HAL open science

What Works to Reduce Inequalities in Higher Education? A Systematic Review of the (Quasi-)Experimental Literature on Outreach and Financial Aid

Estelle Herbaut, Koen Geven

▶ **To cite this version:**

Estelle Herbaut, Koen Geven. What Works to Reduce Inequalities in Higher Education? A Systematic Review of the (Quasi-)Experimental Literature on Outreach and Financial Aid. 2019. hal-02095249

HAL Id: hal-02095249

https://hal.science/hal-02095249v1

Preprint submitted on 10 Apr 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Distributed under a Creative Commons Attribution 4.0 International License

Public Disclosure Authorized

Public Disclosure Authorized

Policy Research Working Paper 8802

What Works to Reduce Inequalities in Higher Education?

A Systematic Review of the (Quasi-)Experimental Literature on Outreach and Financial Aid

Estelle Herbaut
Koen Geven

WORLD BANK GROUP
Education Global Practice
April 2019

Abstract

Policy makers are increasingly searching for ways to allow more disadvantaged students to access and complete higher education. The quickly growing (quasi-)experimental literature on policy interventions in higher education provide the opportunity to identify the causal effects of these interventions on disadvantaged students and discuss inequality mechanisms at the last stage of the educational system. The paper reviews 75 studies and rigorously compares more than 200 causal effects of outreach and financial aid interventions on the access and completion rates of disadvantaged students in higher education. The paper finds that outreach policies are broadly effective in increasing access for disadvantaged students when these policies include active counseling or simplify the university application process, but not when they only provide general information on higher education. For financial aid, the paper finds that need-based grants do not systematically increase enrollment rates but only lead to improvements when they provide enough money to cover unmet need and/or include an early commitment during high school. Still, need-based grants quite consistently appear to improve the completion rates of disadvantaged students. In contrast, the evidence indicates that merit-based grants only rarely improve the outcomes of disadvantaged students. Finally, interventions combining outreach and financial aid have brought promising results, although more research on these mixed interventions is needed.

This paper is a product of the Education Global Practice. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/research. The authors may be contacted at kgeven@worldbank.org.

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

Produced by the Research Support Team

What Works to Reduce Inequalities in Higher Education? A Systematic Review of the (Quasi-)Experimental Literature on Outreach and Financial Aid

Estelle Herbaut

Sciences Po, Observatoire sociologique du changement (OSC)

27, rue Saint-Guillaume, 75337 Paris Cedex 07, France.

estelle.herbaut@sciencespo.fr

Koen Geven

Economist, World Bank

1818 H St NW, 20009, Washington DC, USA.

kgeven@worldbank.org

Keywords: higher education; social inequalities; (quasi-)experimental methods; literature review; outreach; financial aid

JEL codes: I22 (Educational Finance), I23 (Higher Education) I24 (Education and Inequality), I28 (Government Policy)

What Works to Reduce Inequalities in Higher Education? A Systematic Review of the (Quasi-)Experimental Literature on Outreach and Financial Aid

1. Introduction

In recent years, equity in higher education has emerged as a central political issue in many countries, and policy makers are increasingly seeking policy instruments to support disadvantaged students in their access to, and completion from, higher education. Building on recent research in economics, psychology and sociology that has identified the causal effects of policy interventions in higher education, this systematic literature review aims to provide an overview of the effects of various interventions on the enrollment and completion rates of disadvantaged students. It also provides the opportunity to discuss and shed new light on the mechanisms driving social inequalities in the last stage of the educational system.

This review has three distinctive features. First, we are exclusively concerned with outcomes of disadvantaged students. Earlier reviews in this field (Heller, 1997; Leslie & Brinkman, 1987) or a more recent meta-analysis (Sneyers & Witte, 2018) have assessed the effects of interventions on outcomes of any young person in higher education. In contrast, we only include studies that estimate an effect on disadvantaged groups. We use the term 'disadvantaged students' to refer to a broad class of lower socio-economic status groups. The literature alternatively defines these groups as low-income, non-white, working-class, or first-generation college students. While there are differences between these groups, there is also a substantial overlap and a broad definition allows us to capture the relevant literature on equity in higher education, including the different dimensions of social disadvantage.

Secondly, we focus on both enrollment in and completion of higher education. In recent years, the literature has increasingly recognized that getting more youth into higher education is insufficient and that interventions should also ensure that they ultimately graduate (Bettinger, 2004; Castleman & Long, 2013). We thus present effects on both access and graduation in higher education.

Thirdly, we present a systematic overview of the (quasi-)experimental literature on this topic. While a number of research syntheses have summarized empirical evidence on interventions in higher education, the large majority relies on cross-sectional evidence. Only a few reviews

have specifically summarized the (quasi-)experimental literature and their scope was narrower. For instance, Page & Scott Clayton (2016) focus only on college access in the United States, while Deming & Dynarski (2009) only discuss financial aid. In addition, these reviews discuss the conclusions of the literature in a narrative form without systemically providing the estimates on which they are based. The present overview conveys the results in a narrative form but also rigorously gathers, provides, and compares the causal effects on both access and completion.

The present review discusses 75 studies that provide causal estimates of the impact of outreach and financial aid interventions on access or completion rates of disadvantaged students in higher education. Outreach interventions are defined as policies that target youth in secondary education and aim to raise participants' aspirations and readiness for higher education. These include interventions that provide information, counseling, and/or focused academic tutoring in order to increase and facilitate transition to higher education. Financial aid includes monetary help provided to students to meet, at least partially, their financial need for higher education. In this category, we discuss universal, need-based, merit-based, and performance-based grants, loans and tax incentives. Finally, we discuss the effects of interventions which have combined outreach and financial aid. In addition to outreach interventions and financial aid policies, a number of other interventions may help reduce inequalities in higher education but the available (quasi-)experimental evidence on their efficiency is currently insufficient for a literature review and these results are not discussed here.

2. Barriers faced by disadvantaged students in higher education

Outreach and financial aid may help disadvantaged students to access and complete higher education if these interventions efficiently address some of the barriers met by disadvantaged students in higher education. We summarize the most common hypotheses discussed in the current literature on education inequality mechanisms. These include (1) financial barriers, (2) lack of academic preparation, (3) lack of information and, (4) behavioral barriers. While there may be additional mechanisms that prevent disadvantaged students from succeeding in higher education (e.g. negative self-identities or discrimination), these mechanisms are not specifically addressed by financial aid or outreach programs and are not discussed here.

2.1 Unmet financial need

Financial barriers are often at the core of the concerns about higher education opportunities for disadvantaged students who are eligible for it. The total financial cost of higher education studies includes both direct costs such as tuition fees and living costs, study materials, and health coverage, and indirect costs such as foregone earnings. In some countries, the direct costs of higher education attendance have risen dramatically over the last years and have raised public concern about affordability. In the U.S., between 1985 and 2015, average tuition and fees in public four-year institutions increased more than threefold in real terms (Ma, Baum, Pender, & Bell, 2015). And this trend is not restricted to the United States. Between 1995 and 2010, in 14 of 25 industrialized countries, governments have reformed the structure of tuition fees (OECD, 2012). With some exceptions (e.g. Germany), this meant that tuition fees went up.

Low-income students seem to be particularly sensitive to the price of higher education for both enrollment decisions (Heller, 1997; Kane, 1994) and year-to-year persistence (Paulsen & St. John, 2002). Large unmet financial need makes students more likely to work and for a substantially higher number of hours (Scott-Clayton, 2012). In turn, investing many hours in paid work reduces the time students can devote to study and has been shown to be associated with longer time to graduate and with a higher probability of dropout before graduation (Choitz & Reimherr, 2013; King, 2002).

2.2 Unsuitable academic preparation

A *lack of academic preparation* may be a major barrier for disadvantaged students' educational attainment (Carneiro & Heckman, 2002). A large share of these students may drop out from school, but even among students eligible for higher education, lower levels of academic preparation and performance can constitute a major hurdle. For example, Greene and Forster (2003) estimate that in the public high school class of 2001 in the U.S., half of all black and Hispanic students graduated from high school but only 20% and 16% of them, respectively, had the minimum qualifications for applying to four-year colleges. This lack of academic preparation clearly limits students' options in terms of accessing selective forms of higher education (i.e. highly ranked universities).

This lower level of initial academic credentials can also hinder graduation from higher education. For example, in the U.S., a larger proportion of students coming from

disadvantaged backgrounds need to take remediation courses during their higher education studies (Sparks & Malkus, 2013). Since there is a lack of evidence about the effectiveness of remediation, this may reduce these students' chances of completing their degrees (Attewell, Lavin, Domina, & Levey, 2006; Scott-Clayton & Rodriguez, 2014).

2.3 Lack of information

The *lack of accurate information* about higher education among disadvantaged students is another plausible mechanism highlighted in the literature. First, students from disadvantaged backgrounds may underestimate the returns to higher education and overestimate the costs of enrollment, leading them to underestimate the net returns of a higher education degree. Focusing on the literature which evaluates expectations about earnings before students decide to enter higher education (usually high school seniors), results on the accuracy of earning benefits associated with a tertiary degree and on the influence of social background is mixed (for a detailed summary of the available empirical evidence, see Abbiati & Barone, 2017). For example, in the U.K., high school students were found to make accurate estimations of the returns of a university degree, independently of their social background (Williams & Gordon, 1981) and, similarly in Switzerland, no clear patterns of the effect of father's level of education could be identified (Wolter, 2000). In contrast, other studies find that estimated earnings after a university degree are overestimated by high school students, independently of social origin (Avery & Kane, 2004), or that overestimation of returns is stronger among students coming from advantaged social backgrounds (Abbiati & Barone, 2017).

Regarding the estimated cost of higher education, the empirical literature has consistently shown that high school students tend to overestimate higher education costs (Abbiati & Barone, 2017; Avery & Kane, 2004; Loyalka, Song, Wei, Zhong, & Rozelle, 2013) and suggests that incertitude or overestimation of the costs are more common among disadvantaged families (Grodsky & Jones, 2007; Olson & Rosenfeld, 1985; Usher, 2005).

A related problem is the lack of information on how to access financial aid. Financial aid and its application process are often complex, particularly in the US-context. Students need to fill out the Free Application for Federal Student Aid (FAFSA), which, with over 100 questions, has been criticized for being "long and cumbersome" and deterring disadvantaged students from applying for financial aid (Long, 2008). In 2000, around 850,000 students who did not file the FAFSA were actually eligible for financial aid (King, 2004) and lower middle income, white and

male candidates were found to be less likely to complete the FASFA even when they were eligible for it (Kofoed, 2017). Although the complexity of the aid application process has been mainly highlighted in the United States, the non-take-up of financial aid may be a problem relevant to other national contexts. In Germany, for example, a recent simulation estimates that around 40% of the eligible low-income students do not take up their entitlements (Herber & Kalinowski, 2016).

2.4 Behavioural deficits

Recently, the field of behavioral economics, building on findings from cognitive sciences, neurobiology and psychology, has brought attention to *behavioral barriers* as an explanation for suboptimal choices and behaviors in education (Lavecchia, Liu, & Oreopoulos, 2015). These barriers include *present bias, cognitive overload,* and *routine* or *status quo bias.*

The *present bias* may explain why some students or families do not invest in education in the most optimal way. Education is a domain where costs are salient in the present, while benefits are more uncertain and time distant. If some students give more priority to immediate rewards, this may negatively impact enrollment decisions, time devoted to study and dropout behavior (Lavecchia et al., 2015). In sociology, the relatively short time horizon of working class students has been put forward to explain why these students are diverted away from academic tracks in postsecondary education and choose lower-status tracks which are typically shorter in duration and offer more concrete rewards on the job market, e.g. entering a specific occupation (Hillmert & Jacob, 2003).

In addition, students may make suboptimal choices regarding their educational career due to c*ognitive overload. The paradox of choice* highlights that a large set of options is not always better as people may be overwhelmed by the number of alternatives which are cognitively costly to compare (Jabbar, 2011). This may be especially relevant in the case of higher education where the lack of structure makes it especially difficult to navigate for students (Scott-Clayton, 2011).

Thirdly, the s*tatus quo bias* suggests that people rely heavily on routine and on the default option, not engaging in the optimal behaviors despite appropriate information. In higher education, one powerful example of the importance of the default option in shaping behaviors is provided by a small change in the cost of sending test scores in college applications in the

United States in 1997. When the ACT increased the number of reports that could be send for free from three to four, the proportion of test-takers sending four reports rose from 3% to 74%, although the price to send a fourth report before the change was only US$6. This change in the default option for applications mainly benefited low-income students who were able to enroll in more selective colleges (Pallais, 2013).

There is currently little evidence confirming that these behavioral barriers particularly affect disadvantaged students. It may be that disadvantaged students are more bounded in their decision-making processes (by the lack of resources, information sources, lower reference points, etc.) or that they are more affected by the consequences of suboptimal choices (Scott-Clayton, 2011). However, the emerging literature suggests that these mechanisms are helpful to design interventions which efficiently trigger behavioral changes among disadvantaged students (Ross, White, Wright, & Knapp, 2013).

3. Method

3.1 Inclusion criteria

Three main criteria have been used to select relevant articles and reports. First, we only selected studies that look specifically at the impact of an intervention on disadvantaged students. We only included studies evaluating interventions that were either targeted specifically at these groups or were broader in scope but investigated the heterogeneity in the effect of the interventions and provided estimates on these groups. Second, we only included studies with a (quasi-)experimental design. A "naïve" comparison between educational outcomes of students participating in an intervention, and those who do not, is likely to lead to biased estimates, especially in the case of interventions targeted at disadvantaged students who differ from other students in many observed and unobserved characteristics. Thus, selected studies build either on randomized controlled trials (i.e. formal experiments), or quasi-experiments that analyzed a counterfactual using appropriate matching techniques, instrumental variables, difference-in-differences or regression discontinuity methods. Finally, we only selected evaluations of interventions which provided estimates on students' behaviors in higher education (enrollment or graduation). We excluded all studies which only evaluated an intervention in light of changes in students' aspirations or intermediate outcomes (persistence, GPA in higher education, etc.).

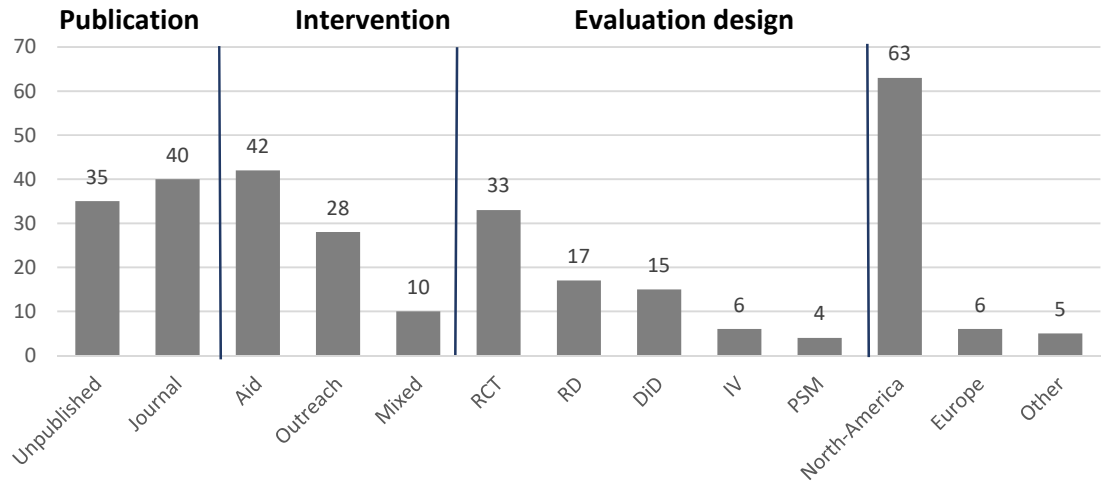
3.2 Literature search

Several strategies were used to find relevant studies. We first reviewed all titles and abstracts of search results in the following electronic databases: JSTOR, ERIC, WEB OF SCIENCE and the Pathways to College Online Library.[1] We also searched the websites of organizations working on higher education policies, most notably the Institute of Education Sciences (IES), the policy research organization MDRC, the National Center for Postsecondary Research (NCPR), the non-profit organization ACT and The National Bureau of Economic Research (NBER). Once we had reached a starting set of papers matching all our inclusion criteria, we systematically reviewed all their references and identified and checked all the studies citing them. We limited the search to articles or reports in English and published by May 2018. Overall, we reviewed titles and abstracts of thousands of academic articles, working papers and policy reports. This yielded an initial set of 296 studies which we carefully read and systematically reviewed on our inclusion criteria, leaving us with 87 studies which met all the inclusion criteria. However, 12 studies which evaluate interventions for which the (quasi-)experimental evidence is currently too scarce to be discussed in a literature review are not presented here. We thus further focus on the findings of 75 studies which specifically evaluate outreach programs, financial aid policies or a combination of the two. The list of the selected studies is presented in Table A.1 in the Appendix.

Figure 1 shows the distribution of the type of publications, the interventions evaluated, the (quasi-)experimental designs, and the countries where the interventions were evaluated among these 75 studies. Randomized experiments are the most common methodology implemented, followed by regression discontinuity and difference-in-differences design. In addition, the (quasi-)experimental literature on outreach and financial aid comes overwhelmingly from North America and no less than 60 studies evaluate an intervention from the United States. The lack of diversity in the educational contexts where interventions or policies are tested is already an important result from this review and should be kept in mind when interpreting the results of these studies.

[1] The following search terms were used: (College OR "Higher Education" OR "Tertiary Education" OR University) AND (Inequality OR Stratification OR Access OR Drop-out OR Retention OR Persistence) AND (Experiment OR RCT OR Policy OR Intervention OR Reform OR Effect OR Impact).

Figure 1: Characteristics of studies included



Note: *For the interventions, articles evaluating more than one type of intervention are counted more*

3.3 Coding

For each of these articles, we coded the experimental design, the characteristics of the intervention (place, duration, content), the nature of the sample (eligibility criteria for participation, assignment to control and treated group, etc.), and the outcomes selected (effect size, standard errors, timing of measurement, model used and baseline in control group). The selection and coding of the studies was first carried out by one coder (allocated at random) and a second coder then reviewed the initial codes. In cases of conflict, we discussed the disagreement. In all cases, we managed to resolve our differences after deliberation.

