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Information and College Access: Evidence from a Randomized Field Experiment*

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Abstract

High-school students from disadvantaged high schools in Toronto were invited to take two surveys, about three weeks apart. Half of the students taking the first survey were also shown a three-minute video about the benefits of post-secondary education (PSE) and were invited to try out a financial-aid calculator. Most students' perceived returns to PSE were high, even among those not expecting to continue. Those exposed to the video, especially those initially unsure about their own educational attainment, reported significantly higher expected returns and lower concerns about costs, and expressed a greater likelihood of PSE attainment.

Keywords: Information; college access
JEL classification: *H*2; *I*2; *J*24

I. Introduction

Many policy makers implicitly presume that children and parents are fully informed when making decisions about education attainment. In economics, we also often assume that individuals have full information when deciding how much education to obtain or what programs to adopt. Recently, attention has been given to a relaxation of these assumptions, and the growing body of evidence suggests that many individuals are, in fact, not fully informed. This especially applies to those from low-income backgrounds. For example, Kane and Avery (2004) have demonstrated that high-school students from low-income family backgrounds have very little understanding

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of actual college tuition levels, financial aid opportunities, and the admissions process. A report by the Advisory Committee on Student Financial Assistance (2001) notes that students and families, as well as adult learners, are often intimidated by news stories about college being unaffordable. These stories might contribute to the fact that individuals often greatly overestimate the cost of higher education (Horn *et al*., 2003). Usher (1998) finds that low-income individuals overestimate tuition costs by an average factor of 2, and underestimate the average annual income differential between high-school and university graduates.

Misinformation or unawareness can lead to suboptimal outcomes. High-school students who view all post-secondary programs as unaffordable might miss out on significant returns. On the other hand, students who are only focused on university options might struggle to complete and might miss out on more enjoyable careers from vocational schooling or other community college options. One approach in addressing the lack of information is through better advertising. Currie (2004) and Dynarski (2002) find that better promotion of financial aid programs leads to higher take-up. Another approach is through simplification. Dynarski and Scott-Clayton (2006) demonstrate that eligibility for college financial aid in the US can reasonably be explained on a postcard, matching up the adjusted gross income of parents and adjusting for family size. Bettinger *et al*. (2012) show that personal assistance in helping to complete the financial aid application markedly increases enrollment in post-secondary education (PSE).

There is also evidence from developing countries that providing information about the benefits of PSE might increase motivation to attend. Jensen (2010) surveyed students from the Dominican Republic and found that while the measured returns to schooling are high, the returns perceived by students are extremely low. Students provided with information on the higher measured returns reported increased perceived returns several months later. In subsequent years, the least poor of these students were also significantly more likely to graduate from school. Nguyen (2007) came to similar conclusions after conducting a similar experiment in Madagascar. Teachers at randomly selected schools reported to parents and children the average earnings at each level of education, as well as the implied gain. The provision of these figures reduced the large gap between perceived returns and the statistics provided, and, in addition, improved average test scores. Dinkelman and Martinez (2011) examined the effects of showing Grade 8 Chilean students DVDs of young disadvantaged adults who describe their path towards college or vocational schools. They show that the presentation led to increased knowledge of financial aid and decreased absenteeism, but little change in overall attainment expectations.

Our paper adds to this body of literature by examining the effects that an internet information intervention had on disadvantaged students in Toronto, Canada. We test whether a short promotional video about higher education affects student interests and expectations about PSE. High-school students from schools in low-income neighborhoods were invited to take two surveys, about three weeks apart. The first survey asks demographic questions and questions about their knowledge of PSE. A random half of the students who took the first survey were also shown a short video with accompanying text about PSE, and were invited to try out a financial-aid calculator to approximate their own expected grant and loan eligibility for attending college or university.

Despite the fact that students who received the online information could ignore it or skip quickly through it, the results are surprisingly clear-cut in suggesting that the message mattered. Students who had been exposed to the additional information about PSE had, three weeks later, higher expectations of their own return to PSE, were more likely to believe that they were eligible for grants, were less likely to believe that the main reason students do not continue to PSE is because of costs, and were more likely to say that they aspired to complete at least a college degree. The effects were largest among those initially unsure about their decision concerning education attainment, which is consistent with information-updating models, such as those discussed by Della Vigna and Gentzkow (2010). We find evidence that the intervention affects not only subjective responses but also behavior. The students treated were more likely to download an additional document that offered additional (and printable) information about PSE, and they were more likely to request additional information about specific colleges and universities. Overall, our study suggests that inexpensive information campaigns to promote higher education are worth considering in order to promote interest and access.

In Section II, we outline our experiment and theory of why it might affect the decision-making of students in the longer term. In Section III, we describe our data. In Section IV, we present the results, and we conclude in Section V.

II. The Experiment

The study was carried out in Toronto at five public schools, the maximum number that our budget allowed. We chose schools in disadvantaged neighborhoods with the goal of targeting students who were unsure about their post-secondary attainment, or those expecting to enter the labor market with no more than a high-school degree. According to a meta analysis based on academic performance, our five schools ranked 577, 669, 683,

706, and 707 out of all 718 public schools in Ontario (Cowley *et al*., 2012). The provincial statistics on these schools also showed substantially lower percentages of students meeting province standards on grade 9 and grade 10 standardized tests. Their one-year transition rates to post-secondary institutions for grade 12 students were among the lowest in the city, about 30 percent.

Between December 5, 2008 and January 20, 2009, homeroom teachers distributed postcard-sized flyers offering $20 for participating in two online surveys (see the online Appendix). All students were invited to participate. Each flyer contained the survey website and a unique password to access the survey. To reduce the potential for survey contamination, each password could only be entered into the survey site once.

