9	+	0.175	5.7	0.157
		(4.2)			(4.0)	
Cumulative GPA	2.60	0.06		0.074	0.03	0.037
		(0.07)			(0.06)	
12+ credits and 2.0 GPA (pct)	58.2	6.5		0.162	5.2	0.143
		(4.2)			(4.0)	
Semester 6						
Enrollment (pct)	72.1	-2.4		-0.072	-2.4	-0.085
		(3.8)			(3.7)	
Credits earned	9.2	-0.4		-0.064	-0.5	-0.072
		(0.6)			(0.6)	
Earned 12+ credits (pct)	58.4	-5.1		-0.128	-5.5	-0.157
		(4.2)			(4.1)	
Cumulative GPA	2.61	0.06		0.077	0.03	0.039
		(0.07)			(0.06)	
12+ credits and 2.0 GPA (pct)	56.9	-5.3		0.162	-5.9	-0.167
		(4.2)			(4.1)	
Cumulative Outcomes						
Credits earned	68.9	0.6		0.024	0.2	0.009
		(2.2)			(2.1)	
Cumulative GPA	2.61	0.06		0.077	0.03	0.039
		(0.07)			(0.06)	
12+ credits each semester (%)	38.4	0.3		0.007	-0.9	-0.026
		(4.2)			(4.0)	
12+ credits and 2.0 GPA each semester (%)	37.3	0.0		0.001	-1.2	-0.033
		(4.1)			(4.0)	
BA Completion Rates (NSC)						
By semester 8 (pct)	18.1	4.9		0.197	4.2	0.170
		(3.3)			(3.3)	

SOURCE: University of Wisconsin System, except where noted.

Notes:

(1) Standard errors from the regression are listed below the regression coefficients.

(2) Retention includes any of the 13 four-year University of Wisconsin System universities, as well as the 13 two-year University of Wisconsin Colleges.

(3) If a student was not enrolled in a given semester, the cumulative GPA from the previous semester is reported.

(4) + represents p<.10, * represents p<.05, and ** represents p<.01, and *** represents p<.001.

(5) The control mean is adjusted for university fixed effects only. The unadjusted column has no covariates, and the covariate-adjusted column includes race, gender, age, parental education, zero EFC status, dependency status, parent income, and immigration status.

(6) Effect sizes are calculated using OLS for continuous outcomes and logistic regression for binary outcomes.