3.4 Estimate selection

Most studies reported more than one estimate of the effect of an intervention on access or graduation rates. In order to report only the most comparable estimates, we defined four main rules to select them. First, we reported the effect on enrollment rates which are measured immediately after high school graduation or after participation in the program since it was most often provided. Conversely, we selected the longest time-frame available regarding graduation rates. Since this review focuses on how to improve graduation rates of disadvantaged students, we compare estimates that evaluate whether students ultimately earned a degree in higher education. In addition, we only reported the estimates referring to the most disadvantaged participants. For example, when the effect of an intervention was provided for participants with different income levels, we selected the lowest level. Finally,

we only reported estimates related to enrollment or graduation in public institutions, if a distinction between public and private was made.

3.5 Analysis

We decided against a formal meta-analysis that can estimate an average effect size of the interventions. There is a large diversity of studies involved, with different interventions and different estimation strategies, with their own assumptions, which are important for the interpretation of the estimated effect. As a result, there are too few studies in each category to do a meaningful formal meta-analysis. Instead, we opt for a systematic review that presents the selected findings and implications in a narrative form. We clustered the studies based on the characteristics of the interventions and we provide all selected estimates and the details of the different interventions in the Appendix.

We also compare the raw unstandardized estimated effects and decided not to calculate standardized effect sizes. While acknowledging that standardized effect sizes would facilitate the comparison of our estimates with external benchmarks, we argue that standardized effect sizes are not absolutely necessary given the characteristics of our review and their calculation would have some important limits in this case. We only included studies which provide the effect of an intervention on the exact same outcomes, enrollment and graduation rates. Even for a meta-analysis, it is recognized that raw mean differences can be used directly when all studies use the same outcome and report the effect a meaningful scale (Borenstein, 2009). Second, among the 75 selected studies, only three reported standardized effect sizes and they were already calculated with two different methods. For all the other studies, we would need to use different methods to calculate them based on the information available in each study and at the price of many assumptions. Given that all the selected studies focus on the same meaningful outcomes and that we do not aim to obtain an average effect of the interventions, we thus report and mainly discuss the estimated marginal effect of the intervention in percentage points. Still, we systematically report in the Appendix the baseline means, when available. In addition, for the interventions where many studies are available, we provide a graphical overview of the available evidence by plotting the selected estimated effects and the calculated relative risks to make the comparisons across studies easier.

4. Outreach programs

We grouped outreach interventions in three types that may affect students differently. The first group consists of low-intensity interventions that address information barriers faced by high school students. These interventions of short duration mainly deliver general information on financial aid, college costs and returns to higher education or college application. A second group of interventions is designed to complement information with personalized assistance and aims to guide students during the steps of the enrollment procedures. These interventions are more often spread over a longer period, provided by tutors who engage in a personalized exchange with participants and often include proactive strategies to ensure that participants engage in the program. Recently though, some low-cost nudging interventions have been designed to provide guidance to students through automated procedures. The third group of outreach programs offer academic tutoring during upper secondary education, in addition to information and counseling. Lasting several years, these interventions include extensive after-school activities and aim to increase students' academic readiness for higher education.

We found 28 studies which provide causal effects of the effect of outreach interventions on access to higher education for disadvantaged students but only 4 which provide estimates on graduation rates (Table 1). The lack of evidence on graduation may be consistent with the aim of outreach interventions, which primarily aim to facilitate access to higher education. Nevertheless, it is crucial to know whether disadvantaged students who entered higher education after participating in an outreach program were able to eventually graduate and this should clearly be addressed more often in the future. Finally, outreach interventions are usually evaluated through experimental designs and have been tested in six different countries. However, we also note that the diversity of educational contexts is only found for interventions providing additional information only. The large evidence on the interventions classified as "information & support" comes exclusively from the United States and Canada, and testing such interventions in other contexts would also be necessary in the future.

Table 1: Available evidence on the impact of outreach interventions

	Access	Graduation
Number of studies by type of interventions		
Not specified (Any outreach programme)	1	0
Information	8	0
Information & support	18	3
Information, support & tutoring	3	1
Total number of studies	**28**	**4**
Studies' characteristics		
RCT design (in % of total studies)	82%	50%
Diversity of national contexts (nb of country)	6	2
National-scale interventions (in % of total studies)	25%	25%
Single-institution interventions (in % of total studies)	11%	0%

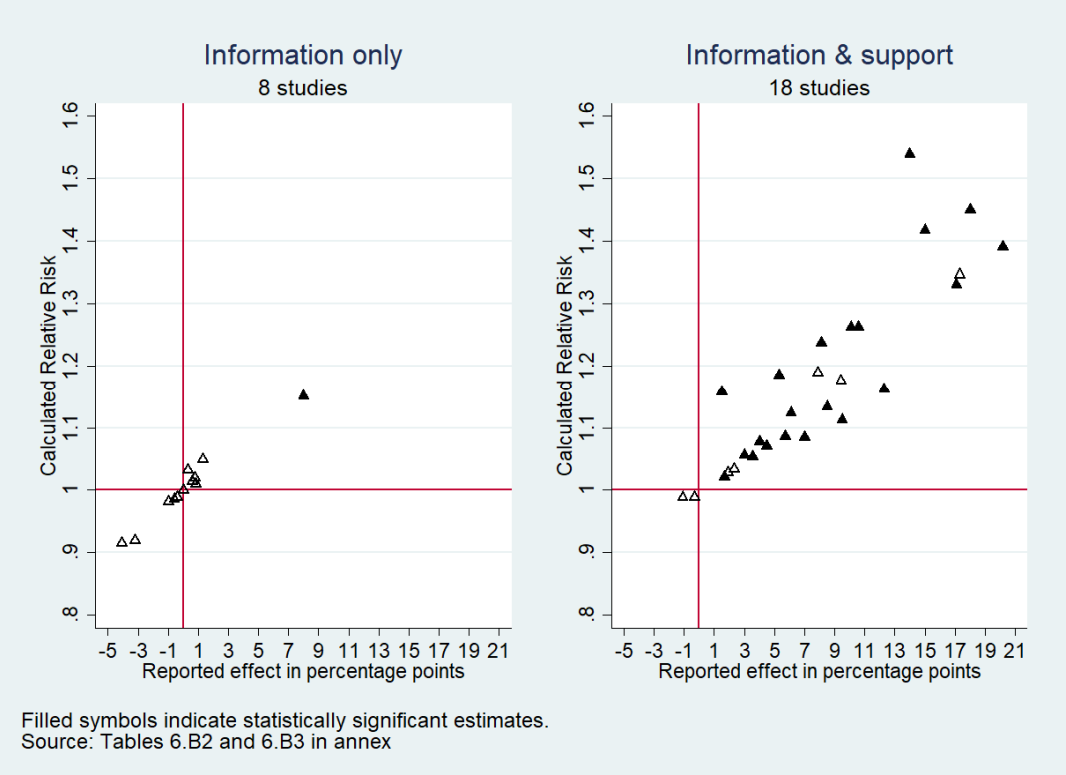
Source: Tables B.1, B.2, B.3, B.4, B.5 in Appendix.

4.1 Impact on access to higher education

Only one study provides a quasi-experimental evaluation of outreach programs in general, not limited to one specific intervention. Domina (2009) uses longitudinal data to compare the efficiency of outreach programs and found an increase in enrollment (+5.5 p.p.) in any higher education institution, but this was not statistically significant (Table B.1 in Appendix). Since no information was available on the type of services offered, it is possible that different program designs have very different impacts on college enrollment.

The evaluations of specific outreach interventions indeed suggest a great variety of effects on enrollment, depending on the characteristics of interventions. As shown by figure 2, interventions providing disadvantaged students with *additional information* only on higher education seem to have very little impact on access patterns, while interventions which complemented information with *assistance or individualized guidance* on college or financial aid applications seem to be more efficient. Among the 18 studies included, the range of the estimated effects is wide, but most found a statistically positive effect on the enrollment rates of disadvantaged students and more than half found an increase in enrollment rates by at least 10%.

Figure 2: Selected estimates for the impact of outreach on access to higher education



Note: Refer to estimates on access to any type of higher institution, whenever available. If not provided, estimates on access to four-year institutions or to university are used instead. See Appendix B for further details.

Whether they focus on financial aid information or costs and returns to higher education, most of the interventions providing disadvantaged students with *additional information* had a very small or null impact on enrollment rates of disadvantaged students (Table B.2 in Appendix B).

Interestingly, such interventions have been tested in very different contexts and consistently brought little improvement in widening access to higher education for disadvantaged students. In the U.S., providing information on aid eligibility and application in tax preparation offices (Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2012) or sending high school seniors text messages on the financial benefits of financial aid (Bird, Castleman, Goodman, & Lamberton, 2017) did not increase enrollment of disadvantaged students. In Finland, an information session on returns to higher education did not have any impact on transition rates of disadvantaged students (Kerr, Pekkarinen, Sarvimäki, & Uusitalo, 2014) similarly to what was found in Colombia (Bonilla, Bottan, & Ham, 2017). In Chile, where students consulted web pages on returns to higher education, there was also no impact on enrollment rates (Hastings, Neilson, & Zimmerman, 2015). In the U.S., the inclusion of an online shopping sheet to provide

personalized information about costs and loan options, had even a negative effect on the enrollment behaviors of low-income admitted students, although this effect was not statistically significant (Rosinger, 2016). Even a more intensive intervention which provided personalized information on the costs, benefits and chances of success in higher education through three meetings did not improve access of disadvantaged students in Italy (Abbiati, Argentin, Barone, & Schizzerotto, 2017).

Among the eight studies reviewed, only one found a large positive impact on enrollment rates. Despite a design very similar to interventions previously mentioned, Loyalka, Song, Wei, Zhong, & Rozelle (2013) found that a one-time presentation on cost and financial aid in poor counties in China increased enrollment by 8 percentage points. Nevertheless, the authors note that the information intervention did not have an impact on enrollment for lower SES students (estimates were unfortunately not provided).

How should we interpret these findings? We formulate different hypotheses building on the literature which has investigated information biases about higher education. First, it could be that beliefs about the costs or returns to higher education are "sufficiently" biased to represent a barrier for disadvantaged students only in specific national or educational contexts. If so, information campaigns can have an impact on access rates, but only if access to information on financial aid and costs of higher education is extremely limited. The only study which found a large positive impact for such intervention took place in China where students learn about financial aid packages only after being accepted to a higher education institution. This lack of early information on financial aid may deter disadvantaged students to even apply (Liu et al., 2011; Loyalka et al., 2013). In other contexts, information about costs, returns or financial aid may be more widely accessible and there would be no need to address this issue. It is interesting to see, for example, that, a recent intervention in the U.S. that provided semi-personalized information about returns to higher education to high school students (through a web platform) reported major difficulties in mobilizing schools and students to participate. In three years, only 25 schools out of 300 agreed to join the experiment despite active outreach, and in the participating schools, students made very little use of the developed tool. As noted by the authors, this is a useful finding in itself which suggests that there may be little demand for additional information, at least in this specific context (Blagg, Chingos, Graves, & Nicotera, 2017).

Another hypothesis would be that students' beliefs about higher education do not automatically impact their intention to attend higher education and/or their behaviors to apply. If so, information interventions may be efficient in changing students' beliefs but that would not necessarily translate to intentions and/or behaviors. For example, in the U.S., Avery and Kane (2004) found that there was only a weak connection between students' estimations of net returns from higher education and plans to attend college. However, there is also evidence that information interventions are efficient in changing beliefs about cost or returns from higher education and intentions to attend (Bleemer & Zafar, 2018; Oreopoulos & Dunn, 2012; Peter & Zambre, 2017). One study found that providing additional information about grants did not change college intentions but did increase college application behaviors (Ehlert, Finger, Rusconi, & Solga, 2017). Finally, providing general information about a prestigious grant changed disadvantaged students' knowledge but did not affect their propensity to apply to it, unless general information was combined with a meaningful role model who could show that someone with a similar background had been successful in obtaining such grants (Herber, 2018). These results call for further research on the relationship between beliefs, intentions and behaviors regarding higher education. In addition, it is important to recall that, in many educational systems, enrollment in higher education goes beyond the student's own decision. Not only do students need to apply but they also need to be selected by the tertiary institution to be able to enroll. Even when additional information increases college intentions and application behaviors, it may be that the lack of support during the application process hinders the chances of disadvantaged students making successful applications.

Finally, further research would be needed to disentangle the effect of information interventions, depending on the type of information provided. Providing additional information on returns from higher education in the labor market, on available financial aid, or on chances of success may impact disadvantaged students very differently. And the connection between beliefs, intentions and behaviors may vary depending on the nature of the information biases and updates. It is very interesting to see, for example, that providing students with a personalized message about their chances of graduating in a chosen program did not increase their actual enrollment if the message was positive, but led to a large decrease (by 14 p.p.) in enrollment in this specific program if the assessment of the chances of success was negative (Pistolesi, 2017). This result suggests that providing additional information on

the odds of success may be more efficient in changing behaviors when it is negative (thus leading to a decrease in enrollment) but has little impact when it is positive. It would be interesting to investigate whether this would also be the case for the other types of information relevant for higher education decision-making.

In contrast, the effect of the interventions which complemented information with ***assistance or individualized guidance*** on college or financial aid application were found to increase enrollment rates of disadvantaged students in most cases (Figure 2 and Table B.3 in Appendix B). Typically, the "information & guidance" outreach interventions provide personalized advice and support on higher education applications through counselors. In some cases, the counseling program can run over a few years in high school: An early example of such a program is the Talent Search program, a large-scale program in the U.S., which provides information and support to disadvantaged students from ninth grade onwards. Using propensity score matching, Constantine, Seftor, Martin, Silva, & Myers (2006) estimate that initial enrollment of Talent Search participants in a postsecondary institution was higher by 18, 4, and 15 percentage points, respectively, in Texas, Indiana, and Florida. Similarly, In Canada, the "Explore Your Horizons project" provided 40 hours of after-school activities over three years in high school (Ford et al., 2012). This included guidance for disadvantaged students and their parents. The intervention was successful in increasing participation of disadvantaged students in higher education, by around 10 percentage points.

Six interventions were designed to provide counseling to disadvantaged students during the senior year in high school only. In the US, Avery (2010) analyzed an individualized counseling intervention of 10 hours over the school year for high-achieving disadvantaged high school seniors. The intervention led to an increase of 8 p.p. in access to most selective higher education institutions, although this large increase was not significant due to the small sample size of this pilot study (Avery, 2010). Similarly, counseling in the senior year of high school was found to increase the probability of enrolling in higher education for disadvantaged students by 3 p.p. (Stephan & Rosenbaum, 2013), and up to 7 p.p. (Barr & Castleman, 2017). It also showed to be efficient in diverting disadvantaged students from short programs and encouraging them to enroll in four-year institutions (Bos, Berman, Kane, & Tseng, 2012; Castleman & Goodman, 2014). Finally, being enrolled in a school which offered a "GO center" i.e. a dedicated classroom for the college application process with a full-time counselor and

active outreach run by selected student peers, already increased enrollment of low-income students by 3.5 p.p. which should be taken as a lower bound estimate as it does not focus on students who actually took part in the program (Cunha, Miller, & Weisburst, 2018).

There are several ways in which these – moderately intense – interventions may have influenced disadvantaged students' enrollment behaviors. While a longer exposition to information on higher education may be beneficial, these interventions also help students to navigate among college choices. Moreover, they reduce the complexity of application tasks which seems to be a crucial step to induce changes in application behaviors as suggested by the behavioral theories described earlier. Additionally, it seems that early familiarization with higher education options may be a powerful way to raise students' educational aspirations which in turn can raise students' performance in high school. Indeed both the Talent Search and Explore Your Horizons, which were spread over four and three years respectively, have raised high school completion among disadvantaged students although they did not include academic tutoring (Constantine et al., 2006; Ford et al., 2012). These results thus draw our attention to the role of anticipatory decisions (Erikson, Goldthorpe, Jackson, Yaish, & Cox, 2005) on academic performance.

Although they are not likely to increase educational aspirations, short-term targeted counseling interventions to support students in the application and enrollment period also appear to be efficient in raising access rates of disadvantaged students. Four interventions specifically focused on students after upper-secondary graduation and provided proactive counseling during the summer months to low-income students. The results highlight the importance of engaging students in available counseling activities as a key factor to improve students' outcomes. Three of these interventions had very consistent and substantial impact (between 8 and 14 p.p.) on immediate enrollment and enrollment in four-year institutions (Castleman, Arnold, & Wartman, 2012; Castleman, Owen & Page, 2015, Castleman, Page, & Schooley, 2014). In these cases, counseling was available for students in the control group but without any proactive outreach, while counselors used many means to contact students in the treatment group. The large gap in enrollment between the two groups thus indicates that availability of information or counseling is not sufficient and that counselors actively need to reach out to potential students. This is achieved using small financial incentives for participation in another one-month counseling intervention which also brought about large

increases (17 to 20 p.p.) in enrollment rates of non-white and low-income students (Carrell & Sacerdote, 2013). Only one summer counseling intervention did not significantly increase enrollment rates of disadvantaged students in higher education (Castleman & Page, 2015). But even this intervention led to an increase of almost 5 p.p. in enrollment in four-year institutions and led to an increase in enrollment rates of 12 p.p. for students with less-developed college plans. Thus, it may also be that the efficiency of such interventions depends largely on their ability to target students who are the most at risk to fail to carry out their matriculation after their high school graduation.

But is it possible to efficiently guide students through the application process with no contact with counselors? Five interventions tested low-cost interventions offering guidance through automated or semi-automated procedures and results are promising that these interventions can, to some extent, improve access outcomes of disadvantaged students. In the U.S., Bettinger et al. (2012) tested a streamlined personal assistance for the FAFSA application which increased college enrollment of low-income high school students by 8 p.p. In addition, Hoxby & Turner (2013) sent high-achieving low-income students semi-customized college advising and college application fee waivers, by regular mail, to simplify the paperwork tasks to obtain application fee waivers. They concluded that treated students enrolled significantly more in institutions matching their ability: an increase of 5 p.p., which amounted to a 20% increase compared to the mean of the control group. With intervention costs amounting only to $6 per student, this type of intervention is extremely promising. The outcomes of interventions that provide personalized information on the steps that need to be taken to enroll (without the simplification component) are somewhat smaller but still lead to improvement in enrollment behaviors with minimal intervention costs. For example, sending text messages to remind high school graduates of the tasks required for enrollment during the summer had a small impact on two-year institution enrollment (+3 p.p.) but not on overall access to higher education (Castleman & Page, 2015). However, text messaging increased enrollment of low-income students by almost 6 p.p. and of first-generation students by almost 5 p.p. (Castleman & Page, 2017). Finally, a large-scale nudging experiment which sent only a few emails and text messages to disadvantaged college-intending high school seniors to guide them step-by-step through the completion of the FASFA application was associated with a small but statistically significant increase in enrollment (+1.7 p.p.) (Bird et al., 2017). In this

study, the control group was receiving the same number of messages but with general information about financial aid, so the positive impact of the texts which included "planning prompts" confirms the importance of complementing information with concrete logistics guidance to efficiently increase access to higher education.