Students who went online were briefed on the purpose of the study and invited to consent to participate. They were asked to provide a valid e-mail address. An e-mail address was required in order to provide the link to the second survey site, and to distribute the incentive payment to the participant. The first survey asked students a set of basic demographic questions about their educational aspirations, parental education, ethnicity, and grade performance (the online Appendix includes the survey). It also asked questions about participants' expectations of education attainment, and their knowledge of their own eligibility for financial aid. The survey concluded by asking students about why they expected or did not expect to enroll in a PSE program.

After answering these questions, a random half of the participants were shown a screen with a video playing at the top-left of the screen, a transcription of its text on the right to allow students to follow along and to accommodate those without speakers, and a simple financial-aid calculator at the bottom-left of the screen. The video presented college and university in a positive light, suggesting that many students who are unsure about PSE might overestimate costs or not realize their eligibility for financial aid. Mean earnings differences were presented for 35-year-old Torontonians working with a high-school degree, a two-year college degree, and a four-year university degree or more. The video was designed to convey key information about the differences in potential earnings for categories of education attainment, about the expected costs of PSE, and about eligibility for financial aid (see the online Appendix for a screen shot and the text of the video). Students were able to watch the video, as well as to estimate the values of the grant and loan for which they would be eligible if they went to college or university. The financial-aid calculator required students to estimate their parents' income and the number of siblings attending PSE. Students were provided with a drop-down list of family incomes. Additionally, there was a button on the financial-aid calculator that allowed students to produce their results on a printable page. On this page, the financial-aid

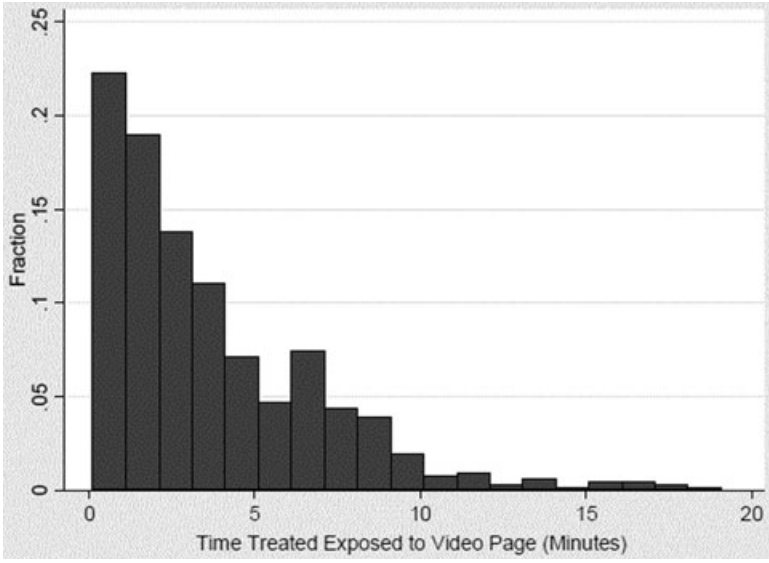

Fig. 1. Distribution of minutes spent on video page, treated participants
Notes: This figure shows a histogram of time exposed to treatment (webpage with video, text, and financial-aid calculator) before advancing to next screen. Histogram bars are displayed in minute intervals.

package for Toronto universities and colleges was provided, as well as brief instructions about how to apply.

After trying out the financial-aid calculator, treated students were asked to click "done" when finished. They were then shown the same page as the control group, which thanked them for their participation and reminded them to expect a notice in three weeks about taking the second survey, along with a reminder that they would receive $20 for completing the second survey. This was sent electronically via internet banking; students could also opt to receive an amazon.ca gift certificate or to donate $20 to their school.

Figure 1 shows the distribution of minutes exposed to the treatment webpage. The median treated student spent three minutes on the webpage, which was the same length of time as the video. Less than 10 percent watched for less than one minute, while another 10 percent spent at least nine minutes watching. To explore whether particular types of students watched the video more, we regressed the time spent watching the treatment webpage on background characteristics, but we found surprisingly little relationship. The students' expectations of education attainment were uncorrelated with the time of exposure to the video. Previous academic performance and parents' education attainment were also unrelated to time

spent on the webpage. Only a students' grade level predicted treatment exposure time. Grade 12 students spent about a minute longer on the webpage than grade 9 students.

About three weeks after completing the first survey, students were sent a reminder and a link to the second survey. Included in the reminder e-mails were password reminders required for accessing the second survey site. The second survey focused on questions about students' expected earnings under alternative scenarios of education attainment, students' expectations about grant and loan eligibility, and students' expectations of education attainment.

We asked participants before being treated in the first survey whether they expected their highest degree to be a high-school degree, a two-year community college degree, a four-year university degree or more, or whether they were unsure. A core prediction from belief-based models with Bayesian updating is that the information treatment will be more effective for those who are unsure (Della Vigna and Gentzkow, 2010). New information might cause some of these students to favor more schooling while others favor less, depending on whether the net expected benefit is adjusted upwards or downwards. We might also observe some who initially report that they intend to complete college or university degrees to adjust their expectations downwards if the video lowers their expected rate of return. Another possibility is that the online intervention advertises higher education without providing significantly new information (Della Vigna and Gentzkow call these preference-based models). For example, a reminder that those with more schooling tend to earn more money might make the relationship more salient when thinking about the outcome of one's own earnings, even though the relationship itself is already known. We might expect, in this case, to observe changes in educational expectations without changes in expected costs or benefits, because the student receives no new information with which to update prior beliefs. However, the observation of changes in attainment expectations and returns does not necessarily lead to a rejection of the preference-based model; students might still react to the reminder by inflating earnings expectations more. Preference-based and belief-based models are not easily distinguishable, because it is often not clear whether advertising provides new information or not.

The effect of the intervention also depends on students' attention to the new information and their interest in retaining it. The salience of the information when trying to decide and the costs involved from using the information might also play a role. We specifically chose a later date from the initial survey to test responses to the treatment in order to focus on delayed, rather than immediate, responses to information. We also provided an option for participants to indicate whether they wished to be sent

Table 1. *Descriptive statistics from participants of the first survey, by grade level*

	Full sample (1)	Grade 9 (2)	Grade 10 (3)	Grade 11 (4)	Grade 12 (5)
Background characteristics					
Female	0.520	0.497	0.592	0.538	0.479
Born in Canada	0.586	0.630	0.672	0.552	0.506
Parents born in Canada	0.066	0.046	0.074	0.057	0.085
Mother with university degree	0.210	0.190	0.195	0.215	0.241
Father with university degree	0.317	0.304	0.266	0.334	0.355
Mother with high school or Less	0.407	0.389	0.444	0.391	0.408
Father with high school or Less	0.088	0.072	0.112	0.085	0.088
Self-reported grade last year (percent)	78.2	79.6	78.4	78.6	76.3
Schooling aspirations					
Highest exp. degree is HS	0.030	0.033	0.044	0.031	0.015
Highest exp. degree is coll.	0.851	0.842	0.828	0.844	0.882
Highest exp. degree is univ.	0.762	0.768	0.742	0.768	0.767
Unsure about highest exp. degree	0.119	0.125	0.127	0.125	0.103
Financial-aid awareness					
Aware of financial-aid guarantee	0.142	0.138	0.154	0.113	0.160
Believes grant eligible	0.412	0.425	0.388	0.354	0.462
Unsure about grant eligibilty	0.433	0.444	0.441	0.482	0.378
Treatment status					
Treated (shown video)	0.498	0.486	0.479	0.499	0.524
Took second survey	0.603	0.540	0.642	0.615	0.628
Sample size	1,616	457	338	353	468

Notes: exp. = expected; HS = high school; coll. = college; univ. = university.

more details regarding specific colleges or universities. Furthermore, students were able to download a PDF booklet about applying to PSE. These "action outcomes" were added to estimate the effects beyond self-reported outcomes. A concern with subjective responses is that it costs little for students to respond to new information without being committed. While sample size and budget constraints prevented us from examining eventual education attainment (and earnings), an examination of the treatment effects on these action outcomes provides at least some evidence of whether students reacted meaningfully to this intervention.

III. Descriptive Statistics

Table 1 describes the student characteristics of the participants of the first survey. We delivered 5,017 postcard invitations to the participating schools, one for each student enrolled. A total of 1,616 students completed the first survey. Because not all students received an invitation, as a result of absences or compliance, the ratio of students responding to invitations distributed (32 percent) represents a lower bound for the response rate. The proportion of students by each grade is spread fairly evenly. Grade 9

and 12 students account for 28 and 29 percent of the sample, respectively. Grade 10 and 11 students each account for 21 percent of the total sample, and 54 percent are female. The average reported grade for the entire sample is 78 percent, suggesting that students with above average academic ability were more likely to participate in the study. A very large fraction of respondents are first- or second-generation immigrants. Of the 1,616 respondents, 41 percent are immigrants, and only 7 percent have parents who were both born in Canada. The levels of educational attainment for parents are also quite low: 32 percent of the sample report that their father has a university degree, and 21 percent report that their mother has a university degree.

A large majority of participants (85 percent) intend to obtain a college or university degree. This result is, in part, because those responding are more likely to be interested in PSE to begin with (as indicated by the high average grade), and also because students' expectations tend to exceed their actual education attainment. For example, Jacob and Wilder (2010) found that 80 percent of recent high-school students in the US expect to attain a BA degree, whereas less than 40 percent actually reach this goal (the number is even less for African Americans and for males). They noted that a common explanation for this occurrence is that students underestimate the difficulty in completing college or the preparation required to excel. Stinebrickner and Stinebrickner (2012) found some evidence for this by using students' updated knowledge of their academic ability to predict the levels of those not graduating from PSE. Other researchers model students as trying to conform to the attainment expectations of parents, teachers, and peers, while failing to account for preparation and difficulty entirely (Haller, 1982). Our treatment is unlikely to cause downward adjustment to attainment expectations because it provides no information about students' own abilities. However, expectations can still change because of remaining doubt about PSE or misinformation about costs and returns.

To explore the hypothesis that disadvantaged students who are unsure about their education attainment expectations, or who are thinking about leaving education at high school, might be overestimating costs or underestimating returns, we separate the estimates of the treatment effects for these subgroups from the majority expecting to obtain PSE degrees. It is unfortunate that the number of students in the sample who report that they intend to leave education at high school is so low. We include the results for this group for descriptive purposes, but we keep them separate from those who are unsure about their expectations. The online Appendix shows the treatment effects for these two groups combined.

In the second survey, participants were asked to answer a series of questions based on income attainment. Students were informed that average

earnings for a 35-year-old in Toronto are about $38,000. They were then asked the following questions.

> "Suppose that you were to graduate from high school, but not go on to pursue any more schooling. What would you expect your annual income to be at age 35?"
> "How much do you think you would earn if instead you were to complete a two-year college program?"
> "How much do you think you would you earn at age 35 if you completed a four-year Bachelor's degree at university?"