These results are encouraging but, as mentioned earlier, the evidence on "information & guidance" outreach interventions come exclusively from North-America and similar interventions should be tested in other contexts to confirm the efficiency of counseling or nudging outreach interventions.

Finally, there are fewer evaluations of intensive outreach programs that offer ***intensive academic tutoring*** during upper secondary education. These interventions not only try to address information gaps but also the lack of academic preparation of disadvantaged students. Although limited, the current evidence suggests that these intensive interventions may have little impact on overall access to higher education (Table B.4 in Appendix B). Randomized experiments to evaluate the "Upward Bound" program and the "College Possible" program, which both offer academic support in upper secondary school, did not find a significant impact on access to higher education (Avery, 2013; Myers, Olsen, Seftor, Young, & Tuttle, 2004; Seftor, Mamun, & Schirm, 2009). One possible explanation is put forward by Myers et al. (2004) who suggest that the absence of impact on postsecondary enrollment is the consequence of the large number of students who do not complete the program. Since these interventions last over many years and include many hours of out-of-school activities, many pupils usually drop out before completing them.

4.2 Impact on graduation

Table B.5 in Appendix presents the estimates of outreach programs on graduation rates but, as mentioned earlier, we found few (quasi-)experimental studies, only four studies, which have evaluated the impact of outreach programs on graduation rates of participants.

So far, only one study has been able to identify a positive impact of an outreach program on graduation rates. Constantine et al. (2006) identified a substantial increase of 5 p.p. in completion rates at 2-year institutions for participants of the "Talent Search" program in Florida. Conversely, the "Upward Bound" program did not have any impact on graduation rates, which is consistent with the almost negligible impact found for enrollment (Seftor et al.,

2009). Similarly, and despite leading to a large increase in enrollment rates, the "Explore Your Horizons" intervention in Canada failed to find an effect on graduation rates. Since the increase in enrollment rates was exclusively driven by enrollment in university programs and graduation rates measured only four years after expected high school graduation, later data may be necessary to identify an increase in graduation rates (Ford, Grekou, Kwakye, & Nicholson, 2014). However, with a long-term evaluation, Cunha et al. (2018) did not find that the increase in enrollment for low-income students translated in an increase in graduation by eight years: being enrolled in a school offering outreach (GO center) seems to induce enrolling students who are also more at risk of dropping out once in college. These results suggest that the long-term benefits of outreach interventions may be limited if students are not further supported once in college (Cunha et al., 2018) and that more attention should be given to graduation outcomes in evaluations of outreach programs.

5. Financial support

As financial aid has diversified over the last two decades, we may expect some heterogeneity in their effects and separately discuss the impact of universal grants (available for all students), need-based aid (which uses parental financial conditions as the main eligibility criteria), merit-based aid (which requires high academic performance, usually at high school graduation), performance-based aid (which is contingent on staying enrolled and making passing grades in higher education), loans and tax incentives.

Table 2: Available evidence on the impact of financial aid

	Access	Graduation
Number of studies by type of interventions		
Universal grants	1	1
Need-based grants	14	12
Merit-based grants	6	4
Performance-based grants	4	2
Loans	2	3
Tax-credit	2	1
Total number of studies	**28**	**22**
Studies' characteristics		
RCT design (in % of total studies)	18%	23%
Diversity of national contexts (nb of country)	8	3
National-scale interventions (in % of total studies)	43%	45%
Single-institution interventions (in % of total studies)	7%	9%

Source: Tables C1-C12 in Appendix C.

Table 2 shows that most of the available evidence deals with need-based grants. Contrary to outreach interventions, we could find many studies providing estimates of the impact of aid on graduation outcomes. Around half of the studies evaluated a national aid scheme, and there is some diversity in the educational contexts where the effect of financial aid was evaluated. However, the available causal evidence on the effect of some aid schemes for disadvantaged students remains extremely limited, most notably for universal grants, loans and tax-credits.

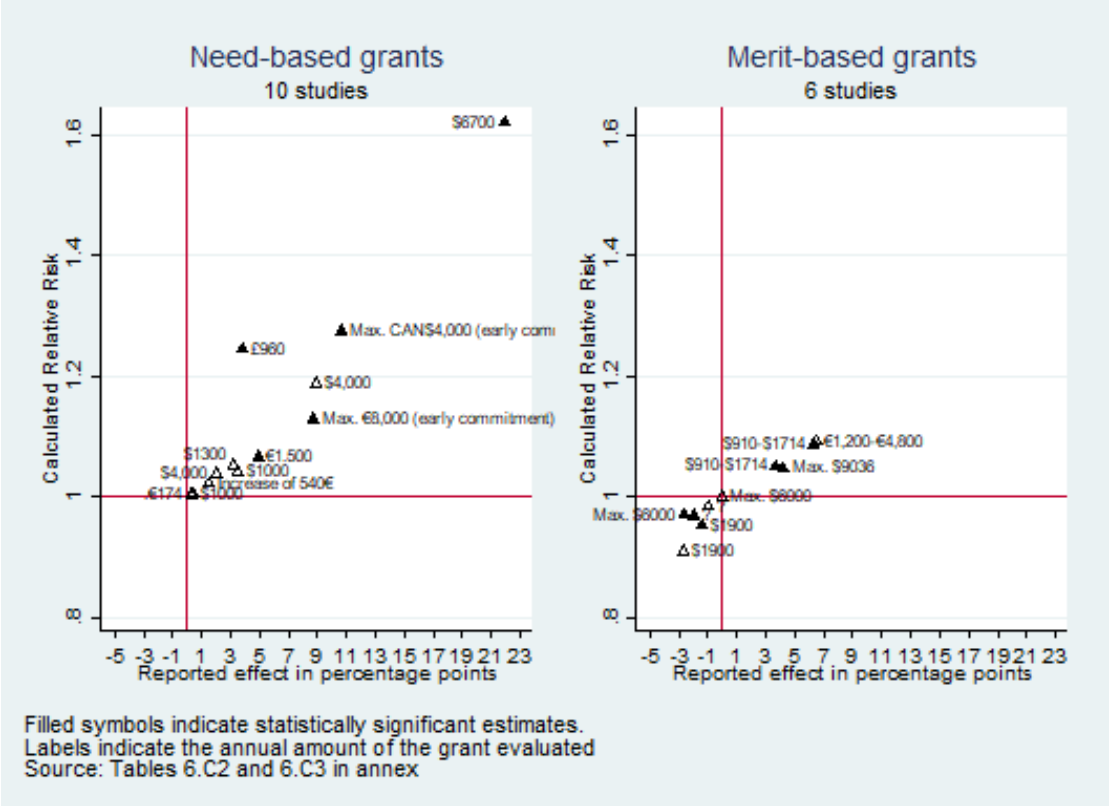
5.1 Effects on enrollment

One study provided causal estimates of the effect of universal grants or price reduction on the access rates of disadvantaged students, using a difference-in-differences design (Table C.1 in Appendix C). Large price reductions in community colleges, which amount to at least 60% reduction of the tuition fees, based on residency was found to successfully increase disadvantaged students' enrollment in these institutions but to divert students from four-year institutions (Denning, 2017). More quasi-(experimental) evidence is obviously needed to conclude whether these policies participate in reducing inequalities in higher education. It may be that universal financial grants, which normally only include a basic application process, are more efficient in reaching all disadvantaged students than specifically targeted programs which require complex application forms. Conversely, it may be that socially advantaged students react more to such opportunity and remain the primary beneficiaries of these policies.

More studies are available regarding the effect of grants which defined more stringent eligibility rules. Figure 3 displays the collected estimates for need-based and merit-based grants. Results on the effect of need-based grants are mixed. Many studies find a small substantive effect, but which fails to reach statistical significance. A few studies, however, found that need-based grants had a large effect on access rates of disadvantaged students. Results on merit-based grants are also mixed but with a different pattern: some concluded that merit-based grants actually decreased enrollment rates of disadvantaged students and only a third of the available studies found that such grants had a positive statistically significant effect on access to higher education for disadvantaged students. Since there is such diversity

in these findings, it is necessary to discuss the studies and the design of the aid schemes in more detail.

Figure 3: Selected estimates for the impact of financial aid on access to higher education



Note: Refers to estimates on access to any type of higher institution, whenever available. If not provided, estimates on access to four-year institutions or to university are used instead. See Appendix C for further details.

The evidence on ***need-based aid*** is mixed. While most studies find a small substantive effect on access to higher education (Table C.2 in Appendix), only a third of the selected estimates are statistically significant. Among the 14 studies reviewed, only four interventions found a statistically significant effect larger than 5 percentage points. However, the grant programs evaluated differ greatly from one another and it is possible to identify some of the features that seem to be associated with larger impacts on access rates to higher education. Most notably the amount and the timing of the grant seem to be central features in the efficiency of need-based financial aid.

For example, in the U.S., the Pell grant, which can be quite small, was not associated with any increase in enrollment (Denning, Marx, & Turner, 2017; Kane, 1995; Rubin, 2011). Conversely, studies analyzing grants that supplement the Pell grant are more likely to find positive effects

of aid, supporting the hypothesis that the size of aid matters. In a randomized controlled trial in the United States (California), Richburg-Hayes et al (2015) provided a one-time $1,000 additional subsidy for enrolling in higher education which increased enrollment at any college by 3.5 percentage points (although it was not statistically significant), and by 5 percentage points for two-year colleges. Using a regression discontinuity design, Castleman and Long (2013) found that an additional yearly renewable grant of $1,300 (in 2000$) had a positive (+3 p.p.), but statistically non-significant effect on higher education enrollment which was mainly driven by an increase in enrollment in four-year institutions (statistically significant at 10%). Bettinger (2015) also found a small but statistically significant response to the Ohio College Opportunity Grant: those who received around $750 more grant aid because of a reform of the aid scheme were 1.5 percentage points more likely to enroll at public, four-year colleges. Linsenmeier et al (2006) found that one university grant, that replaced a loan (increasing total grant aid by an average of just over $3,000), had a small impact on attendance among admitted students (yield rate) for low-income students (2 p.p.) but was able to raise attendance by close to 9 p.p. for low-income minority students, an estimate almost significant at the 10% level.

Finally, interventions that offer very generous subsidies were found to have large effects on enrollment. Dynarski (2003) found that the elimination of the Social Security Benefits program that targeted children of deceased, disabled or retired parents decreased enrollment by 22 percentage points. Under this program, students received an average subsidy of $6,700 per year (in 2000$), at a time when tuition averaged around $1,900 per year at public universities. Similarly, the temporary ban on all types of federal financial aid, for students with drug convictions, decreased immediate college attendance by 22 p.p. although this effect was mainly the consequence of delayed enrollment during the time of the ban (Lovenheim & Owens, 2014).

Evidence from Europe seems to confirm that the effect of need-based aid is only identifiable when the amount of aid is large enough. In France, the main need-based grant scheme contains different levels of aid. While a fee-waiver (which amounted to 174 euros) had small positive (statistically non-significant) effects, an additional €1,500 per year increased enrollments by almost 3 percentage points, and by almost 5 p.p. for enrollment in the first year of undergraduate programs (Fack & Grenet, 2015). In the United Kingdom, the

implementation of need-based grants of £960 (2006 prices), on average, was associated with an increase in access to higher education of almost 4 p.p. among low-income youths (Dearden, Fitzsimons, & Wyness, 2014). In contrast, in Germany, a 10% increase in the federal students' financial assistance scheme led to a small but not significant increase in enrollment rates of low-income students (Baumgartner & Steiner, 2006). The authors argue that this may have to do with the small sample size, but it is also possible that the increase in aid, which amounted to €45 per month on average, was too small to lead to any sizable increase in enrollment rates, in line with the findings from the studies discussed above.

Together with the amount, the timing of the grants may also be important for efficiently supporting disadvantaged students. In New Brunswick in Canada, Ford et al. (2014) deposited a maximum of CAN$8,000 in high school students' saving accounts. The amount was deposited in tenth grade, giving students enough time to prepare their college applications. Importantly, students were only able to access the grants for two years while in college. Enrollment in postsecondary education increased dramatically, by almost 11 percentage points, although this was driven exclusively by an increase in short program enrollment. Another example of financial aid with early commitment was tested in Italy (Azzolini, Martini, Romano, & Vergolini, 2018). Disadvantaged students were invited to save money for their education during their last two years of high school and their deposits on this dedicated saving account were matched at a rate of 4 to 1. The money could then only be used for educational expenses and this led to a large increase in enrollment of almost 9 p.p. Not only were students aware of the amount of money they had for higher education studies before the end of secondary school, but students and families were directly involved in anticipating and saving for educational expenses, which may be another promising way to increase educational aspirations for higher education (Azzolini et al., 2018).

The causal evidence on ***merit-based aid*** suggest that these types of grants can have negative effects for disadvantaged students, and only have a positive effect when they are designed to guarantee that disadvantaged students have access to them (Table C.3 in Appendix C). Eligibility for merit-based aid is defined in reference to the academic ability of the students, with criteria setting minimum high school grades or performance in specific standardized tests. The rationale for this form of aid is that it may incentivize student performance in high school (thus increasing academic preparation for higher education), while encouraging good

performers to enroll in higher education. However, since high performers are typically from privileged backgrounds, it is possible that these kinds of programs are not accessible to students from disadvantaged backgrounds. If this is so, this form of aid may reward those who would anyway enroll in college, or even increase inequality across social groups. On the other hand, some of the merit-based grants are made accessible only to disadvantaged students by including a need-based eligibility criterion and may be able to improve access to higher education for this group.

With one exception, merit-based grants that did not have a need-based eligibility criterion often seemed to have either increased inequalities or failed to trigger any improvement for disadvantaged students (Bruce & Carruthers, 2014; Dynarski, 2000; Sjoquist & Winters, 2015). Only Cohodes and Goodman (2014) found a positive effect of a merit-based grant without a need-based eligibility criterion. The Adams scholarship in Massachusetts added between $900 and $1,700 in annual aid to reduce tuition costs for those who score highly on the state-wide examinations in tenth grade and without any need-based eligibility component. Enrollment in four-year institutions increased by more than 6 percentage points among non-White students, while it went up by almost 4 percentage points among low-income groups. The difference with the negative effects identified by the previous studies may be interpreted in light of the specific design of the Adam scholarship: the initial idea was to provide a grant to students whose score would place them in the top 25 percent of students state-wide. However, "Concerned that […] statewide standard would assign scholarships largely to students in wealthy, high-performing school districts", the state decided that a student's total score would need to fall in the top 25 percent of scores in *his or her school district* (Cohodes & Goodman, 2014). Thus, although there was no need-based criterion for eligibility, the grant scheme was designed to guarantee that disadvantaged students would benefit from it.

Regarding merit-based grants which are targeted to lower-income students, Kane (2003) found that a merit-aid program in California with a need-based component increased enrollment by 4 percentage points immediately below the income eligibility threshold. Similarly, Vergolini, Zanini and Bazoli (2014) found that an Italian merit grant, available only for high performers from low-income families increased enrollments by 6.5 percentage points, although this finding was not statistically significant.

While there is limited evidence on the effect of ***performance-based scholarships,*** which make grant payment conditional on minimum academic achievement in higher education, the few available studies find promising effects. Nevertheless, it should be noted that these types of grants often focus on students who have already carried out the first enrollment steps in a specific institution and provide them incentives to register for a minimum number of courses***.***

Of the four available studies, three (Barrow, Richburg-Hayes, Rouse, & Brock, 2014; Jackson, 2010; Richburg-Hayes et al., 2015) identified a positive significant effect on enrollment (Table C.4 in Appendix C) and the only study that did not show any increase was targeting freshmen students who already had a registration rate of almost 100% in the control group (Binder, Krause, Miller, & Cerna, 2015).

Finally, the evidence on ***loans*** suggests that these forms of aid may be efficient in improving access rates of disadvantaged students but more experimental research is necessary (Table C.5 in Appendix C). In Chile, the national loan program was found to increase enrollment by 20 percentage points for college-intending students in the lowest-income quintile (Solis, 2013). Similarly, short-term loans covering tuition fees in South African public universities were estimated to double enrollment rates of admitted disadvantaged students (Gurgand, Lorenceau, & Mélonio, 2011). In contrast, the available evidence on ***tax incentives*** does not suggest any positive impact for disadvantaged groups' access to higher education (Table C.6 in Appendix C) as two studies in the U.S. fail to identify an effect on enrollment for disadvantaged students (Bulman & Hoxby, 2015; LaLumia, 2012) As these tax incentives only provide income relief about 10.5 months after enrollment, these may not be very effective in addressing unmet financial need. Moreover, these tax incentives tend to benefit middle- and upper-income families, as lowest-income families do not pay taxes and are thus not eligible for them.

5.2 Effects on graduation

The literature on the effects of financial aid on higher education graduation is still quite recent but has lately received growing attention. Regarding an example of a "universal" grant, price reduction in community colleges, based on residency, led to a small increase in associate degree graduation for black students but not for low-income students, for whom the increase in enrollment did not translate into more graduates (Denning, 2017).

The available evidence further suggests that ***need-based grants*** are often efficient in supporting the graduation of disadvantaged students (Table C.8 in Appendix C). Alon (2011) found that each additional $100 of Pell grant received in the first year by students coming from the poorest families increases degree completion by 0.6 percentage points, which is statistically significant. Similarly an additional $1,000 in annual grant aid was found to significantly increase graduation rates of minority students enrolled in private and most selective universities (Alon, 2007) and to increase graduation from bachelor's degrees for the lowest-income students by more than 5 p.p. (Denning et al., 2017). Lovenheim and Owens (2014) also found that convicted drug offenders were 7 percentage points less likely to earn a bachelor's degree when they became ineligible for federal aid, although this was not significant. Only Denning (2018) found an effect of less than 1 p.p. on completion of a bachelor's degree following an increase in the Pell grant but this was estimated on students already in their last year of a bachelor's program and the larger financial aid did increase on-time graduation by almost 3 p.p. (Denning, 2018).

Regarding the grants supplementing federal aid in the U.S., Castleman and Long (2013) found that the Florida FSAG increased graduation from four-year colleges by 5 percentage points. This is a substantial effect, as it represents an increase of 21% over the sample mean probability to graduate. The Wisconsin Scholars Grant was also found to largely increase on-time bachelor's graduation (Goldrick-Rab et al., 2016) but not completion of associate degrees (Anderson & Goldrick-Rab, 2016). An institutional grant meant to cover 100% of unmet need had a small but non-significant effect on on-time graduation (+2.2 p.p.; Clotfelter, Hemelt, & Ladd, 2018). Finally, Turner and Bound (2003) estimated that the GI-Bill, which provided up to $500 in tuition expenses and up to $120 per month in living costs to returning veterans from WWII, increased college degree completion of black students by almost 3 percentage points, although this effect was not statistically significant. The authors argue that the absence of a large effect is due to higher education supply problems in the South of the United States, where school segregation was still a major issue. Indeed, they identified a larger, statistically significant, effect of almost 6 p.p. for Blacks in the northern states.