The responses to these questions allow us to calculate each participant's expected rate of return to college and university. Table 2 shows mean earnings for the control group, categorized by the expectations of education attainment reported in the first survey, as well as the earnings ratios between completing college and high school, and between completing university and high school, for the 10th, 50th, and 90th percentiles in each group. Similar to previous studies (Betts, 1996; Dominitz and Manski, 1996; Botelho and Pinto, 2004), students varied considerably in their responses. However, on average, the expected earnings for each category of education attainment are similar to the actual mean differences observed (from the 2009 Labor Force Survey, the mean incomes for 34-year-old Torontonians leaving education after high school, community college, and university are $37,000, $49,000, and $59,000, respectively). Students generally predict higher earnings from further schooling. Interestingly, the median return from college or university is substantial, regardless of intentions regarding education attainment. The median student who expects to leave education at high school also expects to earn 40 percent more with a two-year college degree, and 107 percent more with a four-year university degree. The median student expecting to obtain a two-year college degree expects to earn 32 percent more if they receive a university degree instead. Those unsure about their decision expect an average rate of return to college and university of 31 and 53 percent, respectively. Because these results are self-reported, taking into account expected ability, they suggest that the expected returns cannot explain why some students intend to leave school earlier. While expected returns are high for the median in each group, they are negative for those in the 10th percentile.

A potential explanation for the high returns among students opting for less education is cost concerns. Table 3 reports the results from asking the survey participants about why they think some do not enroll in PSE (for the control group only). The most frequent reason given, regardless of expectations about their own education, is cost. More than 60 percent of those unsure about their education attainment say tuition costs are too

Table 2. *Mean expected earnings and ratio of expected PSE-to-high-school earnings for 10th, 50th, and 90th percentiles, by highest expected degree (control sample)*

	Highest expected degree				
	(1)	(2)	(3)	(4)	(5)
Mean expected earnings if:	Full sample	High school	College	University	Unsure
High-school graduate	$37,381	$28,077	$30,083	$37,303	$43,542
Two-year college graduate	$46,639	$37,500	$44,417	$46,214	$52,417
Four-year university graduate	$61,328	$41,731	$57,083	$62,309	$61,500
Ratio of expected college to high school earnings 10th, 50th, and 90th percentiles	[0.72 1.36 2.5]	[0.85 1.4 2.5]	[0.83 1.57 3.07]	[0.66 1.36 2.5]	[0.72 1.31 2.14]
Ratio of expected university to high school earnings 10th, 50th, and 90th percentiles	[0.97 1.88 3.8]	[0.54 2.07 4.5]	[0.92 1.83 8.15]	[1.0 1.91 3.8]	[0.79 1.53 3.4]
Sample size	483	13	30	380	60

Notes: Students were informed that the average earnings for a 35-year-old in Toronto are about $38,000. They were then asked, "Suppose that you were to graduate from high school, but not go on to pursue any more schooling. What would you expect your annual income to be at age 35?", and "How much do you think you would earn if instead you were to complete a two-year college (or four-year university) program?". The top of the table shows the mean responses for the control group, categorized by highest expected degree. The bottom of the table shows the expected return to a college or university degree (relative to completing only a high-school degree), expressed as an earnings ratio for the 10th, 50th, and 90th percentiles in each subgroup, respectively.

Table 3. *Frequency responses for reasons why some students do not enrol in PSE, conditional on highest expected degree (control sample)*

		Highest expected degree			
	(1)	(2)	(3)	(4)	(5)
Percent of following responses:	Full sample	High school	College	University	Unsure
Job opportunities are not much better	2.5	7.7	10.0	0.8	8.3
Not everyone can get the grades to go	30.6	30.8	36.7	32.4	16.7
Not sure	7.9	0.0	6.7	8.7	5.0
Other	3.9	0.0	3.3	4.5	1.7
School sucks	6.4	15.4	10.0	5.8	6.6
Tuition and other costs are too high	48.7	46.1	33.3	47.9	61.7
Total	100.0	100	100	100	100
Sample size	483	13	30	380	60

high for some to attend. The median expected rate of return to a university degree for these students who are unsure is 80 percent, whereas the median is 18 percent for unsure students who do not identify cost as the main reason why some do not attend PSE. Participants indicate that poor grades are the second key reason for why some do not attend. For the small group reporting that they plan to leave education at high school, a dislike of school is also an important explanatory factor.

Of those students who completed the first survey, 60.3 completed the second survey three weeks later. Importantly, the response rate to the second survey was very similar for the treatment and control groups (61.2 and 59.6 percent, respectively). To further explore potential response bias, Table 4 presents mean differences for background characteristics in the first survey by treatment status. Not surprisingly, parents' education, initial expectations of education attainment, gender, previous grades, and immigrant status are generally balanced between groups for those completing the first survey (before randomization). However, a few of these variables are not balanced when conditioning on the sample of students responding to both surveys. The p-value from an F-test on the joint significance of these variables being different across treatment and control groups is 0.09. For the subsample of students who were initially unsure about their final education attainment, the p-value is 0.29.

We estimate treatment effects with and without conditioning on the variables listed in Table 4. In addition, we follow two other approaches recommended by Puma *et al*. (2009) in addressing missing data after randomization. Table A1 of the Appendix shows that our main results are robust to weighting observations by the predicted probability of completing the second survey, and to interacting each control variable with treatment status. The table indicates similar results for the sample of students initially unsure

Table 4. *Mean characteristics of the first survey by treatment status, responses to the second survey, and whether participants are unsure about their final education attainment in the first survey*

	Responded to first survey (initial sample)		Responded to first and second surveys		Responded to first and second surveys Unsure about exp. educ. attainment	
	Control group (variable mean) (1)	Treatment group (Mean difference compared to controls) (2)	Control group (variable mean) (3)	Treatment group (Mean difference compared to controls) (4)	Control group (variable mean) (5)	Treatment group (Mean difference compared to controls) (6)
Female	0.536	−0.032 [0.025]	0.579	−0.055 [0.033]*	0.63	−0.13 [0.106]
Born in Canada	0.572	0.028 [0.025]	0.563	0.064 [0.033]**	0.685	0.104 [0.092]
Grade last year (percent)	78.089	0.194 [0.497]	78.681	0.513 [0.616]	74.398	0.668
Mother's highest degree, university	0.206	0.009 [0.020]	0.235	−0.022 [0.028]	0.093	0.013 [0.064]
Father's highest degree, university	0.334	−0.034 [0.023]	0.357	−0.057 [0.031]*	0.167	0.018 [0.082]
Ever thought of not graduating	0.079	−0.018 [0.013]	0.049	−0.001 [0.014]	0.074	−0.048 [0.045]
Believes government guarantees college access	0.141	0.004 [0.017]	0.135	−0.006 [0.023]	0.519	0.192 [0.101]*
Unsure about grant eligibility	0.436	−0.008 [0.025]	0.404	0.018 [0.033]	1	0
Highest degree expected, unsure	0.129	−0.021 [0.016]	0.12	−0.036 [0.020]*		
Highest degree expected, high school	0.03	0 [0.008]	0.027	0 [0.011]		
Highest degree expected, two-year college	0.086	0.006 [0.014]	0.064	0.03 [0.018]*		
Highest degree expected, university	0.755	0.016 [0.021]	0.789	0.007 [0.027]		
Responded to second survey	0.596	0.016 [0.024]				
Joint test for significance (p-value from F-test)		0.484		0.099		0.287
Sample size		1,616		975		101

Notes: Means between treatment and control groups are calculated for each variable. The estimated standard error for the difference between treatment and control mean is shown in square brackets. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively. The joint test for significance is calculated by first regressing treatment status on all listed variables combined, and then conducting an F-test for the hypothesis that all coefficients are zero.

about their attainment plans and for the combined sample of those unsure and those planning on leaving education with a high-school degree.

IV. Results

In this section, we present our estimates of the main effects of the program. First, we examine the effects on expected PSE benefits and costs in order to explore evidence that participants responded directly to the information provided. Then, we examine interest shown in PSE more directly, by looking at the effects of the program on attainment expectations and interest in acquiring more information about PSE.

Table 5 shows treatment effects on expected annual earnings at age 35, grouped by the highest degree expected by participants, as reported in the first survey (prior to treatment). The first panel displays results among those unsure about their schooling. As predicted, this group reacts more than the other participants with stronger priors. Column 1 indicates that those who were initially unsure and exposed to the online information, subsequently report lower expected earnings from leaving education after high school, compared to the control group ($34,512, on average, versus $43,542; p-value $= 0.040$). Including linear controls for background characteristics (the same variables listed in Table 4), does not substantially alter the estimates, which is the case for all outcomes examined in this section. The differences in expected earnings from completing a college or university degree are not significantly different between treated and control participants.

Overall, the results suggest that the online information changes students' expected rates of return to PSE from high to very high. Column 7 shows that the ratio between expected earnings after college and after high-school is 40 percent higher for the treated group than the controls (2.1 versus 1.5; p-value $= 0.050$). The impact on the ratio between expected earnings after university and after high school is also substantial (2.8 versus 1.9; p-value $= 0.036$). The estimated college and university returns for the sample reporting the intention to leave education after high school are high for both the treatment and control groups (about 80 percent higher earnings from completing college and 140 percent higher earnings from completing university), but these returns are measured imprecisely because of small sample size. We do not find any significant change in expected returns to college or university for the sample who predict that they will obtain some type of PSE degree. Interestingly, the estimated returns reported by this group are about the same as the returns reported by the students who intend to leave education after high school.

Table 6 shows the estimates of program effects on survey responses related to the costs of PSE. The notable result is a significant fall in the number of unsure students who indicate that tuition and other costs are

Table 5. *Estimated effects of the program on earnings and returns to college and university*

	Expected earnings from HS at age 35		Expected earnings from college at age 35		Expected earnings from univ. at age 35		Expected coll.-to-HS ratio at age 35		Expected univ.-to-HS ratio at age 35	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
In first survey, unsure about expected educational attainment (sample size = 101)										
Control mean	43,542		52,417		61,500		1.5		1.9	
Treatment difference	−9,029 [4,334]**	−8,245 [4,580]*	−3,270 [4,001]	−2,393 [4,076]	1,244 [3,357]	328 [3,170]	0.662 [0.333]**	0.681 [0.340]**	0.995 [0.469]**	0.974 [0.461]**
In fisrt survey, expecting not to complete more than high school (sample size = 25)										
Control mean	28,077		37,500		41,731		1.8		2.4	
Treatment difference	1,298 [8,118]	−627 [7,717]	8,542 [8,928]	2,545 [11,237]	5,478 [9,254]	294 [11,580]	0.251 [0.477]	0.162 [0.522]	−0.165 [0.641]	0.215 [0.842]
In first survey, expecting to complete college or university (sample size = 849)										
Control mean	36,774		46,082		61,925		1.7		2.5	
Treatment difference	−413[1,463]	−418 [1,451]	1,196 [1,253]	817 [1,243]	−789 [1,118]	−913 [1,124]	0.026 [0.102]	0.025 [0.103]	−0.068 [0.168]	-0.055 [0.168]