In Canada, Ford et al (2014) found that the two-year grant provided with early commitment during high school increased any degree completion by 9 percentage points, which represents a 70% increase from the baseline. In France, Fack & Grenet (2015) found that receiving a

€1,500 grant, on top of a fee-waiver increases undergraduate degree completion by almost 3 percentage points, for those on the threshold of grant eligibility in their final year. While these effects are slightly smaller than the enrollment effect cited above, they are still sizeable, as this aid allowed around half the students who it incentivized to enroll to complete their undergraduate degrees.

The evidence of ***merit-based financial aid*** on degree completion is limited but current findings are not encouraging (Table C.9 in Appendix C). Among the four reviewed studies, none was able to identify an improvement in graduation rates for disadvantaged students (Carruthers & Özek, 2016; Cohodes & Goodman, 2014; Sjoquist & Winters, 2015; Welch, 2014). All the selected estimates on graduation from any degree or bachelor's degree range from -4 to +0.2 percentage points and none are significant.

We would expect the effects of ***performance-based financial aid*** on degree completion to be larger on completion as these forms of grants are specifically designed to increase persistence and graduation. Performance-based aid provides short-term monetary incentives to maintain a minimum GPA allowing students to graduate within a reasonable period of time. The evidence on disadvantaged students' graduation or completion rates is however still very limited (Table C.10 in Appendix C). Binder et al. (2015) find that the VISTA program for disadvantaged students at the University of New Mexico increased degree completion within five years by 4.5 p.p., which was statistically significant at the 11% level. Mayer, Patel and Gutierrez (2015) found that a performance-based grant in three community colleges, raised degree attainment within two and within three years, by 3 to 4 percentage points. Nevertheless, within four years, the program had increased completion by less than 2 p.p. and was no longer statistically significant. In other words, the program accelerated degree completion, thus increasing efficiency, but did not increase overall graduation in the long term.

Finally, none of the three studies which provide causal estimates of the effect of ***loans*** on graduation identified a statistically significant impact (Alon, 2007; Dunlop, 2013). Only (Wiederspan, 2016) identified a large effect (+ 20) of receiving federal loans on graduation from associate degrees but this was not statistically significant. We could identify only one study assessing the effects of ***tax incentives*** on degree completion for disadvantaged students (Elsayed, 2016) and more experimental research is obviously needed to draw any conclusions.

6. Mixed interventions combining financial aid and outreach

This section presents the results from studies evaluating mixed interventions that combine outreach with financial aid. While these studies make it difficult to assess the causal effect of a specific component, they do allow us to assess the effectiveness of a package of interventions. Table 3 provides the overview of the available evidence on these interventions. The causal evidence is still limited but covers equally access and graduation outcomes. Around half of the available evidence comes from randomized experiments. However, we could only find evidence from the United-States and Canada for these types of interventions and this is clearly one of the main limits of this literature.

Table 3: Available evidence on the impact of interventions combining outreach and financial aid

	Access	Graduation
Total number of studies	**7**	**6**
Studies' characteristics		
RCT design (in % of total studies)	43%	50%
Diversity of national contexts (nb of country)	2	2
National-scale interventions (in % of total studies)	0%	0%
Single-institution interventions (in % of total studies)	14%	33%

Source: Tables D.1-D.2 in Appendix D.

6.1 Effects on enrollment

The evidence is still limited but mixed interventions seem efficient in raising enrolment. Six out of the seven available studies found a statistically significant positive impact for at least one disadvantaged group. And when a positive impact was identified, effect sizes are generally large compared to outreach or aid estimates.

The Quantum Opportunities Program (QOP) was one of the earlier experiments from the 1990s and included education (tutoring, computer-based instruction), development activities and community service to improve the living conditions in the community. It targeted inner-city low-income youth from ninth grade through to high school. Students received a small cash incentive to engage actively in these activities, as well as bonuses when major segments were completed. Students received over $1,000 on average, and all funding was deposited in a fund

that they could access while in postsecondary education. An initial evaluation found that QOP had a dramatic effect and increased postsecondary enrollment by 26 percentage points (Hahn, Leavitt, & Aaron, 1994) but it should be noted that the sample of this experiment was small (N=158 students). A more recent evaluation with a larger sample found smaller but still sizeable effects: By the time that youth were in their mid-twenties, participants were around 7 p.p. more likely to have ever attended postsecondary education than those in the control group (Rodríguez-Planas, 2012).

The other randomized experiment tested in Canada a combination of outreach and need-based aid (Ford et al., 2014). Students were eligible to receive 40 hours of counseling during high school, and a maximum of CAN$8,000 in need-based aid, deposited during high school and payed while in college, over two years. The impact was substantial as it increased enrollment in higher education by more than 10 p.p. Interestingly, this study also tested the effect of each component of the intervention individually allowing us to compare the effect sizes of the mixed intervention with its single components: the estimated impact on access to higher education for the mixed intervention is not larger than the impacts of the individual components of the intervention (see earlier in outreach and need-based grants). However, the combination of the interventions also increased attendance at university by almost 7 p.p. while financial aid alone only had an impact on enrolment in short programs (Ford et al., 2014).

The Pathways to Education program (Oreopoulos, Brown, & Lavecchia, 2014) provided an intensive multifaceted support to pupils from ninth grade through high school in urban settings in Canada. Participants received counseling, free daily evening tutoring and group mentoring activities. Students also received financial support throughout the program, including transportation, school supplies, and a financial award of CAN$1,000 at the end of each year of program participation. Financial support could reach a maximum of CAN$4,000 and could be used only to pay for postsecondary education expenses. At the first site where the program was tested, the program had dramatic effects on postsecondary attendance as program youths were 19 percentage points more likely to enroll in any postsecondary education. At the second site where the program was tested, however, the results were much more modest as the increase in postsecondary enrollment was 4 percentage points, which was not statistically significant, although there was an increase in application rates (Oreopoulos et al., 2014).

All these interventions reached disadvantaged students early, in ninth or tenth grade of high school but one intervention starting only in the senior year of high school was also efficient in raising access rates of disadvantaged students. The Knox Achieves program which provided outreach and financial aid for making an immediate transition to community colleges increased enrollment by more than 25 p.p. in these institutions without diverting students from universities (Carruthers & Fox, 2016).

Only two studies (Andrews, Imberman, & Lovenheim, 2016; Page, Castleman, & Sahadewo, 2016) did not identify large increase in enrollment of disadvantaged students with interventions combining outreach and generous financial aid. Interestingly, both were focusing on high-achieving disadvantaged students only. As already mentioned when discussing merit-based aid, high-performing and motivated disadvantaged students can be expected to enroll in higher education in any case. Thus, it is less likely that such interventions bring large improvements for this specific population.

6.2 Effects on graduation

The available findings regarding interventions that combine outreach and financial aid on graduation rates of disadvantaged students is still insufficient but suggests that these interventions can have positive effects on graduation rates but that their efficiency is not systematic. Of the six studies selected, three found a large positive effect on graduation rates. Two found smaller effects (less than 5 percentage points) and one did not find any positive effect on graduation rates of disadvantaged students.

The Quantum Opportunities Program did not affect graduation rates for bachelor's degrees or associate degrees. Nevertheless, youths in the program were 7 p.p. more likely to complete two years of college (Rodríguez-Planas, 2012). The mixed interventions implemented by two flagship public universities in Texas also brought very limited improvements in degree outcomes of the treated students (+1.5 p.p. increase in one case and a nil effect in the other) but these interventions already had only a limited impact in enrollment rates in these specific universities (Andrews et al., 2016).

Conversely, Ford et al (2014) found an increase in completion by 8 p.p. in their evaluation of learning accounts and Explore Your Horizons. This is broadly in line with the effect of the financial aid alone discussed above. The Dell program, focusing on high-performing

disadvantaged students, was also able to support bachelor's graduation which was raised by 19 p.p., despite its very small impact on enrollment (Page et al., 2016). Comprehensive intervention implemented after enrollment in higher education may also be successful. The ASAP program targeted disadvantaged students at three community colleges in New York. In return for full-time enrollment, the program provided students with free tuition and free public transport. Students also received a dedicated advisor and academic tutoring. The participants were estimated to be 18 p.p. more likely to graduate by three years, effectively doubling graduation rates (Scrivener et al., 2015). Similarly, combining a need-based grant with mentoring and career guidance in one university raised completion rates by almost 5 percentage points, although this was not significant through the (preferred) regression discontinuity estimating strategy (Clotfelter et al., 2018).

7. Conclusion

The results of the experimental or quasi-experimental literature discussed in this paper provide an overview of the causal effects of the most common interventions or policies implemented to raise higher education outcomes of disadvantaged students. We were able to identify some promising ways to reduce inequalities in higher education, even though many interventions failed to find an effect.

Outreach interventions targeted at students in high school or recent graduates seem to be a relatively cost-effective tool to address inequalities in access to higher education, as long as the interventions go beyond providing general information about higher education. Substantial improvements have been identified when disadvantaged students were offered personalized counseling activities or simplification of application tasks, especially when counselors actively reach out to targeted students to ensure their participation. However, neither interventions which only provide additional information nor those including intensive academic tutoring seem to efficiently raise higher education outcomes of disadvantaged students.

Financial aid is more expensive, and the evidence on its effectiveness for disadvantaged students varies largely depending of the type of aid. The evidence on need-based grants suggests that most grant schemes only lead to limited improvements in enrollment rates, unless they provide substantial amounts of money. It is possible that enrollment as a response

to aid follows a threshold effect and that need-based aid is only effective when it covers a significant part of unmet financial need and determining such a threshold should be an interesting question for future research. It also seems that an early commitment of aid, while students are still in high school, leads to much larger impact on higher education access and this type of grant could be further tested. Merit-based aid is rarely effective in tackling inequalities in higher education, except when it includes a need-based component to specifically support disadvantaged students. Conversely, merit-based aid based only on academic results, without any assessment of students' financial needs, seems to have no effect, and was even found to raise inequality. Regarding attainment, only need-based grants were found to increase graduation rates of disadvantaged students quite consistently.

Interventions that combine early financial aid and outreach activities are even more demanding for the public purse. Nevertheless, the experimental literature shows promising results on enrollment and completion of disadvantaged students. Since they support students through different mechanisms, these interventions seem to lead to large increases in enrolment rates, more consistently than either outreach or financial aid alone. It should also be noted that effect sizes of these interventions are in the same ballpark as some of the more effective outreach or financial aid interventions. More needs to be known, therefore, about the cost effectiveness of these interventions as compared to other types of interventions.

Our systematic review of the literature also allows us to identify areas for which additional experimental evidence is needed. Overall, there is still a lack of available evidence on the impact of the outreach interventions on graduation rates. As the problem of dropout in higher education has received increasing attention, it is crucial to provide causal evidence on the capacity of interventions to translate a higher number of under-represented students in higher education into a higher number of graduates. Another shortcoming of the existing literature is that there is little variation in institutional settings. Most studies discussed here are from the United States, and further research, in other national and institutional contexts, is needed to shed light on the pertinence of the interventions. To make this literature comparable and to be able to draw more precise conclusion on the effect of financial aid, we also consider that studies should systematically report the amount of the aid evaluated relative to higher education costs (tuition and living expenses) in their specific context. For the time being, it is very difficult to compare or standardize the amount of aid evaluated as the

costs of higher education vary so widely across countries and institutions, and this information would be crucial to identify a threshold that financial aid needs to cover to increase access and graduation rates of disadvantaged students.

Nevertheless, most of the evidence discussed here is quite recent and this literature is growing quickly. We therefore hope that more precise conclusions and policy recommendations could be drawn in the coming years. Overall, the available evidence from the (quasi-)experimental literature is encouraging for the institutional and political leverage to reduce inequality in higher education. Although some of the inequalities discussed here may arise very early in the life course, our results highlight the possibility, and perhaps the necessity, to also tackle education inequalities later. Well-designed interventions in high school and higher education can thus bring about substantial improvements in the difficult educational careers of disadvantaged students.

References

Abbiati, G., Argentin, G., Barone, C., & Schizzerotto, A. (2017). Information barriers and social stratification in higher education: evidence from a field experiment. *The British Journal of Sociology*, (0).

Abbiati, G., & Barone, C. (2017). Is university education worth the investment? The expectations of upper secondary school seniors and the role of family background. *Rationality and Society*, *29*(2), 113–159.

Alon, S. (2007). The influence of financial aid in leveling group differences in graduating from elite institutions. *Economics of Education Review*, *26*(3), 296–311.

Alon, S. (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.

Anderson, D. M., & Goldrick-Rab, S. (2016). *Aid After Enrollment: Impacts of a Statewide Grant Program at Public Two-year Colleges*. Retrieved from http://www.wihopelab.com/publications/Anderson-Goldrick-Rab-2016-Impacts-of-Statewide-Grant-Program.pdf

Andrews, R. J., Imberman, S. A., & Lovenheim, M. F. (2016). *Recruiting and Supporting Low-Income, High-Achieving Students at Flagship Universities* (Working Paper No. 22260). National Bureau of Economic Research.

Attewell, P., Lavin, D., Domina, T., & Levey, T. (2006). New Evidence on College Remediation. *The Journal of Higher Education*, *77*(5), 886–924.

Avery, C. (2010). *The Effects of College Counseling on High-Achieving, Low-Income Students* (Working Paper No. 16359). National Bureau of Economic Research.

Avery, C. (2013). *Evaluation of the College Possible Program: Results from a Randomized Controlled Trial* (NBER Working Paper No. 19562). National Bureau of Economic Research.

Avery, C., & Kane, T. J. (2004). Student perceptions of college opportunities. The Boston COACH program. In *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 355–394). Retrieved from http://www.nber.org/chapters/c10104.pdf

Azzolini, D., Martini, A., Romano, B., & Vergolini, L. (2018). Affording college with the help of asset building: First experimental impacts from Italy. *Economics Letters*, *169*, 27–30.

Barr, A., & Castleman, B. (2017). *The Bottom Line on College Counseling* (p. 41). Retrieved from https://www.bottomline.org/sites/default/files/The%20Bottom%20Line%20on%20College%20Counseling%20RCTPaper_10_2017.pdf

Barrow, L., Richburg-Hayes, L., Rouse, C. E., & Brock, T. (2014). Paying for Performance: The Education Impacts of a Community College Scholarship Program for Low-Income Adults. *Journal of Labor Economics*, *32*(3), 563–599.

Baumgartner, H. J., & Steiner, V. (2006). *Does More Generous Student Aid Increase Enrolment Rates into Higher Education? Evaluating the German Student Aid Reform of 2001* (SSRN Scholarly Paper No. ID 892831). Rochester, NY: Social Science Research Network.

Bettinger, E. (2004). How financial aid affects persistence. In *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 207–238). University of Chicago Press.

Bettinger, E. (2015). Need-Based Aid and College Persistence The Effects of the Ohio College Opportunity Grant. *Educational Evaluation and Policy Analysis*, *37*(1 suppl), 102S-119S.

Bettinger, E., Long, B. T., Oreopoulos, P., & Sanbonmatsu, L. (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.

Binder, M., Krause, K., Miller, C., & Cerna, O. (2015). *Providing Incentives for Timely Progress Toward Earning a College Degree*. Retrieved from http://www.mdrc.org/publication/providing-incentives-timely-progress-toward-earning-college-degree

Bird, K. A., Castleman, B., Goodman, J., & Lamberton, C. (2017). *Nudging at a National Scale: Experimental Evidence from a FAFSA Completion Campaign* (No. 54; p. 34).

Blagg, K., Chingos, M., Graves, C., & Nicotera, A. (2017). *Rethinking Consumer Information in higher education* (p. 59). Urban Institute.

Bleemer, Z., & Zafar, B. (2018). Intended college attendance: Evidence from an experiment on college returns and costs. *Journal of Public Economics*, *157*, 184–211.

Bonilla, L., Bottan, N. L., & Ham, A. (2017). *Information Policies and Higher Education Choices: Experimental Evidence from Colombia* (SSRN Scholarly Paper No. ID 2546835). Rochester, NY: Social Science Research Network.

Borenstein, M. (Ed.). (2009). *Introduction to meta-analysis*. Chichester, U.K: John Wiley & Sons.

Bos, J., Berman, J., Kane, T. J., & Tseng, F. (2012, November 8). *Does the Source Program Increase Access to Financial Aid and Support Four-Year College Enrollment?* Presented at the APPAM Fall Research Conference. Retrieved from https://appam.confex.com/appam/2012/webprogram/Paper2589.html

Bruce, D. J., & Carruthers, C. K. (2014). Jackpot? The impact of lottery scholarships on enrollment in Tennessee. *Journal of Urban Economics*, *81*, 30–44.

Bulman, G. B., & Hoxby, C. M. (2015). The Returns to the Federal Tax Credits for Higher Education. *Tax Policy and the Economy*, *29*(1), 13–88.

Carneiro, P., & Heckman, J. J. (2002). *The Evidence on Credit Constraints in Post-Secondary Schooling* (Working Paper No. 9055). National Bureau of Economic Research.

Carrell, S. E., & Sacerdote, B. (2013). *Why do college going interventions work?* (No. 19031). National Bureau of Economic Research.

Carruthers, C. K., & Fox, W. F. (2016). Aid for all: College coaching, financial aid, and post-secondary persistence in Tennessee. *Economics of Education Review*, *51*, 97–112.

Carruthers, C. K., & Özek, U. (2016). Losing HOPE: Financial aid and the line between college and work. *Economics of Education Review*, *53*, 1–15.

Castleman, B., Arnold, K., & Wartman, K. L. (2012). Stemming the Tide of Summer Melt: An Experimental Study of the Effects of Post-High School Summer Intervention on Low-Income Students' College Enrollment. *Journal of Research on Educational Effectiveness*, *5*(1), 1–17.

Castleman, B., & Goodman, J. (2014). *Intensive College Counseling and the College Enrollment Choices of Low Income Students* (SSRN Scholarly Paper No. ID 2493103). Rochester, NY: Social Science Research Network.

Castleman, B., & Long, B. (2013). *Looking Beyond Enrollment: The Causal Effect of Need-Based Grants on College Access, Persistence, and Graduation* (NBER Working Paper No. 19306). National Bureau of Economic Research, Inc.