Notes: Treatment difference with controls is the coefficient estimate for treated participants after regressing the outcome variable on it, plus linear controls for female, born in Canada, grade last year (percent), indicators for whether mother's and father's highest degrees were university, first survey reports on whether they have ever thought of not finishing high school, whether government guarantees college access, and indicators for expected highest degree in first survey (unsure, high school, college, or university). Huber−White robust standard errors are shown in square brackets. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively. The calculation of the variables "Expected returns to college and university' is described in more detail in Figure 1 and in the text. Coll. = two-year college, HS = high school, and Univ. = university

Table 6. *Estimated effects of the program on financial-aid expectations*

	Costs prevent some from going		Believe Ontario guarantee		Unsure about granteligibility		Eligible for grant	
	(1)	(2)	(5)	(6)	(7)	(8)	(9)	(10)
In first survey, unsure about expected educational attainment (sample size = 92)								
Control mean	0.617		0.033		0.583		0.283	
Treatment difference	-0.226 [0.100]**	-0.241 [0.105]**	0.064 [0.052]	0.04 [0.038]	-0.12 [0.102]	-0.134 [0.105]	0.083 [0.096]	0.072 [0.095]
In first survey, expecting not to complete more than high school (sample size = 24)								
Control mean	0.462		0		0.231		0.308	
Treatment difference	-0.045 [0.207]	0.015 [0.276]	0.333 [0.142]**	0.374 [0.208]*	0.269 [0.194]	0.04 [0.216]	0.026 [0.195]	0.303 [0.240]
In fisrt survey, expecting to complete college or university (sample size = 791)								
Control mean	0.468		0.09		0.363		0.5	
Treatment difference	0.026 [0.034]	0.025 [0.034]	0.003 [0.020]	0.011 [0.019]	-0.04 [0.033]	-0.043 [0.032]	0.065 [0.034]*	0.078 [0.033]**
With controls?	No	Yes	No	Yes	No	Yes	Yes	Yes

Notes: Same as Table 5.

the main reasons why they do not enroll in PSE. The fraction reporting that costs prevent some from going to PSE falls from 61.7 percent for the control group to 39.1 percent for the treated group. The point estimates for the other cost-related outcomes are consistent with the possibility that unsure students also become more confident about being eligible for a grant, but the estimates are not statistically significant at the 10 percent level. The pattern is clearer for the larger sample of students who report an intention in the first survey to complete college or university. Three weeks after being shown our financial-aid calculator and video, these students are about 7 percentage points more likely to believe they are eligible for grant aid. There is no significant change for this group in the fraction reporting cost as a factor to explain why some do not attend PSE.

The above results suggest that when the online information was shown to the group of students who were unsure about their educational attainment, they adjusted their expectations about the costs and benefits of PSE in such a way that their decision to attend seemed more favorable. We do not observe any downward adjustment in expected returns or upward adjustment in expected costs from the video. In fact, students expressing the goal of completing a PSE degree appear to be more aware, after the treatment, of being eligible for financial aid. Correspondingly, Table 7 indicates that, following the treatment, there is a significant fall in the uncertainty surrounding education attainment both for students initially unsure and for those aiming to enroll in PSE. Those unsure about their attainment prior to treatment are 18.5 percentage points less likely to express uncertainty three weeks after treatment (Column 1). Students from this group shift their response, indicating a greater expectation of obtaining a two-year college degree rather than a four-year university degree. The results also show that the program has an effect on attainment expectations for those initially saying that they intend to complete PSE. Of these students, 8.3 percent in the control group change their response to the same question in the second survey, and indicate that they are unsure. The program appears to reinforce the resolve of students in this group to enroll in PSE. Compared to the control group, 3.3 percent fewer report that they are unsure, while 3.5 percent more maintain their intention of obtaining a PSE degree.

At the end of the second survey, students were provided with the opportunity to request more information; students could download an electronic document with information about PSE (e.g., with subsections titled “Why should I go?”, “How do I apply?”, “How do I pay?”, and “What colleges are near me?”). Students could also request to be sent information about a particular university or college by clicking boxes beside a list of regional schools. As mentioned in Section II, the purpose of recording who accessed this information was to test whether the program affected more than just subjective survey responses. Table 8 presents these results, along with

Table 7. *Estimated effects of the program on educational aspirations*

	Unsure about highest Degree Attainment		Highest degree High School or Less		Highest degree Community College		Highest degree More than High School	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
In first survey, unsure about expected educational attainment (sample size = 92)								
Control mean	0.5		0.08		0.08		0.42	
Treatment difference	−0.18 [0.098]*	−0.23 [0.102]**	0.01 [0.059]	0.01 [0.059]	0.11 [0.072]	0.15 [0.068]**	0.17 [0.101]*	0.23 [0.103]**
In first survey, expecting not to complete more than high school (sample size = 24)								
Control mean	0		0.54		0.15		0.46	
Treatment difference	0.08 [0.083]	0 [0.000]	−0.04 [0.208]	−0.17 [0.224]	0.18 [0.176]	0.22 [0.129]	−0.05 [0.207]	0.17 [0.224]
In first survey, expecting to complete college or university (sample size = 791)								
Control mean	0.08		0.03		0.04		0.89	
Treatment difference	−0.03 [0.017]*	−0.04 [0.017]**	0 [0.011]	0 [0.011]	0.05 [0.017]***	0.03 [0.013]**	0.04 [0.020]*	0.04 [0.020]**
With controls?	No	Yes	No	Yes	No	Yes	No	Yes

Notes: Same as Table 5.

the estimates of the program's effects on expected grade. For students initially unsure about attainment and expecting to leave education after high school, we observe a higher fraction of those from the treatment group downloading the PSE document and requesting school information. The fraction requesting more school information almost doubles for the treated group with initial expectations of leaving education after high school, compared to the control group. The other outcome differences are not large enough to reject the hypothesis that they occurred by chance. However, if we combine these two groups (i.e., those unsure and those intending to leave education after high school), the gap in the fraction downloading the electronic document is statistically significant at the 10 percent level (see the Appendix).