Castleman, B., & Page, L. (2015). Summer nudging: Can personalized text messages and peer mentor outreach increase college going among low-income high school graduates? *Journal of Economic Behavior & Organization*, *115*, 144–160.

Castleman, B., & Page, L. (2017). Parental Influences on Postsecondary Decision Making: Evidence From a Text Messaging Experiment. *Educational Evaluation and Policy Analysis*, *39*(2), 361–377.

Castleman, B., Page, L., & Schooley, K. (2014). The Forgotten Summer: Does the Offer of College Counseling After High School Mitigate Summer Melt Among College-Intending, Low-Income High School Graduates? *Journal of Policy Analysis and Management*, *33*(2), 320–344.

Choitz, V., & Reimherr, P. (2013). *Mind the Gap: High Unmet Financial Need Threatens Persistence and Completion for Low-Income Community College Students*. Center for Law and Social Policy.

Clotfelter, C. T., Hemelt, S. W., & Ladd, H. F. (2018). Multifaceted Aid for Low-Income Students and College Outcomes: Evidence from North Carolina. *Economic Inquiry*, *56*(1), 278–303.

Cohodes, S. R., & Goodman, J. S. (2014). Merit Aid, College Quality, and College Completion: Massachusetts' Adams Scholarship as an In-Kind Subsidy. *American Economic Journal: Applied Economics*, *6*(4), 251–285.

Constantine, J. M., Seftor, N. S., Martin, E. S., Silva, T., & Myers, D. (2006). *Study of the Effect of the Talent Search Program on Secondary and Postsecondary Outcomes in Florida, Indiana and Texas. Final Report from Phase II of the National Evaluation*. ED Pubs.

Cunha, J. M., Miller, T., & Weisburst, E. (2018). Information and College Decisions: Evidence From the Texas GO Center Project. *Educational Evaluation and Policy Analysis*, *40*(1), 151–170.

Dearden, L., Fitzsimons, E., & Wyness, G. (2014). Money for nothing: Estimating the impact of student aid on participation in higher education. *Economics of Education Review*, *43*, 66–78.

Deming, D., & Dynarski, S. (2009). *Into College, Out of Poverty? Policies to Increase the Postsecondary Attainment of the Poor* (Working Paper No. 15387). National Bureau of Economic Research.

Denning, J. T. (2017). College on the Cheap: Consequences of Community College Tuition Reductions. *American Economic Journal: Economic Policy*, *9*(2), 155–188.

Denning, J. T. (2018). Born Under a Lucky Star: Financial Aid, College Completion, Labor Supply, and Credit Constraints. *Journal of Human Resources*.

Denning, J. T., Marx, B. M., & Turner, L. J. (2017). *ProPelled: The Effects of Grants on Graduation, Earnings, and Welfare* (Working Paper No. 23860). https://doi.org/10.3386/w23860

Domina, T. (2009). What Works in College Outreach: Assessing Targeted and Schoolwide Interventions for Disadvantaged Students. *Educational Evaluation and Policy Analysis*, *31*(2), 127–152.

Dunlop, E. (2013). *What Do Stanford Loans Actually Buy You?-The Effect of Stanford Loan Access on Community College Students* (CALDER Working Paper No. No. 94).

Dynarski, S. (2000). Hope for Whom? Financial Aid for the Middle Class and Its Impact on College Attendance. *National Tax Journal*, *53*(3), 2.

Dynarski, S. (2003). Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion. *The American Economic Review*, *93*(1), 279–288.

Ehlert, M., Finger, C., Rusconi, A., & Solga, H. (2017). Applying to college: Do information deficits lower the likelihood of college-eligible students from less-privileged families to pursue their college intentions?: Evidence from a field experiment. *Social Science Research*, *67*, 193–212.

Elsayed, M. A. A. (2016). The Impact of Education Tax Benefits on College Completion. *Economics of Education Review*, *53*, 16–30.

Erikson, R., Goldthorpe, J. H., Jackson, M., Yaish, M., & Cox, D. R. (2005). On class differentials in educational attainment. *Proceedings of the National Academy of Sciences of the United States of America*, *102*(27), 9730–9733.

Fack, G., & Grenet, J. (2015). Improving College Access and Success for Low-Income Students: Evidence from a Large Need-Based Grant Program. *American Economic Journal: Applied Economics*, *7*(2), 1–34.

Ford, R., Frenette, M., Nicholson, C., Kwakye, I., Hui, T. S., Hutchinson, J., … others. (2012). *Future to discover: Post-secondary impacts report*. Ottawa: the Social Research and Demonstration Corporation.

Ford, R., Grekou, D., Kwakye, I., & Nicholson, C. (2014). *Future to Discover: Fourth Year Post-Secondary Impacts Report*. Ottawa: Social Research and Demonstration Corporation.

Goldrick-Rab, S., Kelchen, R., Harris, D. N., & Benson, J. (2016). Reducing Income Inequality in Educational Attainment: Experimental Evidence on the Impact of Financial Aid on College Completion. *American Journal of Sociology*, *121*(6), 1762–1817.

Greene, J. P., & Forster, G. (2003). *Public High School Graduation and College Readiness Rates in the United States. Education Working Paper No. 3*. Manhattan Institute for Policy Research.

Grodsky, E., & Jones, M. T. (2007). Real and imagined barriers to college entry: Perceptions of cost. *Social Science Research*, *36*(2), 745–766.

Gurgand, M., Lorenceau, A. J. S., & Mélonio, T. (2011). *Student Loans: Liquidity Constraint and Higher Education in South Africa* (SSRN Scholarly Paper No. ID 1969424). Rochester, NY: Social Science Research Network.

Hahn, A., Leavitt, T., & Aaron, P. (1994). Evaluation of the Quantum Opportunity Program (QOP): Did the program work. *Waltham, MA: Brandeis University, Heller Graduate School*.

Hastings, J., Neilson, C. A., & Zimmerman, S. D. (2015). *The Effects of Earnings Disclosure on College Enrollment Decisions* (Working Paper No. 21300). National Bureau of Economic Research.

Heller, D. E. (1997). Student Price Response in Higher Education: An Update to Leslie and Brinkman. *The Journal of Higher Education*, *68*(6), 624–659.

Herber, S. P. (2018). The role of information in the application for highly selective scholarships: Evidence from a randomized field experiment. *Economics of Education Review*, *62*, 287–301.

Herber, S. P., & Kalinowski, M. (2016). *Non-Take-Up of Student Financial Help: A Microsimulation for Germany*. Retrieved from DIW Berlin, The German Socio-Economic Panel (SOEP) website: http://econpapers.repec.org/paper/diwdiwsop/diw_5fsp844.htm

Hillmert, S., & Jacob, M. (2003). Social Inequality in Higher Education. Is Vocational Training a Pathway Leading to or Away from University? *European Sociological Review*, *19*(3), 319–334.

Hoxby, C., & Turner, S. (2013). *Expanding College Opportunities for High-Achieving, Low Income Students* (Discussion Paper No. 12–014). Stanford Institute for Economic Policy Research.

Jabbar, H. (2011). The Behavioral Economics of Education New Directions for Research. *Educational Researcher*, *40*(9), 446–453.

Jackson, C. K. (2010). A Little Now for a Lot Later A Look at a Texas Advanced Placement Incentive Program. *Journal of Human Resources*, *45*(3), 591–639.

Kane, T. J. (1994). College Entry by Blacks since 1970: The Role of College Costs, Family Background, and the Returns to Education. *Journal of Political Economy*, *102*(5), 878–911.

Kane, T. J. (1995). *Rising Public College Tuition and College Entry: How Well Do Public Subsidies Promote Access to College?* (Working Paper No. 5164). National Bureau of Economic Research.

Kane, T. J. (2003). *A Quasi-Experimental Estimate of the Impact of Financial Aid on College-Going* (Working Paper No. 9703). National Bureau of Economic Research.

Kerr, S. P., Pekkarinen, T., Sarvimäki, M., & Uusitalo, R. (2014). *Educational Choice and Information on Labor Market Prospects: A Randomized Field Experiment*. Retrieved from Working Paper website: http://www.demm.unimi.it/extfiles/unimidire/100601/attachment/pekkarinen.pdf

King, J. E. (2002). *Crucial Choices: How Students' Financial Decisions Affect Their Academic Success.*

King, J. E. (2004). Missed opportunities: Students who do not apply for financial aid. *Washington, DC: American Council on Education*.

Kofoed, M. S. (2017). To Apply or Not to Apply: FAFSA Completion and Financial Aid Gaps. *Research in Higher Education*, *58*(1), 1–39.

LaLumia, S. (2012). Tax Preferences For Higher Education And Adult College Enrollment. *National Tax Journal*, (1), 59.

Lavecchia, A., Liu, H., & Oreopoulos, P. (2015). *Behavioral Economics of Education: Progress and Possibilities* (IZA Discussion Paper No. 8853). Institute for the Study of Labor (IZA).

Leslie, L. L., & Brinkman, P. T. (1987). Student Price Response in Higher Education: The Student Demand Studies. *The Journal of Higher Education*, *58*(2), 181–204.

Linsenmeier, D. M., Rosen, H. S., & Rouse, C. E. (2006). Financial Aid Packages and College Enrollment Decisions: An Econometric Case Study. *Review of Economics and Statistics*, *88*(1), 126–145.

Liu, C., Zhang, L., Luo, R., Wang, X., Rozelle, S., Sharbono, B., … Glauben, T. (2011). Early commitment on financial aid and college decision making of poor students: Evidence from a randomized evaluation in rural China. *Economics of Education Review*, *30*(4), 627–640.

Long, B. T. (2008). *What is Known about the Impact of Financial Aid? Implications for Policy. An NCPR Working Paper*. National Center for Postsecondary Research.

Lovenheim, M. F., & Owens, E. G. (2014). Does federal financial aid affect college enrollment? Evidence from drug offenders and the Higher Education Act of 1998. *Journal of Urban Economics*, *81*, 1–13.

Loyalka, P., Song, Y., Wei, J., Zhong, W., & Rozelle, S. (2013). Information, college decisions and financial aid: Evidence from a cluster-randomized controlled trial in China. *Economics of Education Review*, *36*, 26–40.

Ma, J., Baum, S., Pender, M., & Bell, D. (2015). Trends in College Pricing 2015. *New York, NY: The College Board*.

Mayer, A., Patel, R., & Gutierrez, M. (2015). *Four-Year Effects on Degree Receipt and Employment Outcomes from a Performance-Based Scholarship Program in Ohio* (SSRN Scholarly Paper No. ID 2594482). Rochester, NY: Social Science Research Network.

Myers, D., Olsen, R., Seftor, N. S., Young, J., & Tuttle, C. (2004). The Impacts of Regular Upward Bound: Results from the Third Follow-Up Data Collection.

OECD. (2012). Indicator B5 How much do tertiary students pay and what public support do they receive? In *Education at a Glance* (pp. 272–285). Retrieved from http://www.oecd-ilibrary.org/content/chapter/eag-2012-20-en

Olson, L., & Rosenfeld, R. A. (1985). Parents, students, and knowledge of college costs. *Journal of Student Financial Aid*, *15*(1), 4.

Oreopoulos, P., Brown, R. S., & Lavecchia, A. M. (2014). *Pathways to Education: An Integrated Approach to Helping At-Risk High School Students* (Working Paper No. 20430). National Bureau of Economic Research.

Oreopoulos, P., & Dunn, R. (2012). *Information and College Access: Evidence from a Randomized Field Experiment* (Working Paper No. 18551). National Bureau of Economic Research.

Page, L., Castleman, B., & Sahadewo, G. A. (2016). *More than Dollars for Scholars: The Impact of the Dell Scholars Program on College Access, Persistence and Degree Attainment*.

Page, L., & Scott-Clayton, J. (2016). Improving college access in the United States: Barriers and policy responses. *Economics of Education Review*, *51*, 4–22.

Pallais, A. (2013). *Small Differences that Matter: Mistakes in Applying to College* (Working Paper No. 19480). National Bureau of Economic Research.

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

Peter, F. H., & Zambre, V. (2017). Intended college enrollment and educational inequality: Do students lack information? *Economics of Education Review*, *60*, 125–141.

Pistolesi, N. (2017). Advising students on their field of study: Evidence from a French University reform. *Labour Economics*, *44*, 106–121.

Richburg-Hayes, L., Patel, R., Brock, T., Campa, D. la, Elijah, Rudd, T., & Valenzuela, I. (2015). *Providing More Cash for College: Interim Findings from the Performance-Based Scholarship Demonstration in California* (SSRN Scholarly Paper No. ID 2625711). Rochester, NY: Social Science Research Network.

Rodríguez-Planas, N. (2012). Longer-Term Impacts of Mentoring, Educational Services, and Learning Incentives: Evidence from a Randomized Trial in the United States. *American Economic Journal: Applied Economics*, *4*(4), 121–139.

Rosinger, K. (2016). *Can Simplifying Financial Aid Information Impact College Enrollment and Borrowing? Experimental and Quasi-Experimental Evidence*.

Ross, R., White, S., Wright, J., & Knapp, L. (2013). *Using behavioral economics for postsecondary success*. New York: ideas42.

Rubin, R. B. (2011). The Pell and the Poor: A Regression-Discontinuity Analysis of On-Time College Enrollment. *Research in Higher Education*, *52*(7), 675–692.

Scott-Clayton, J. (2011). *The Shapeless River: Does a Lack of Structure Inhibit Students' Progress at Community Colleges? CCRC Working Paper No. 25. Assessment of Evidence Series*. Community College Research Center.

Scott-Clayton, J. (2012). *What Explains Trends in Labor Supply Among U.S. Undergraduates, 1970-2009?* (Working Paper No. 17744). National Bureau of Economic Research.

Scott-Clayton, J., & Rodriguez, O. (2014). Development, Discouragement, or Diversion? New Evidence on the Effects of College Remediation Policy. *Education Finance and Policy*, *10*(1), 4–45.

Scrivener, S., Weiss, M. J., Ratledge, A., Rudd, T., Sommo, C., & Fresques, H. (2015). *Doubling Graduation Rates: Three-Year Effects of CUNY's Accelerated Study in Associate Programs (ASAP) for Developmental Education Students* (SSRN Scholarly Paper No. ID 2571456). Rochester, NY: Social Science Research Network.

Seftor, N. S., Mamun, A., & Schirm, A. (2009). *The Impacts of Regular Upward Bound on Postsecondary Outcomes 7-9 Years After Scheduled High School Graduation* [Mathematica Policy Research Reports]. Mathematica Policy Research.

Sjoquist, D. L., & Winters, J. V. (2015). State Merit-Based Financial Aid Programs and College Attainment. *Journal of Regional Science*, *55*(3), 364–390.

Sneyers, E., & Witte, K. D. (2018). Interventions in higher education and their effect on student success: a meta-analysis. *Educational Review*, *70*(2), 208–228.

Solis, A. (2013). *Credit Access and College Enrollment* (Working Paper Series No. 2013:12). Retrieved from Uppsala University, Department of Economics website: http://econpapers.repec.org/paper/hhsuunewp/2013_5f012.htm

Sparks, D., & Malkus, N. (2013). *First-Year Undergraduate Remedial Coursetaking: 1999-2000, 2003-04, 2007-08. Statistics in Brief. NCES 2013-013*. National Center for Education Statistics.

Stephan, J. L., & Rosenbaum, J. E. (2013). Can High Schools Reduce College Enrollment Gaps With a New Counseling Model? *Educational Evaluation and Policy Analysis*, *35*(2), 200–219.

Turner, S., & Bound, J. (2003). Closing the Gap or Widening the Divide: The Effects of the G.I. Bill and World War II on the Educational Outcomes of Black Americans. *The Journal of Economic History*, *63*(1), 145–177.

Usher, A. (2005). *A Little Knowledge is A Dangerous Thing: How Perceptions of Costs and Benefits Affect Access to Education*. Toronto: Educational Policy Institute.

Vergolini, L., Zanini, N., & Bazoli, N. (2014). *Liquidity Constraints and University Participation in Times of Recession. Evidence from a Small-scale Programme*. Research Institute for the Evaluation of Public Policies (IRVAPP), Bruno Kessler Foundation.

Welch, J. G. (2014). HOPE for community college students: The impact of merit aid on persistence, graduation, and earnings. *Economics of Education Review*, *43*, 1–20.

Wiederspan, M. (2016). Denying loan access: The student-level consequences when community colleges opt out of the Stafford loan program. *Economics of Education Review*, *51*, 79–96.

Williams, G., & Gordon, A. (1981). Perceived earnings functions and ex ante rates of return to post compulsory education in England. *Higher Education*, *10*(2), 199–227.

Wolter, S. C. (2000). Wage Expectations: A Comparison of Swiss and US Students. *Kyklos*, *53*(1), 51–69.