It is interesting to see how our results differ by age or gender. Unfortunately, the small size of the sample prevents us from conducting subgroup analyses. We do not find strong support for the possibility that students in later grades are less affected because they are more informed. In fact, while the estimated treatment effect on expected returns to PSE for the sample of unsure students is smaller for students in grade 12 than those in lower grades, the effects on cost concerns and attainment expectations are higher (although we cannot ignore the fact that the two effects are equal). Also, we cannot ignore the fact that the main effects of gender are equal (because they have large standard errors associated with them).

V. Discussion and Conclusion

In this paper, we have presented the results from a small field experiment in which students from disadvantaged high schools were invited to take two short online surveys. The students were offered $20 for their participation. At the end of the first survey, a random half were shown a multimedia page with an easy to follow three-minute video describing costs and benefits of PSE, and how to make PSE affordable. Students could also follow the text provided beside the video, and they could estimate their own eligibility for financial aid using a financial-aid calculator that only required them to approximate household income and family size. Three weeks later, students were asked to complete a second survey, which asked questions about their impressions of PSE costs and benefits, as well as their expectations for their own education attainment.

The purpose of this study was not to design a nationally scalable policy that would lead to substantial increases in PSE enrollment and completion, but rather to test whether exposing students from disadvantaged backgrounds to online information might play a role in affecting prior beliefs about PSE and increase (or perhaps decrease) their interest in PSE. Stakes were generally low for the participants – there was no cost for

Table 8. *Estimated effects of the program on downloading additional information and on expected grade*

	Clicked on PDF		Requested more Institutional Information		Expected grade This Year (Percent)	
	(1)	(2)	(3)	(4)	(5)	(6)
In first survey, unsure about expected educational attainment (sample size = 92)						
Control Mean	0.08		0.83		75.38	
Treatment Difference	0.06 [0.066]	0.08 [0.071]	0.02 [0.074]	0.04 [0.079]	0.97 [2.158]	−0.3 [1.722]
In first survey, expecting not to complete more than high school (sample size = 24)						
Control Mean	0		0.46		73.65	
Treatment Difference	0.17 [0.112]	0.28 [0.198]	0.37 [0.183]*	0.59 [0.168]***	−5.53 [4.838]	−2.45 [7.172]
In first survey, expecting to complete college or university (sample size = 791)						
Control Mean	0.2		0.78		81.15	
Treatment Difference	−0.03 [0.027]	−0.03 [0.027]	−0.01 [0.029]	0 [0.028]	0.59 [0.539]	0.51 [0.454]
With Controls?	No	Yes	No	Yes	No	Yes

Notes: Same as Table 5. "Clicked on PDF" indicates whether a participant accessed downloadable information file about college and university at the end of the second survey. "Requested more institutional information" indicates whether, at the end of the second survey, a participant indicated an interest in receiving additional information about a particular institution.

treated respondents to skip over the information page provided (although they might have assumed that they needed to do this to remain eligible for the payment for their participation). There was also little cost to them when deciding how to respond subjectively to the questions, or whether to choose to receive additional information.

In this setting, we can classify the study as a framed field experiment, using the dichotomy outlined by Harrison and List (2004). Participants dealt with a subject of interest outside the experiment (their own education), but not in an environment where they would naturally undertake the task of thinking about their long-term plans. A video shown in class or a homework assignment to estimate their own eligibility for financial aid would more closely resemble a real program. We cannot rule out the possibility that some students responded according to what they thought the researchers wanted to observe. However, this possibility was likely similar for the control group, who were also aware that they were participating in a study about PSE and "life after high school". The three weeks between the two surveys allowed students in both the treated and control groups to return to their daily lives before being surveyed again. The responses themselves seem reasonable. In addition, the measured outcome of accessing additional information about PSE requires more action, and thus, at least slightly, greater cost than not accessing this information at all.

Despite the fact that the intervention lasted only a few minutes and that there was a wait of three weeks before estimating the effects, the results suggest that the provision of easily accessible information about PSE does matter, especially for students who are initially uncertain about whether they want to enroll in PSE or uncertain about whether they can afford PSE. With the online information, these students were more likely to adjust their cost concerns downwards, and their own expected return from attending PSE upwards. Correspondingly, this group expressed less uncertainty and more subsequent interest in completing a PSE degree. We also found some evidence that those treated were more likely to seek out additional information about the next steps in how to enroll in PSE and how to access financial aid.

Much of the information we provided to selected students is readily accessible online and likely obtained by talking to a high-school guidance counselor. Most students report that they already believe they would earn significantly more by completing PSE (and those in our treated group expect an even higher return). The type of financial-aid calculator we presented is also accessible online. One explanation as to why students reacted to the information we provided is that we did not require them to seek it out. A common finding from research in social psychology is that individuals tend towards the status quo (e.g., Thaler and Sunstein, 2008). In our context, the status quo for high-school students is not to

apply to PSE and not to receive information about PSE, except whatever information is presented in class. In an environment where day-to-day distractions are common, adolescents might easily put off learning more about PSE, especially without additional interest shown by family and peers.