Appendix

Table A.1: Selected publications for the systematic literature review

Authors	Date	Title	Intervention	Type of publication	Design	Country
Abbiati , Argentin, Barone & Schizzerotto	2017	Information barriers and social stratification in higher education: evidence from a field experiment	Outreach	Journal	RCT	Italy
Alon	2007	The influence of financial aid in leveling group differences in graduating from elite institutions	Financial aid	Journal	IV	United States
Alon	2011	Who Benefits Most from Financial Aid? The Heterogeneous Effect of Need-Based Grants on Students' College Persistence	Financial aid	Journal	IV	United States
Anderson& Goldrick Rab	2016	Aid After Enrollment: Impacts of a Statewide Grant Program at Public Two-year Colleges	Financial aid	Unpublished	RCT	United States
Andrew, Imberman & Lovenheim	2016	Recruiting and Supporting Low-Income, High-Achieving Students at Flagship Universities	Mixed intervention	Unpublished	DiD	United States
Avery	2013	Evaluation of the College Possible program: Results from a randomized controlled trial	Outreach	Unpublished	RCT	United States
Avery	2010	The Effects of College Counseling on High-Achieving, Low-Income Students	Outreach	Unpublished	RCT	United States
Azzolini, Martini, Romano & Vergolini	2018	Affording college with the help of asset building: First experimental impacts from Italy	Financial aid	Journal	RCT	Italy
Barr & Castleman	2017	The Bottom Line on College Counseling	Outreach	Unpublished	RCT	United States
Barrow, Richburg-Hayes, Rouse, & Brock	2014	Paying for Performance: The Education Impacts of a Community College Scholarship Program for Low-Income Adults	Financial aid	Journal	RCT	United States
Baumgartner & Steiner	2006	Does More Generous Student Aid Increase Enrolment Rates into Higher Education? Evaluating the German Student Aid Reform of 2001	Financial aid	Unpublished	DiD	Germany
Bettinger	2015	Need-Based Aid and College Persistence: The Effects of the Ohio College Opportunity Grant	Financial aid	Journal	DiD	United States
Bettinger, Long, Oreopoulos, & Sanbonmatsu	2012	The Role Of Application Assistance And Information In College Decisions: Results From The H&R Block Fafsa Experiment	Outreach	Journal	RCT	United States
Binder, Krause, Miller, & Cerna	2015	Providing Incentives for Timely Progress Toward Earning a College Degree Results from a Performance-Based Scholarship Experiment	Financial aid	Unpublished	RCT	United States
Bird, Castleman, Goodman & Lamberton	2017	Nudging at a National Scale: Experimental Evidence from a FAFSA Completion Campaign	Outreach	Unpublished	RCT	United States

Bonilla, Bottan, & Ham	2017	Information Policies and Higher Education Choices. Experimental Evidence from Colombia	Outreach	Unpublished	RCT	Colombia
Bos et al	2012	The Impacts of SOURCE - A Program to Support College Enrollment through Near-Peer, Low-Cost Student Advising	Outreach	Unpublished	RCT	United States
Bruce & Carruthers	2014	Jackpot? The impact of lottery scholarships on enrollment in Tennessee	Financial aid	Journal	RD	United States
Bulman & Hoxby	2015	The Returns to the Federal Tax Credits for Higher Education	Financial aid	Journal	IV	United States
Carell & Sacerdote	2013	Late interventions matter too: the case of college coaching in New Hampshire	Outreach	Unpublished	RCT	United States
Carruthers & Fox	2016	Aid for all: College coaching, financial aid, and post-secondary persistence in Tennessee	Mixed intervention	Journal	PSM	United States
Carruthers & Ozek	2016	Losing HOPE: Financial aid and the line between college and work	Financial aid	Journal	RD	United States
Castleman & Goodman	2014	Intensive College Counseling and the College Enrollment Choices of Low Income Students	Outreach	Unpublished	RD	United States
Castleman & Long	2013	Looking beyond enrollment: The causal effect of need-based grants on college access, persistence, and graduation	Financial aid	Unpublished	RD	United States
Castleman & Page	2015	Summer Nudging: Can Personalized Text Messages and Peer Mentor Outreach Increase College Going Among Low-Income High School Graduates?	Outreach	Journal	RCT	United States
Castleman & Page	2017	Parental Influences on Postsecondary Decision Making: Evidence From a Text Messaging Experiment	Outreach	Journal	RCT	United States
Castleman, Arnold, & Wartman	2012	Stemming the Tide of Summer Melt	Outreach	Journal	RCT	United States
Castleman, Owen & Page	2015	Stay late or start early? Experimental evidence on the benefits of college matriculation support from high schools versus colleges	Outreach	Journal	RCT	United States
Castleman, Page, & Schooley	2014	The Forgotten Summer: Does the Offer of College Counseling After High School Mitigate Summer Melt Among College-Intending, Low-Income High School Graduates?	Outreach	Journal	RCT	United States
Clotfelter, Hemelt & Ladd	2018	Multifaceted aid for low-income students and college outcomes: evidence from North-Carolina	Financial aid; Mixed intervention	Journal	RD	United States
Cohodes & Goodman	2014	Merit Aid, College Quality, and College Completion: Massachusetts' Adams Scholarship as an In-Kind Subsidy	Financial aid	Journal	RD	United States
Constantine, Seftor, Martin, Silva, & Myers	2006	A Study of the Effect of the Talent Search Program on Secondary and Postsecondary Outcomes in Florida, Indiana and Texas	Outreach	Unpublished	PSM	United States

Cunha, Miller & Weisburst	2018	Information and College Decisions: Evidence From the Texas GO Center Project	Outreach	Journal	DiD	United States
Dearden, Fitzsimmons, Wyness	2014	Money for nothing: Estimating the impact of student aid on participation in higher education	Financial aid	Journal	DiD	United Kingdom
Denning, Marx & Turner	2017	Propelled: the effects of grants on graduation, earnings, and welfare	Financial aid	Unpublished	RD	United States
Denning	2017	College on the Cheap: Consequences of Community College Tuition Reductions	Financial aid	Journal	DiD	United States
Denning	2018	Born Under a Lucky Star: Financial Aid, College Completion, Labor Supply, and Credit Constraints	Financial aid	Journal	RD	United States
Domina	2009	What Works in College Outreach: Assessing Targeted and Schoolwide Interventions for Disadvantaged Students	Outreach	Journal	PSM	United States
Dunlop	2013	What Do Stafford Loans Actually Buy You? The Effect of Stafford Loan Access on Community College Students	Financial aid	Unpublished	IV	United States
Dynarski	2000	Hope for Whom? Financial Aid for the Middle Class and Its Impact on College Attendance	Financial aid	Journal	DiD	United States
Dynarski	2003	Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion	Financial aid	Journal	DiD	United States
Elsayed	2016	The Impact of Education Tax Benefits on College Completion	Financial aid	Journal	PSM	United States
Fack & Grenet	2015	Improving College Access and Success for Low-Income Students: Evidence from a Large Need-Based Grant Program	Financial aid	Journal	RD	France
Ford et al.	2012	Future to Discover: Post-secondary Impacts Report	Outreach; Financial aid; Mixed intervention	Unpublished	RCT	Canada
Ford, Grekou, Kwakye, & Nicholson	2014	Future to Discover: Fourth Year Post-Secondary Impacts Report	Outreach; Financial aid; Mixed intervention	Unpublished	RCT	Canada
Goldrick-Rab, Harris, Kelchen & Benson	2016	Reducing Income Inequality in Educational Attainment: Experimental Evidence on the Impact of Financial Aid on College Completion	Financial aid	Journal	RCT	United States
Gurgand, Lorenceau & Melonio	2011	Student Loans: Liquidity Constraint and Higher Education in South Africa	Financial aid	Unpublished	RD	South Africa
Hahn, Leavitt, & Aaron	1994	Evaluation of the Quantum Opportunities Program (QOP). Did the Program Work?	Mixed intervention	Unpublished	RCT	United States
Hastings, Neilson, & Zimmerman	2015	The effects of Earnings Disclosure on College Enrollment Decisions	Outreach	Unpublished	RCT	Chile

Hoxby & Turner	2013	Expanding college opportunities for high-achieving, low income students.	Outreach	Unpublished	RCT	United States
Jackson	2010	A Little Now for a Lot Later: A Look at a Texas Advanced Placement Incentive Program	Financial aid	Journal	DiD	United States
Kane	2003	A Quasi-Experimental Estimate of the Impact of Financial Aid on College-Going	Financial aid	Unpublished	RD	United States
Kane	1995	Rising Public College Tuition Fees and College Entry. How well do public subsidies promote access to college?	Financial aid	Unpublished	DiD	United States
Kerr, Pekkarinen, Sarvimäki, & Uusitalo	2014	Educational Choice and Information on Labor Market Prospects: A Randomized Field Experiment	Outreach	Unpublished	RCT	Finland
LaLumia	2012	Tax Preferences for Higher Education And Adult College Enrollment	Financial aid	Journal	IV	United States
Linsenmeier, Rosen, & Rouse	2006	Financial Aid Packages and College Enrollment Decisions: An Econometric Case Study	Financial aid	Journal	DiD	United States
Lovenheim & Owens	2014	Does federal financial aid affect college enrollment? Evidence from drug offenders and the Higher Education Act of 1998	Financial aid	Journal	DiD	United States
Loyalka, Song, Wei, Zhong, & Rozelle	2013	Information, college decisions and financial aid: Evidence from a cluster-randomized controlled trial in China	Outreach	Journal	RCT	China
Mayer, Patel, & Gutierrez	2015	Four-Year Effects on Degree Receipt and Employment Outcomes from a Performance-Based Scholarship Program in Ohio	Financial aid	Unpublished	RCT	United States
Myers et al.	2004	The Impacts of Regular Upward Bound: Results from the Third Follow-Up Data Collection	Outreach	Unpublished	RCT	United States
Oreopoulos, Brown, & Lavecchia	2014	Pathways to Education: An Integrated Approach to Helping At-Risk High School Students	Mixed intervention	Unpublished	DiD	Canada
Page, Castleman & Sahadewo	2016	More than Dollars for Scholars: The Impact of the Dell Scholars Program on College Access, Persistence and Degree Attainment	Mixed intervention	Unpublished	RD	United States
Richburg-Hayes et al.	2015	Providing More Cash for College: Interim Findings from the Performance-Based Scholarship Demonstration in California	Financial aid	Unpublished	RCT	United States
Rodríguez-Planas	2012	Longer-Term Impacts of Mentoring, Educational Services, and Learning Incentives: Evidence from a Randomized Trial in the United States	Mixed intervention	Journal	RCT	United States
Rosinger	2016	Can Simplifying Financial Aid Information Impact College Enrollment and Borrowing? Experimental and Quasi-Experimental Evidence	Outreach	Unpublished	RCT	United States

Rubin	2011	The Pell and the Poor: A Regression-Discontinuity Analysis of On-Time College Enrollment	Financial aid	Journal	RD	United States
Scrivener et al.	2015	Doubling graduation rates: Three-year effects of CUNY's Accelerated Study in Associate Programs (ASAP) for developmental education students	Mixed intervention	Unpublished	RCT	United States
Seftor, Mamun, & Schirm	2009	The Impacts of Regular Upward Bound on Postsecondary Outcomes 7-9 Years after Scheduled High School Graduation	Outreach	Unpublished	RCT	United States
Sjoquist & Winters	2015	State Merit-based Financial Aid Programs and College Attainment	Financial aid	Journal	DiD	United States
Solis	2013	Credit access and college enrollment	Financial aid	Unpublished	RD	Chile
Stephan & Rosenbaum	2013	Can High Schools Reduce College Enrollment Gaps With a New Counseling Model?	Outreach	Journal	DiD	United States
Turner & Bound	2003	Closing the Gap or Widening the Divide: The Effects of the G.I. Bill and World War II on the Educational Outcomes of Black Americans	Financial aid	Journal	RD	United States
Vergolini, Zanini, Bazoli, & others	2014	Liquidity Constraints and University Participation in Times of Recession. Evidence from a Small-scale Programme	Financial aid	Unpublished	RD	Italy
Welch	2014	HOPE for community college students: The impact of merit aid on persistence, graduation, and earnings	Financial aid	Journal	RD	United States
Wiederspan	2016	Denying loan access: The student-level consequences when community colleges opt out of the Stafford loan program	Financial aid	Journal	IV	United States
Total	**75 publications**					

RCT: Randomized Control Trial

RD: Regression Discontinuity

DiD: Difference-in-Differences

IV: Instrumental variable

PSM: Propensity Score Matching

Appendix B: Causal estimates on the effect of outreach interventions on disadvantaged students

Table B.1: the impact of outreach programs (any type) on access to postsecondary education

Evaluation Design	Authors (Year)	Intervention (Country)	Location/ Time of evaluation	Details of intervention (duration)	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
PSM	Domina (2009)	College outreach programs (United States)	Nationally representative sample of students/ By 2 years after high school graduation	Any type of outreach programs (?)	Disadvantaged high school students (N=940)	Enrolment (any)	73.9	+5.5
						Enrolment in 4-year institution	44.4	+0.2

Table B.2: the impact of "information" outreach programs on access to higher education

Evaluation Design	Authors (Year)	Intervention (Country)	Location/ Time of evaluation	Details of intervention (duration)	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Abbiati et al. (2017)	Information intervention (Italy)	Four Italian provinces (Milano, Vicenza, Bologna, Salerno)/ Fall following high school graduation	Detailed and personalized information about: (1) the costs of higher education; (2) the occupational prospects of graduates; (3) the chances of successfully completing specific higher education programmes. (3 meetings during school year)	Senior high school students with low-educated parents (N=1,364)	Enrolment (any)	39.3	-3.2
						Enrolment in "strong" fields of study	7.1	-0.07
					Senior high school students from the working class (N=1,767)	Enrolment (any)	43.2	-0.6
						Enrolment in “strong" fields of study	10.3	0.4

RCT	Bettinger et al. (2012)	H&R Block Fafsa Experiment (United States)	Ohio and North Carolina/ Year following the experiment	Information on financial aid: individualized aid eligibility estimates (one time)	Low-income 17-year-olds whose parents/families received treatment (N=868)	Enrolment (any)	34.2	-0.4
					Low-income young adults, with no prior college (N=9,228)	Enrolment (any)	9.5	+0.3
					Low-income young adults, with some prior college (N=6,646)	Enrolment (any)	26.3	+1.3
RCT	Bird et al. (2017)	Information-only financial aid nudge campaign (United States)	National/ Fall following high school graduation	Messages with information on financial benefits of FASFA completion, making salient the monetary gains (2-4 emails and 5 text messages)	First-generation college-intending high school seniors (N=32,079)	Enrolment (any)	81.7	+0.8
						Enrolment at 2-year institution	12	+0.8
						Enrolment at 4-year institution	69.7	+0.08
RCT	Bonilla, Bottan, & Ham (2017)	Information presentation (Colombia)	Bogota/ Year following the experiment	Presentation by college graduates with information on returns to higher education, financial aid and admission criteria	Low-income high school seniors in public schools (N=6,003)	Enrolment (any)	44.8[a]	+0.6
						Enrolment in academic degree	9.6[a]	+2.4
RCT	Hastings, Neilson & Zimmerman (2015)	Disclosure of information on costs and returns (Chile)	National/ By one year after treatment	Consultation of web pages including information on costs and returns of different tertiary programs (one time)	Low-SES High school graduates applying to federal student loan (N=16,594)	Enrolment (any)	77[a]	0.0

RCT & DiD	Kerr et al (2014)	Information campaign on the returns to education (Finland)	National sample of schools/ One year after treatment	PowerPoint presentation with information on the returns to education (45 minutes)	High school seniors from low-educated districts -Males	Enrolment (any)	?	-1.0
					High school seniors from low-educated districts -Females	Enrolment (any)	?	+0.8
RCT	Loyalka et al (2013)	Information campaign on college costs and financial aid (China)	Shaanxi/ 8 months after treatment	Information on college costs and financial aid through a booklet and an oral presentation (20 minutes)	High school seniors in the poorest counties (N=2,256)	Enrolment (any)	53	+8**
RCT	Rosinger (2015)	Information in financial aid award notifications (United States)	One public university/ Immediately after treatment	Inclusion of a shopping sheet in the online financial aid award notification, providing personalized information about costs and loan options.	Pell-eligible students admitted to the university (N=2,471)	Institutional enrolment (yield rate)	48[a]	-4.1[b]

a: Refers to the whole control group, not specific to disadvantaged students.

b: Own calculations based on interaction terms.

Estimates plotted in figure 2

Table B.3: the impact of "information and guidance" outreach programs on access to higher education

Evaluation Design	Authors (Year)	Intervention (Country)	Location/ Time of evaluation	Details of intervention (duration)	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Avery (2010)	Individualized college counseling (United States)	New York/ ?	Individualized advice on the choice of college application, completion of college application, financial aid and college choice (10 hours over school year)	High-Achieving, Low-Income high school seniors (N=106)	Enrolment in most competitive institutions	~42	+7.9
RCT	Barr & Castleman (2017)	Bottom Line college advising model (United States)	Boston/ Fall after high school graduation	Individualized counseling providing comprehensive college and financial aid support (One-hour individual meeting per month)	Low-income, first-generation junior or senior high school students with minimum GPA of 2.5	Enrolment (any)	82.7	+7.0***
						Enrolment at 2-year institution	70.3	+10.3***
						Enrolment at 4-year institution	12.7	-3.4**
RCT	Bettinger et al. (2012)	H&R Block Fafsa Experiment (United States)	Ohio and North Carolina/ Year following the experiment	-Information on financial aid & - Simplification/assistance with financial aid application (one time)	Low-income 17-year-olds whose parents/families received treatment (N=788)	Enrolment (any)	34.2	+8.1**
						Enrolment at 2-year institution	17.6	+4.7*
						Enrolment at 4-year institution	15.8	+3.7
					Low-income young adults, with no prior college (N= 8,506)	Enrolment (any)	9.5	+1.5**
						Enrolment at 2-year institution	6,2	+0.8

						Enrolment at 4-year institution	3,1	+0.5
					Low-income young adults, with some prior college (N=6,646)	Enrolment (any)	26.3	-0.3
RCT	Bird et al. (2017)	Information-only financial aid nudge campaign (United States)	National/ Fall following high school graduation	Messages with planning prompts for FASFA completion, with focus on logistics and step-by-step guidance for completion (2-4 emails and 5 text messages)	First-generation college-intending high school seniors (N=32,079)	Enrolment (any)	81.7	+1.7**
						Enrolment at 2-year institution	12	+1.2*
						Enrolment at 4-year institution	69.7	+0.45
RCT	Bos et al. (2012)	Student Outreach for College Enrollment (SOURCE) program (United States)	Los Angeles, California/ 18 months after high school graduation	Outreach from advisors to support, counsel, and oversee the college and financial aid identification, application, and admissions process (over one year)	Junior high school students whose primary language is Spanish (N=1,129)	Enrolment at 4-year institution	40.4	+10.6***
					Junior high school students whose parents did not attend college (N=2,037)	Enrolment at 4-year institution	49.3	+6.1***
RCT	Carell & Sacerdote (2013)	Mentoring program with financial incentives (United States)	New Hampshire	Weekly meetings to help completing FASFA and college applications with financial incentives: application fee waivers and a $100 cash bonus for completing the process (over one month)	Non-white high school seniors (N=419)	Enrolment (any)	51.8[a]	+17.1***[b]
						Enrolment at 4-year institution	22.7[a]	+15.4***[b]
					Low-income high school seniors (N=419)	Enrolment (any)	51.8[a]	+20.2**[b]
						Enrolment at 4-year institution	22.7[a]	+17.3**[b]

RCT	Castleman & Page (2015)	Outreach during summer after high school graduation (United States)	Dallas, Boston, Lawrence & Springfield, Philadelphia/ Fall after high school graduation	Text messaging campaign reminding students of tasks required by intended college and to connect them with counsellor-based support (10 texts sent over the summer)	Low-income college-intending high school graduates (N=5,753)	Enrolment (any)	69.6	+1.9
						Enrolment at 2-year institution	20.2	+3**
						Enrolment at 4-year institution	38.6	-1.8
				Peer-mentor interventions with proactive outreach during summer (over 2 months)	Low-income college-intending high school graduates (N=3,276)	Enrolment (any)	67.6	+2.3
						Enrolment at 2-year institution	14.2	-0.4
						Enrolment at 4-year institution	38.8	+4.5*
RCT	Castleman & Page (2017)	Outreach during summer after high school graduation (United States)	Massachusetts and Florida/ Fall after high school graduation	Text messaging campaign reminding students of tasks required for college enrolment and offering help from counselors. Texts sent to students or to both students and parents. (14 texts sent over the summer)	Low-income college-intending high school graduates (N=2,010)	Enrolment (any)	66.4	+5.7***
						Enrolment at 2-year institution	24.3	+5.1**
						Enrolment at 4-year institution	42.1	+0.5
					First-generation college-intending high school graduates (N=1,448)	Enrolment (any)	63.8	+4.5*
						Enrolment at 2-year institution	20.8	-0.3
						Enrolment at 4-year institution	42.9	+4.8*

RCT	Castleman, Arnold and Wartman (2012)	Summer individualized counseling (United States)	Providence, Rhode Island/ Fall after high school graduation	Proactive outreach from counselors during the summer focusing on financial aid package, information barriers & social/emotional barriers to enrolment (over 2 months)	All graduates from high schools with predominantly non-white and low-income students (N=162)	Enrolment (any)	?	+13*
						Enrolment at 2-year institution	?	-4
						Enrolment at 4-year institution	26	+14*
RCT	Castleman, Owen & Page (2015)	Summer college matriculation support (United States)	University of New Mexico, Albuquerque/ Fall after high school graduation	Proactive outreach from a high school- or college-based counselor, during the summer, focusing on help to complete required summer tasks (financial aid, loan options, procedural tasks...) (over 2 months)	Hispanic high school graduates admitted to university -Males (N=290)	Enrolment (any)	84	+9.5**
					Hispanic high school graduates admitted to university-Females (N=513)	Enrolment (any)	93	-1.1
RCT	Castleman, Page & Schooley (2014)	Summer counseling intervention (United States)	Boston (MA)/ Fall after high school graduation	Proactive outreach from counselors during the summer with information on college affordability, enrolment process and social barriers (2 months)	Lowest-income college-intending high school graduates (N=487)	Enrolment (any)	76.3	+12.3***
			Fulton County (GA)/ Fall after high school graduation	Proactive outreach from counselors during the summer (2 months)	Lowest-income college-intending high school graduates (N=586)	Enrolment (any)	63.4	+8.5*

RCT	Ford et al. (2012)	Explore Your Horizons program (Canada)	Manitoba/ 2 years after high school graduation	After-school project activities with enhanced career education and focused information on post-secondary studies. (40 hours over 3-year period)	Low-income and first-generation high school students (from 10th grade) (N=873)	Enrolment (any)	53.7	+9.4
						Enrolment at college (short)	17.4	+11.4*
						Enrolment at university	33.8	+0.8
RCT	Ford et al. (2014)	Explore Your Horizons program (Canada)	New Brunswick/ 4 years after high school graduation	After-school project activities with enhanced career education and focused information on post-secondary studies. (40 hours over 3-year period)	Low-income and first-generation high school students (from 10th grade) (N=1,033)	Enrolment (any)	38.5	+10.1***
						Enrolment in college (short)	21.8	+1.5
						Enrolment at university	18.2	+7.7***
RCT	Hoxby & Turner (2013)	ECO Comprehensive Intervention (United States)	National level/ One year after high school graduation	Materials sent by mail combining Application Guidance, Net cost information in selective colleges, and Fee Waiver to apply to selective colleges	High-performing low-income high school seniors (N=6,000)	Enrolment in a "peer college": matching students' score	28.6	+5.3**
RD+IV	Castleman & Goodman (2014)	"Bottom Line" (United States)	Boston and Worcester, Massachusetts/ Fall after high school graduation	Outreach during senior year to encourage students to apply to a set of target colleges: regular meetings with a counselor to help navigate the college application process (Over one year)	Low-income college-ready students in senior year of high school (N=2,881)	Enrolment at 2-year institution	29	-35,5**
						Enrolment at 4-year institution	50	+17.3

PSM	Constantine et al. (2006)	Talent search program (United States)	Texas/ 4, 5 or 6 years after 9th grade	Information about college, financial aid, assistance for financial aid applications and college application process (nearly half of Talent Search participants received 10 hours per year of services or fewer)	Primarily targeting low-income, potentially first-generation students in high school (from 9th Grade) (N=34,346)	Enrolment (any public institution)	40	+18***
						Enrolment at 2-year public institution	26	+12***
						Enrolment at 4-year public institution	19	+8***
			Indiana/ 4 or 5 years after 9th grade	Idem	Idem (N=10,927)	Enrolment (any)	52	+4***
						Enrolment at 2-year institution	13	+3***
						Enrolment at 4-year institution	32	+3***
			Florida/ 4 or 5 years after 9th grade	Idem	Idem (N=14,721)	Enrolment (any public institution)	36	+15**
						Enrolment at 2-year public institution	29	+10**
						Enrolment at 4-year public institution	9	+5**

DiD+PSM	Cunha, Miller & Weisburst (2018)	GO Center Project (United States)	Texas/ One year after high school graduation	A dedicated classroom for the college application process with a full-time counsellor and active outreach run by selected student peers	Low-income high school students in selected schools (N=43,230)	Enrolment (any)	67[a]	+3.5**
						Enrolment at 2-year institution	?	+1.8*
						Enrolment at 4-year institution	?	+2.2*
DiD	Stephan & Rosenbaum (2013)	College coach program (United States)	Chicago/ Fall after high school graduation	One coach per high school to provide help in completion of FAFSA, scholarship, and college applications (Over one year)	Disadvantaged High school seniors (primarily African American, Latino and low-income) (N=35,777)	Enrolment (any)	53	+3* (calculated from OR)
						Enrolment at 2 year-institution	20	+1.3 (calculated from OR)
						Enrolment at less selective 4-year institution vs. 2-year	24	+4.1** (calculated from OR)

a: Refers to the whole control group, not specific to disadvantaged students.

b: Own calculations based on interaction terms.

Estimates plotted in figure 2

Table B.4: the impact of "information, guidance and academic tutoring" outreach programs on access to higher education

Evaluation Design	Authors (Year)	Intervention (Country)	Location/ Time of evaluation	Details of intervention (duration)	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Avery (2013)	College Possible Program (United States)	St Paul(MN)/ Fall after high school graduation	After-school curriculum with -Extensive tutoring with test preparation services & -College admissions and financial aid consulting, guidance in the transition to college (320 hours over 2 years)	High school students mostly of color with below median family income and GPA > 2.0 (from 11th grade) (N=238)	Enrolment (any)	63.8	+1.7
						Enrolment at 4-year institution	34.4	+15.1**
RCT	Myers et al. (2004)	Upward Bound program (United States)	National sample of schools/ by 2 to 4 years after expected high school graduation	Vary but always academic tutoring, preparation for college entrance exams, cultural activities and information on financial aid (average of 477 sessions attended over 21 months)	Low -income or first-generation high school students (from 9th or 10th grade) (N=2,292)	Enrolment (any)	71	+3
						Enrolment at 2-year institution	24	-5
						Enrolment at 4-year institution	44	+6**
RCT	Seftor, Mamun & Schirm (2009)	Upward Bound program (United States)	National sample of schools/ by 7 to 9 years after expected high school graduation	Vary but always academic tutoring, preparation for college entrance exams, cultural activities and information on financial aid (average of 477 sessions attended over 21 months)	Low -income or first-generation high school students (from 9th or 10th grade) (N=2,102)	Enrolment (any)	79.1	+1.5
						Enrolment at 2-year institution	22.4	-2.9
						Enrolment at 4-year institution	51.9	+1.3

Table B.5: the impact of outreach programs on graduation in higher education

Evaluation Design	Authors (Year)	Intervention (Country)	Location/ Time of evaluation	Details of intervention (duration)	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Ford et al (2014)	Explore Your Horizons program (Canada)	New Brunswick/ 4 years after high school graduation	After-school project activities with enhanced career education and focused information on post-secondary studies. (40 hours over 3-year period)	Low-income and first-generation high school students-from 10th grade (N=1,033)	Any post-secondary degree (by 4 years)	12.5	+1.2
RCT	Seftor, Mamun & Schirm (2009)	Upward Bound program (United States)	National sample of schools/ by 7 to 9 years after expected high school graduation	Vary but always academic tutoring, preparation for college entrance exams, cultural activities and information on financial aid (average of 477 academic and activity sessions attended over 21 months)	Low -income or first-generation high school students-from 9th or 10th grade (N=1,724)	Any post-secondary degree	34.8	+2.26
						Associate degree	9.1	-2.18
						Bachelor's degree	21.6	0.14
PSM	Constantine et al. (2006)	Talent search program (United States)	Florida/ by 4 years after end of intervention	Information about college, financial aid, assistance for financial aid applications and college application process (nearly half of Talent Search participants received 10 hours per year of services or fewer)	Primarily targeting low-income, potentially first-generation students in high school-from 9th Grade (N=14,721)	Associate degree (by 8 years)	8	+5***

DiD+PSM	Cunha, Miller & Weisburst (2018)	GO Center Project (United States)	Texas/ by 8 years after high school graduation	A dedicated classroom for the college application process with a full-time counsellor and active outreach run by selected student peers	Low-income high school students in selected schools (N=43,230)	Any post-secondary degree (by 8 years)	21.7[a]	-1.5
						Associate degree (by 8 years)	7.5[a]	-0.6
						Bachelor's degree (by 8 years)	13[a]	+0.8

a: Refers to the whole control group, not specific to disadvantaged students.

Appendix C: Causal estimates on the effect of financial aid on disadvantaged students

Table C.1: The effect of universal financial aid on access to higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
DiD	Denning (2017)	Community College Tuition Reductions, Texas (United States)	Discount in tuition fees in community colleges based on residency: Annexion of municipalities making residents eligible for reduced tuition at a community college (in-district tuition); community colleges in Texas charged 63 percent more, on average, to out-of-district students relative to in-district students	Economically disadvantaged high school graduates (N=204,448)	Enrolment at community college	27[a]	+5.2***[b]
					Enrolment at 4-year institution	25[a]	-3.1[b]
				Black high school graduates (N=204,448)	Enrolment at community college	27[a]	+4.8***[b]
					Enrolment at 4-year institution	25[a]	-3.4***[b]

a: Refers to the whole control group, not specific to disadvantaged students.

b: Own calculations based on interaction terms.

Table C.2: The effect of need-based financial aid on access to higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Azzolini et al (2018)	ACHAB experiment (Italy)	Dedicated savings account for high school students with compulsory savings between 5-50€/month and deposits matched at a rate of 4 to 1. Maximum savings of €2,000 matched for a maximum of €8,000. Money could be spent only on education-related expenses	Low-income high school students (last 2 years) (N=716)	Enrolment (any)	67.1	+8.7***
RCT	Ford et al. (2014)	New Brunswick Learning Accounts (Canada)	Annual grant of CAN$4,000 for maximum two years, with early commitment (deposited while student is in high school and provided conditional on high school completion)	Low-income and first-generation high school students-from 10th grade (N=1,145)	Enrolment (any)	38.6	+10.7***
					Enrolment at college (short)	21.6	+9.8***
					Enrolment at university	17.9	+0.9
RCT	Richburg-Hayes et al (2015)	California Cash for College (CFC) (United States)	One-time scholarship of $1,000 for enrolling in postsecondary education	Low-income high school seniors (N=3,560)	Enrolment (any)	84.4	+3.5
					Enrolment at 2-year institution	43.2	+5.2*
					Enrolment at 4-year institution	42.8	-2.9
DiD	Baumgartner & Steiner (2006)	BaFöG (Germany)	Increase in federal need-based aid by roughly 10 percent (on average 45€ more per month)	Low-income high school graduates (N=456)	Enrolment at university	64	+1.5
DiD	Bettinger (2015)	Ohio College Opportunity Grant (United States)	Increase of about $750 in total grant aid	Low-income first-year students in public institutions (N=83,259)	Enrolment at 4-year institution	?	+1.5***

RD	Castleman & Long (2013)	Florida Student Access Grant (United States)	An additional $1,300 in grant aid (in 2000 dollars), yearly renewable	Low-income high school graduates (N=6,917)	Enrolment (any)	61	+3.2
					Enrolment at 2-year public institution	34	+0.1
					Enrolment at 4-year public institution	26	+3.2*
DiD	Dearden, Fitzsimmons, Wyness (2014)	Maintenance grants (United Kingdom)	Implementation of a grant of £960 on average (in 2006 prices)	Low-income 18-19- year-olds (N=11,286)	Enrolment (any)	15.5	+3.8**
RD+IV	Denning, Marx & Turner (2017)	Maximum Pell grants (United States)	An additional $1,000 in first year grant aid due to eligibility to maximum Pell grant	Lowest-income university entrants (EFC=0) (N=36,697)	Enrolment at 4-year public institution	76	+0.4
DiD	Dynarski (2003)	Social Security Student Benefit Program (United States)	Annual renewable grant of $6,700 on average (in 2000 dollars)	High school seniors with father deceased during childhood (more likely to be low-income and/or black) (N=3,986)	Enrolment (any, by age 23)	35.2	+21.9*
RD	Fack & Grenet (2015)	Bourses sur Critères Sociaux (France)	Fee waiver for public university fees, averaging €174 per year for undergraduate students	Low-income grant applicants (N=50,388)	Enrolment (any)	77.3	+0.3
			Annual cash allowances of €1500, in addition to fee waivers	Low-income grant applicants	Enrolment (any) (N=194,513)	78.6	+2.7***
					Enrolment in 1st year (N=16, 467)	73.4	+4.9***

DiD	Kane (1995)	Federal Pell grant (United States)	Annual renewable grant of maximum $3,544 (in 1991 dollars)	Black 18-19-year-old females (N=12,163)	Enrolment (any)	?	-1.5
					Enrolment at 2-year public institution	?	+1.2
				Lowest income quartile 18-19-year-old females (N=12,163)	Enrolment (any)	?	+0.5
					Enrolment at 2-year public institution	?	+2.4
DiD	Linsenmeier et al. (2006)	Institutional grant, replacing loan (United States)	University grant of about $4,000, replacing a loan of the same amount	Admitted low-income students (N=13,701)	Institutional enrolment (yield rate)	51.9	+2.0
				Admitted minority low-income students (N=3,523)	Institutional enrolment (yield rate)	47.1	+8.9
DiD	Lovenheim & Owens (2014)	Ineligibility of federal financial aid (United States)	Ineligibility for federal financial aid due to HEA98 for up to two years	Convicted drug offenders (majority of disadvantaged males) (N=7, 401)	Enrolment (any, by two years)	35.8	-22**
					Enrolment (any, ever enrolled)	40.1	-8
RD	Rubin (2011)	Federal Pell grant (United States)	Pell grant around the eligibility threshold (average $400)	Low-income high school graduates	Enrolment (any, on-time)	86[a]	-1.35 (logit estimates)

a: Refers to the whole control group, not specific to disadvantaged students.

Estimates plotted in figure 3

Table C.3: The effect of merit-based financial aid on access to higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RD	Bruce & Carruthers (2014)	HOPE-scholarship, Tennessee (United States)	Annual grant of max $3.000 (for 2-year colleges) or max $6.000 (for 4-year colleges) to cover tuition -Students must submit FAFSA to receive HOPE (but do not have to be eligible) -Eligibility with near-average high school GPA and ACT scores	Pell-grant eligible high school graduates (N=17,145)	Enrolment (any)	85.9[a]	-0.0
					Enrolment at 2-year public institution	28.5[a]	-2.9**
					Enrolment at 4-year public institution	42.3[a]	+2.4**
				Non-white high school graduates (N=10,609)	Enrolment (any)	85.9[a]	-2.6**
					Enrolment at 2-year public institution	28.5[a]	-2.8*
					Enrolment at 4-year public institution	42.3[a]	+1.1
RD	Cohodes & Goodman (2014)	Adams Scholarship, Massachusetts (United States)	Between $910-$1714 in annual renewable tuition aid (roughly a 20% reduction in costs) -Not need-based -Eligibility with top 25% score in own school district in 10th grade (MCAS test)	Non-white high school seniors (N=88,152)	Enrolment at 4-year institution	71.6[a]	+6.3***
				Low-income high school seniors (N=88,152)	Enrolment at 4-year institution	71.6[a]	+3.7**

DiD	Dynarski (2000)	HOPE-scholarship, Georgia (United States)	Tuition and fee waiver, averaging $1900 per year but amount offset by other aids received (not cumulative with Pell) -Not need-based but application differs by parental income (easier for middle/high-income) -Eligibility with at least a 3.0 GPA (B) in high school graduation -Renewable conditional on maintaining a 3.0 GPA (B) in college	Low-income 18-19-year-olds (N=3,380)	Enrolment (any)	30[a]	-1.4
				Black 18-19-year-olds (N=1,837)	Enrolment (any)	30[a]	-2.7
RD	Kane (2003)	Cal Grant, California (United States)	Fee subsidy of maximum $9,036 - $9,420 per year -Need-based: income and assets below specific limits - Minimum high school GPA around 3.1	17-20-year-old grant low-income applicants (N=5,558)	Enrolment (any)	~87	+4.2**
DiD	Sjoquist & Winters (2015)	State-wide merit aid programs, (United States)	Strong merit aid - defined as not having too restrictive eligibility requirements and providing relatively large awards	Non-White or Hispanic men	Enrolment (any)	63.5[a]	-1.99***
				Non-White or Hispanic Women	Enrolment (any)	63.5[a]	-0.97
RD	Vergolini, Zanini & Bazoli (2014)	Trento 5B grant (Italy)	Annual grant of €1,200-€4,800 -Need-based -Final grade in high school above 93/100	Low-income, high performing students (N=5,535)	University enrolment	~70[a]	+6.5

a: Refers to the whole control group, not specific to disadvantaged students.