Students who are shown the additional information might also have become more salient to the benefits and affordability of PSE. Students might identify themselves in different ways (e.g., someone who likes to have fun, who plays soccer, or who wants to have a successful career). Each of these identities can be more or less salient at any moment of time, and the relative salience of different identities can significantly affect behavior (Akerlof and Kranton, 2002; McLeish and Oxoby, 2011). Perhaps treated students were more salient of the importance of PSE for future well-being, and perhaps this additional saliency lasted while they took the second survey (or reoccurred when they took it). Frequent reminders to students about the benefits and affordability of PSE (e.g., regular campus visits, posters) might improve students' interest in PSE at a time when PSE-related decisions are being made.

Our findings appear to be more consistent with belief-based models, where students' priors are updated after receiving new information, rather than with preference-based models, where the treatment promotes PSE without providing new information. This is because we observe students adjusting their expectations about both net benefits and education attainment rather than just education attainment on its own.

Our findings show that students react favorably to information that promotes higher levels of schooling, which is consistent with results from Jensen (2010), Nguyen (2007), and Dinkelman and Martinez (2011). Taken overall, our findings suggest that inexpensive information programs might facilitate the transition from high school to college. Videos, websites, or presentations, especially at times when students must make decisions that affect the outcome of PSE, might lead to higher levels of PSE enrollment and degree completion.

Appendix A1. *Treatment Effect Estimates Using Alternative Adjustments for Missing Data*

	In first survey, unsure about Expected Educational Attainment			Excluding students expecting to go to College or University		
	Case deletion (1)	Weight adjustment (2)	Treatment/ covariate interactions (3)	Case deletion (4)	Weight adjustment (5)	Treatment/ covariate interactions (6)
Outcome						
Highest degree, unsure	−0.23 [0.102]**	−0.19 [0.099]*	−0.2 [0.107]*	−0.17 [0.085]**	−0.15 [0.085]*	−0.16 [0.091]*
Highest degree, high school	0.01 [0.059]	0.03 [0.059]	−0.03 [0.053]	0 [0.063]	0.03 [0.072]	0.02 [0.069]
Highest degree, college	0.15 [0.068]**	0.13 [0.077]	0.22 [0.070]***	0.12 [0.067]*	0.14 [0.072]*	0.15 [0.068]**
Highest degree, university	0.08 [0.101]	0.03 [0.098]	0 [0.098]	0.05 [0.089]	−0.02 [0.085]	0 [0.093]
Highest degree, any post-secondary	0.23 [0.103]**	0.16 [0.102]	0.22 [0.108]**	0.17 [0.094]*	0.12 [0.092]	0.15 [0.102]
Believes grant elligible	0.07 [0.095]	0.1 [0.097]	0.08 [0.104]	0.08 [0.087]	0.07 [0.085]	0.07 [0.092]
Unsure about grant elligibility	−0.13 [0.105]	−0.15 [0.102]	−0.21 [0.107]**	−0.07 [0.093]	−0.07 [0.092]	−0.12 [0.100]
Believes in financial-aid guarantee	0.04 [0.038]	0.02 [0.036]	0.02 [0.036]	0.1 [0.047]**	0.13 [0.054]**	0.05 [0.059]
Costs too high for some	−0.24 [0.105]**	−0.2 [0.102]**	−0.26 [0.101]**	−0.17 [0.097]*	−0.16 [0.092]*	−0.18 [0.098]*
Expected returns to college	0.68 [0.340]**	0.66 [0.340]*	0.78 [0.430]*	0.63 [0.303]**	0.56 [0.277]**	0.67 [0.358]*
Expected returns to university	0.97 [0.461]**	1.02 [0.448]**	0.89 [0.455]*	0.84 [0.402]**	0.76 [0.368]**	0.75 [0.407]*
Lifetime present value return > $900k	0.01 [0.051]	−0.01 [0.046]	−0.02 [0.046]	0.05 [0.054]	0.03 [0.055]	0.03 [0.055]
Clicked on PDF	0.08 [0.071]	0.07 [0.068]	0.12 [0.070]*	0.12 [0.065]*	0.08 [0.057]	0.15 [0.069]**
Requested more information	0.04 [0.079]	0.01 [0.073]	0.04 [0.078]	0.11 [0.074]	0.06 [0.074]	0.09 [0.075]
Expected grade this year (percent)	−0.3 [1.722]	0.75 [2.333]	0.88 [1.807]	−0.59 [1.713]	−1 [2.207]	−0.55 [2.097]

Notes: Column 1 shows the estimated effects of the treatment as in Tables 5–8, with linear controls for female, born in Canada, grade last year (percent), indicators for whether mother's and father's highest degrees were university, first survey reports on whether a participant has ever thought of not finishing high school, whether government guarantees college access, and indicators for expected highest degree in first survey (unsure, high school, college, or university) for the sample excluding students who report in the first survey that they expect to go to university. Column 4 shows the same, but for the sample excluding students who expect to go to any college. Columns 2 and 5 display the estimated effects of the treatment from regressing the outcomes on treatment status and reweighting the sample by the inverse probability of responding to the second survey. Probabilities were estimated using a probit model and the same variables used for controls in Columns 1 and 4. Columns 3 and 6 show the estimated effects of the treatment after interacting the control variables with the treatment indicator (for more details see the main text of this paper and Puma *et al.*, 2009). Huber–White robust standard errors are shown in square brackets. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

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