Estimates plotted in figure 3

Table C.4: The effect of performance-based financial aid on access to higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Barrow et al. (2014)	Opening Doors Louisiana (United States)	Additional grant in first year of enrolment of $1,000 per semester, conditional on: -being enrolled for at least 6 credits -maintaining a C GPA.	Low-income parents accepted in community colleges (N=1,019)	Enrolment at institution (2-year) after drop/add period	76.7	+5.3*
RCT	Binder et al. (2015)	VISTA at University of New Mexico (United States)	Additional grant of $1,000 per semester for 4 consecutive semesters, conditional on: -being enrolled in at least 12 credit hours in 1st semester, and 15 credit hours in subsequent semesters -Maintaining a GPA of 2.0 (C) or higher -Meeting with advisers at least twice per semester	Low-income incoming freshmen (N=1,081)	Enrolment at institution (4-year)	99.4	-1.3
RCT	Richburg-Hayes, et al. (2015)	California CFC-PBS (United States)	Additional grants ranging from $1,000 to $4,000, for one semester or up to 2 years, conditional on: -Enrolment -Completion of at least 6 credit hours per semester -Maintaining a "C" average GPA or higher	Low-income high school seniors (N=4,642)	Enrolment (any)	84.4	+4.9***
					Enrolment at 2-year institution	43.2	+4.7***
					Enrolment at 4-year institution	42.8	0
DiD	Jackson (2010)	Texas Advanced Placement Incentive Program (APIP) (United States)	Financial incentives for teachers and students based on scores in advanced placement courses in high school: Students receive between $100 and $500 for each eligible course conditional on a score of 3 or above	Low-income students in minority high schools (226 schools)	Enrolment (any, in Texas)	?	+5.0* (percent increase)

Table C.5: The effect of loans on access to higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RD	Solis (2013)	National loan programs (Chile)	National loan programs covering tuition costs with interest rates ranging from 2% to 6%, conditional on: - Being in one of the four poorest income quintiles; - Score at least 475 points in the national college admission test (PSU test)	Students taking the college admission test in the lowest income quintile (N=84,605)	Enrolment (any)	13.3	+20***
RD+IV	Gurgand, Lorenceau & Melonio	Eduloan (South Africa)	Short-term loans to cover tuition fees for students admitted in a public university (have to be repaid during the studies)	Admitted applicants to public universities with income below first quartile (N=1,397)	Enrolment at public university	44.3	+41.9*

a: Refers to the whole control group, not specific to disadvantaged students.

b: Own calculations based on interaction terms.

Table C.6: The effect of tax credit incentives on access to higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
IV	Bulman & Hoxby (2015)	American Opportunity Tax Credit (AOTC) (United States)	AOTC allowed tax-payers to deduct yearly up to $2,500 for up to four years of higher education. AOTC is partly refundable: a taxpayer who owes zero taxes can receive a check of up to $1,000.	Low-income 19-year-olds	Enrolment (any)	~32	No effect
Fixed-effect IV	LaLumia (2012)	Hope Tax Credit (HTC); Lifetime Learning Tax Credit (LLTC); Tuition and Fees Deduction (TD) (United States)	HTC allowed tax-payers to deduct yearly up to $1,500 of college expenses for up to 2 years; LLTC allowed tax-payers to deduct yearly up to $2,000 of college expenses an unlimited period of time; TD allowed tax-payers to deduct up to $4,000 of college expenses from adjusted gross income;	Non-white men, aged 33-50	Enrolment (any)	3.4[a]	+2.0
				Non-white women, aged 33-50	Enrolment (any)	6.7[a]	+1.1[b]
				Parents had no college, men aged 33-50	Enrolment (any)	3.4[a]	+0.9
				Parents had no college, women aged 33-50	Enrolment (any)	6.7[a]	-1.7[b]

a: Refers to the whole control group, not specific to disadvantaged students.

b: Own calculations based on interaction terms.

Table C.7: The effect of universal financial aid on graduation in higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
DiD	Denning (2015)	Community College Tuition Reductions, Texas (United States)	Discount in tuition fees in community colleges based on residency: Annexion of municipalities making residents eligible for reduced tuition at a community college (in-district tuition); community colleges in Texas charged 63 percent more, on average, to out-of-district students relative to in-district students	Economically disadvantaged high school graduates (N=204,448)	Associate degree (by 4 years)	4.1[a]	+0.3[b]
				Black high school graduates (N=204,448)	Associate degree (by 4 years)	4.1[a]	+0.9**[b]

a: Refers to the whole control group, not specific to disadvantaged students.

b: Own calculations based on interaction terms.

Table C.8: The effect of need-based financial aid on graduation in higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Anderson & Goldrick-Rab (2016)	Wisconsin Scholars Grant (United States)	Annual grant, complementing Pell grant, of $1,800 and renewable for up to five years	Low-income 2-year freshmen (N=3,153)	Associate degree (by 3 years)	30	-1
RCT	Ford et al. (2014)	New Brunswick Learning Accounts (Canada)	Annual grant of CAN$4,000 for maximum two years, with early commitment (deposited while student is in high school and provided conditional on high school completion)	Low-income and first-generation high school students- from 10th grade (N=1,145)	Any postsecondary degree (by 4 years)	12.5	+9.1***

RCT	Goldrick-Rab et al. (2016)	Wisconsin Scholars Grant (United States)	Annual grant, complementing Pell grant, of $3,500 and renewable for up to five years	Low-income 4-year freshmen (N=1,500)	Bachelor's degree (by 4 years, on-time)	16.3	+4.7**
IV	Alon (2007)	Any federal, state or college grant (United States)	An additional $1,000 in annual grant aid	Black freshmen in private and most selective universities (N=15,196)	Bachelor's degree (by 6 years)	76	+3.2[b]***
				Hispanic freshmen in private and most selective universities (N=15,196)	Bachelor's degree (by 6 years)	83	+3.2[b]***
IV	Alon (2011)	Any need-based grant (United States)	Each additional $100 received in the first year	University students in the lowest-income quartile (N=1,937)	Bachelor's degree (by 6 years)	48	+0.6**
RD	Castleman & Long (2013)	Florida Student Access Grant (United States)	An additional $1,300 in grant aid (in 2000 dollars), yearly renewable	Low-income high school graduates (N=6,917)	Associate degree (by 5 years)	17	-0.3
					Bachelor's degree (by 7 years)	25	+5.2**
RD	Clotfelter, Hemelt & Ladd (2018)	Carolina Covenant (United States)	Need-based grant covering the financial costs of college attendance through a mix of grant and work-study awards	Low-income students admitted to a public flagship university (N=1,133)	Bachelor's degree (by 4 years)	76	+2.2
RD+IV	Denning, Marx & Turner (2017)	Maximum Pell grants (United States)	An additional $1,000 in first year grant aid due to eligibility to maximum Pell grant	Lowest-income university entrants (EFC=0) (N=17,109)	Bachelor's degree (by 7 year)	43	+5.7*
RD	Denning (2018)	Any financial aid (United States)	Increase in financial aid (on average + $374 in grants) associated with being declared financially independent	Low-income (Pell recipients) students in 4th year of bachelor's program (N=33,844)	Bachelor's degree (by 5 year)	71.2	+0,9

RD	Fack & Grenet (2015)	Bourses sur Critères Sociaux (France)	Annual cash allowances of €1500, in addition to fee waivers	Low-income grant applicant entering the first year of a bachelor's degree (N=10,951)	Bachelor's degree (by 3 years, on-time)	25.5	+2.1
				Low-income grant applicants entering the final year of a bachelor's degree (N=40,789)	Bachelor's degree (same year)	58.7	+2.9***
DiD	Lovenheim & Owens (2014)	Ineligibility of federal financial aid due to HEA98 (United States)	Ineligibility for federal financial aid due to HEA98 for up to two years	Convicted drug offenders (majority of disadvantaged males) (N=7,401)	Bachelor's degree graduation	7.4	-7.2
RD	Turner & Bound (2003)	GI Bill (United States)	Renewable tuition subsidy of $500 + monthly stipend of up to $120 (1984$) for World War II veterans	Black war veterans	Any postsecondary degree	6	+2.7

a: Refers to the whole control group, not specific to disadvantaged students.

b: Own calculations based on interaction terms.

Table C.9: The effect of merit-based financial aid on graduation in higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RD	Carruthers & Ozek (2016)	HOPE-scholarship, Tennessee (United States)	Loss of hope scholarship after first year in college because of GPA below the threshold for renewal. Annual grant up to $4,000 (in 4-year institutions) and up to $2,000 (in 2-year institutions), conditional on near-average high school GPA and ACT scores and maintaining a 2.75 or 3.0 GPA in college	College freshmen with family income below median (N=7,248)	Any postsecondary degree (on-time)	?	+1.4
RD	Cohodes & Goodman (2014)	Adams Scholarship, Massachusetts (United States)	Between $910-$1714 in annual renewable tuition aid (roughly a 20% reduction in costs) -Not need-based -Eligibility with top 25% score in 10th grade (MCAS test)	Non-white high school seniors (N=88,152)	Bachelor's degree (by 4 years, on-time)	43.3[a]	-2.4
				Low-income high school seniors (N=88,152)	Bachelor's degree (by 4 years, on-time)	43.3[a]	-1.5
DiD	Sjoquist & Winters (2015)	State-wide merit aid programs (United States)	Strong merit aid - defined as not having too restrictive eligibility requirements and providing relatively large awards	Non-White or Hispanic men	Associate degree or higher	38.8[a]	+0.66
					Bachelor's degree or higher	30[a]	-0.4
				Non-White or Hispanic women	Associate degree or higher	38.8[a]	-0.45
					Bachelor's degree or higher	30[a]	0.23
RD	Welch (2014)	HOPE-scholarship, Tennessee (United States)	In 2005, Annual grant up to $1,500 per year at a community college and up to $3,000 in 4-year institutions, renewable for up to five years, conditional on: -near-average high school GPA (3.0) and ACT scores (21) -Maintaining a 2.75 or 3.0 GPA in college	Community college freshmen with family income below median (N=10,639)	Associate degree (by 3 years)	6.6[a]	-0.4
					Bachelor's degree (by 5 years)	7.2[a]	-3.8

a: Refers to the whole control group, not specific to disadvantaged students.

b: Own calculations based on interaction terms.

Table C.10: The effect of performance-based financial aid on graduation in higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Binder, Krause, Miller & Cerna (2015)	VISTA at University of New Mexico (United States)	Additional grant of $1,000 per semester for 4 consecutive semesters, conditional on: -being enrolled in at least 12 credit hours in 1st semester, and 15 credit hours in subsequent semesters -Maintaining a GPA of 2.0 (C) or higher -Meeting with advisers at least twice per semester	Low-income incoming freshmen (N=1,081)	Bachelor's degree (by 5 years)	33.2	+4.5
RCT	Mayer, Patel & Gutierrez (2015)	Ohio Performance-Based Scholarship Program (United States)	Additional grant of $900 per semester, or $600 per quarter, up to a maximum of $1800, conditional on: -Achieving a "C" or better in 12 or more credits -or a part-time award of $450 per semester/$300 per quarter for achieving a "C" or better in 6 to 11 credits	Low-income parents in community colleges (N=2,285)	Any postsecondary degree (by 4 years)	32.9	+1.6

Table C.11: The effect of loans on graduation in higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
IV	Alon (2007)	Any federal, state or college loan (United States)	An additional $1,000 in annual loan aid	Black freshmen in private and most selective universities (N=15,196)	Bachelor's degree (by 6 years)	88[a]	+0.2[b]
				Hispanic freshmen in private and most selective universities (N=15,196)	Bachelor's degree (by 6 years)	88[a]	-1.1[b]
IV	Wiederspan (2016)	Federal loan, Texas (United States)	Federal loan receipt	Low-income community college students (N=132,147)	Associate degree (by 3 years)	9	+20
				Black low-income community college students (N=84,793)	Associate degree (by 3 years)	5	+16.4
IV	Dunlop (2013)	Federal Stafford loans (United States)	An extra $100 in total loan	High-need community college students (N=2,037)	Associate degree (by 5 years)	21[a]	+0.3
				Black community college students (N=437)	Associate degree (by 5 years)	21[a]	+1.0

a: Refers to the whole control group, not specific to disadvantaged students.

b: Own calculations based on interaction terms.

Table C.12: The effect of tax credits on graduation in higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
PSM	Elsayed (2016)	Hope Tax Credit (HTC); Lifetime Learning Tax Credit (LLTC); Tuition and Fees Deduction (TD) (United States)	HTC allowed tax-payers to deduct yearly up to $2,200 of college expenses for up to 2 years; LLTC allowed tax-payers to deduct yearly up to $2,000 of college expenses an unlimited period of time; TD allowed tax-payers to deduct up to $4,000 of college expenses from adjusted gross income	Black college students who had applied to financial aid (N=4,850)	Any postsecondary degree (by 6 years)	41.6[a]	+9.7***

a: Refers to the whole control group, not specific to disadvantaged students.

Appendix D: Causal estimates on the effect of mixed interventions on disadvantaged students

Table D.1: The effect of mixed interventions on access to higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Ford et al (2014)	Expand Your Horizons + Learning Accounts in New Brunswick (Canada)	-40 hours of after-school project activities with enhanced career education and focused information on post-secondary studies over a 3-year period - Annual grant of CAN$4,000 for maximum two years, with early commitment (deposited while student is in high school and provided conditional on high school completion)	Low-income and first-generation high school students- from 10th grade (N=1,148)	Enrolment (any)	37.8	+10.5***
					Enrolment at college (short)	21.6	+5.1*
					Enrolment at university	16.5	+6.9***
RCT	Hahn, Leavitt & Aaron (1994)	Quantum Opportunities Program (United States)	-250 hours of education -250 hours of developmental activities -250 hours of service each year from 9th grade to high school graduation. -$1.00 - $1.33 per hour for participating and a grant amounting total earnings for postsecondary enrolment	Low-income high school students- from 9th grade (N=158)	Enrolment (any)	16	+26****
RCT	Rodriguez-Planas (2012)	Quantum Opportunities Program (United States)	-250 hours of education -250 hours of developmental activities -250 hours of service each year from 9th grade to high school graduation. -$1.00 - $1.33 per hour for participating and a grant amounting total earnings for postsecondary enrolment	Low-income high school students- from 9th grade (N=791)	Enrolment (any postsecondary)	55.8	+7.4**
					Enrolment at 2-year or 4-year institution	37.7	+4.3

DiD	Andrew, Imberman & Lovenheim (2016)	Longhorn Opportunity Scholars (LOS) & Century Scholars (CS) programs (United States)	LOS: Combination of outreach in disadvantaged high schools, financial aid ($4,000 per year) and academic tutoring during college in University of Texas	High-achieving minority & low-income high school seniors (eligible FRL) (N=15,835)	Enrolment in targeted flagship university (UT)	2.7	+2***
			CS: combination of outreach in disadvantaged high schools, financial aid ($5,000 per year for four years) and support service during college in Texas A&M University	High-achieving minority & disadvantaged high school seniors (N=21,327)	Enrolment in targeted flagship university (TAMU)	4.3	+0.2
PSM	Carruthers & Fox (2016)	Knox Achieves, Tennessee (United States)	Combination a college coaching (outreach) and financial aid program, covering the gap between the direct cost of enrollment and aid from other sources, offered to students for making a seamless, immediate transition between high school and one of the state's public community colleges	Lowest-income high school seniors (eligible FRL) (N=5,197)	Enrolment (any)	47.8[a]	+25.7***
					Enrolment at 2-year institution	23[a]	+25.2***
					Enrolment at 4-year institution	29.7[a]	+3*
DiD + Matching	Oreopoulos, Brown & Lavecchia (2014)	Pathways to Education (Canada)	Comprehensive program that included counseling, academic support, social support and financial support.	Low-income high school students-from 9th grade Site 1: Regent's Park (N=1,274)	Enrolment (any)	33.6	+19.2***
					Enrolment at college (short)	11.9	+9.8***
					Enrolment at university	21.6	+9.4***
				Low-income high school students-from 9th grade Site 2: Rexdale (N=737)	Enrolment (any)	40.7	+4.4
					Enrolment at college (short)	14.3	+4.6
					Enrolment at university	26.4	-0.3
RD	Page, Castleman & Sahadewo (2016)	Dell Scholars Program (United States)	Combination of financial support (up to $20,000 of scholarship) and individualized advising, both at college entrance and throughout the duration of postsecondary enrollment	High-achieving low-income high school seniors (N=2,040)	Enrolment at 4-year institution	81.2	+2.8

a: Refers to the whole control group, not specific to disadvantaged students.

Table D.2: The effect of mixed interventions on graduation in higher education

Evaluation Design	Authors (Year)	Program (Country)	Details of program	Disadvantaged group (Sample size)	Outcome	Baseline in control group (%)	Estimated effect (p.p.)
RCT	Ford et al (2014)	Expand Your Horizons (EYH) + Learning Accounts (LA) in New Brunswick (Canada)	-40 hours of after-school project activities with enhanced career education and focused information on post-secondary studies over a 3-year period - Annual grant of CAN$4,000 for maximum two years, with early commitment (deposited while student is in high school and conditional on high school completion)	Low-income and first-generation high school students- from 10th grade (N=1,148)	Any postsecondary degree (by 4 years)	12.6	+8.0***
RCT	Rodriguez-Planas (2012)	Quantum Opportunities Program (United States)	-250 hours of education -250 hours of developmental activities -250 hours of service each year from 9th grade to high school graduation. -$1.00 - $1.33 per hour for participating and a grant amounting total earnings for postsecondary enrolment	Low-income high school students- from 9th grade (N=791)	Bachelor's or associate degree (at age 25)	7.1	-0.3
					Bachelor's degree (at age 25)	2.0	+1.1
RCT	Scrivener et al (2015)	Accelerated Study in Associate Programs, New York (United States)	Combination of counselling, tutoring, special courses, and financial support (tuition waiver, MetroCard and free textbooks) based on a full-time enrolment requirement	Low-income community college freshmen (N=896)	Associate degree (by 3 years)	21.8	+18.3***
DiD	Andrew, Imberman & Lovenheim (2016)	Longhorn Opportunity Scholars (LOS) & Century Scholars (CS) programs (United States)	LOS: Combination of outreach in disadvantaged high schools, financial aid ($4,000 per year) and academic tutoring during college in University of Texas	High-achieving minority & low-income high school seniors (eligible FRL) (N=15,835)	Graduation from targeted flagship university (UT) (by 6 years)	2.0	+1.5***
			CS: combination of outreach in disadvantaged high schools, financial aid ($5,000 per year for four years) and support service during college in Texas A&M University	High-achieving minority & disadvantaged high school seniors (N=21,327)	Graduation from targeted flagship university (TAMU) (by 6 years)	3.2	-0.0

RD	Clotfelter, Hemelt & Ladd (2018)	Carolina Covenant (United States)	Combination of need-based grant covering the financial costs of college attendance – through a mix of grant and work-study awards – and additional support services, such as mentoring by faculty and peers, career advice, professional development opportunities, and social events	Low-income students admitted to a public flagship university (N=1,838)	Bachelor's degree (by 4 years)	82	+4.7
RD	Page, Castleman & Sahadewo (2016)	Dell Scholars Program (United States)	Combination of financial support (up to $20,000 of scholarship) and individualized advising, both at college entrance and throughout the duration of postsecondary enrollment	High-achieving low-income high school seniors (N=337)	Bachelor's degree (by 6 years)	60.5	+19.2*

a: Refers to the whole control group, not specific to disadvantaged students.