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INTERVENTION, EVALUATION, AND POLICY STUDIES

Goal Setting, Academic Reminders, and College Success: A Large-Scale Field Experiment

Christopher R. Dobronyi[a], Philip Oreopoulos[a], and Uros Petronijevic[b]

ABSTRACT

This article presents an independent large-scale experimental evaluation of two online goal-setting interventions. Both interventions are based on promising findings from the field of social psychology. Approximately 1,400 first-year undergraduate students at a large Canadian university were randomly assigned to complete one of two online goal-setting treatments or a control task. In addition, half of treated participants were offered the opportunity to receive follow-up goal-oriented reminders through e-mail or text messages to test a cost-effective method for increasing the saliency of treatment. Across all treatment groups, we observed no evidence of an effect on grade point average, course credits, or second-year persistence. Our estimates are precise enough to discern a 7% standardized performance effect at a 5% significance level. Our results hold by subsample, for various outcome variables, and across a number of specifications.

KEYWORDS

goal setting
field experiment
mindset
higher education

Introduction

Having earned acceptance into college, most students intend to earn good grades and keep options open for graduate school (Beattie, Laliberte, & Oreopoulos, 2016). Despite these intentions, many perform poorly and drop out. In the province of Ontario, for example, only 75% of students complete a degree within six years[1] and 30% of students withdraw from their program within their first year, citing poor grades and a lack of motivation as the main factors behind the withdrawal decision (Finnie, Childs, & Qiu, 2010). In the United States, the completion rate is even lower, at 56% (Symonds, Schwartz, & Ferguson, 2011).

Studies suggest that financial aid, structured coaching, tutoring, and group activities help students graduate both two-year (Scrivener et al., 2015) and four-year programs (Angrist, Autor, Hudson, & Pallais, 2015; Bettinger & Baker, 2014; Clotfelter, Hemelt, &

CONTACT Philip Oreopoulos philip.oreopoulos@utoronto.ca University of Toronto, 150 St. George Street, Suite 308, Toronto, Ontario, M5S3G7, Canada.
[a]Department of Economics & Public Policy, University of Toronto, Toronto, Ontario, Canada
[b]Department of Economics, York University, Toronto, Ontario, Canada

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[1]Authors' calculations using data from Ontario's Ministry of Advanced Education and Skills Development (http://www.iaccess.gov.on.ca/OsapRatesWeb/enterapp/home.xhtml). Looking ahead to our attempt to replicate an experiment conducted at McGill University (Montreal, Quebec) with an experiment at the University of Toronto (U of T), the completion rates at McGill and U of T's main St. George campus are 85% and 80%, respectively (http://www.macleans.ca/education/canadian-universities-with-the-highest-and-lowest-graduation-rates/). At the Mississauga campus of U of T, the site of our experiment, the six-year graduation rate is 70%.

Ladd, 2018; Page, Keho, Caslteman, and Sahadewo, 2017). Financial aid helps relax credit constraints, allowing students to focus on studying instead of working (Belley & Lochner, 2007), and coaching and group activities help students develop consistent study habits (Cook et al., 2014; Oreopoulos, Brown, & Lavecchia, 2014). While effective, these services are often costly and, therefore, difficult to scale to large student populations (Bloom, 1984).

Recent research from social psychology suggests that brief one-time interventions can produce effects comparable to traditional services but at a much lower cost (Cohen & Garcia, 2014; Walton, 2014; Yeager & Walton, 2011). These interventions work by challenging unhelpful perspectives about school; for example, Yeager et al. (2016) find that struggling students earn better grades after completing an online exercise aimed to promote a growth mindset: the belief that intellect can be developed. Although the saliency of treatment tends to fade over time, an effective intervention affects recursive processes, altering a student's long-term trajectory (Yeager & Walton, 2011).[2] Often, these brief one-time interventions are inexpensive and can be scaled.

As a promising example of such an intervention, Morisano, Hirsh, Peterson, Pihl, and Shore (2010) find that struggling college students earn higher grades when they write about personal goals at the beginning of the school year. Students randomly assigned to complete a brief online goal-setting intervention experienced a large increase in grade point average (GPA) relative to a control group and a higher likelihood of maintaining a full course load. It is believed that salient goals affect action (Locke, Shaw, Saari, & Latham, 1981; Locke & Latham, 1990, 2002) and that goal-setting affects performance by improving focus, effort, enthusiasm, and persistence, while leading students to more efficient strategies for achieving desired outcomes (Locke & Latham, 2002). Online goal-setting interventions are inexpensive and can be scaled, with the potential to help students earn better grades and complete college.

Most studies that evaluate the efficacy of goal-setting interventions either have small sample sizes (e.g., Morisano et al., 2010) or use quasi-experimental approaches with observational data (e.g., Schippers, Scheepers, & Peterson, 2015), making it difficult to credibly identify treatment effects. In contrast, this article presents an independent large-scale experimental evaluation of the effect of two goal-setting exercises on grades and retention rates in college.

We randomly assign approximately 1,400 undergraduate students from a representative commuter campus in suburban Toronto to control or treatment. Treated students completed an online goal-setting exercise similar to that of Schippers et al. (2015) and related to Morisano et al. (2010) or a condensed version of this goal-setting exercise and a short mindset-message exercise designed to foster the belief that intellect can be developed.[3] To test a cost-effective way to increase the saliency of treatment, half of the treated students were offered the opportunity to regularly receive e-mail or text message reminders, which made explicit references to the goals each student described during the completion of initial

[2]A recursive process occurs when a psychological belief affects performance, which then affects the belief and performance further, continuing the cycle further in a reinforcing manner (Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009). For example, low self-confidence can cause poor performance in school, leading to even lower self-confidence and lowering performance further.

[3]We outline below how our intervention differs from that in Morisano et al. (2010).

treatment. All experimental materials, documented in Appendices A through C, were generously provided by Jordan Peterson (Morisano et al., 2010; Peterson & Mar, 2013; Schippers et al., 2015) and are similar to that of Schippers et al. (2015). Grades and registration status were monitored for two years after treatment.

Theory and Evidence

Students who do not complete college often begin to struggle shortly after the start of their first term (Adelman, 1999, 2006; Ishitani & DesJardins, 2002). In part, the struggles stem from inadequate preparation (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2007), which makes it difficult to complete coursework and keep up in a fast-paced, competitive environment (Pennebaker, Colder, & Sharp, 1990). All else equal, students who devote adequate time and effort to their studies perform well and complete college (Pascarella & Terenzini, 2005). But many students do not study enough to earn good grades (Beattie et al., 2016). Non-cognitive factors like attitude, procrastination, and persistence predict how much schooling a student attains nearly as well as cognitive skill (Kautz, Heckman, Diris, ter Weel, & Borghans, 2014).

Studies suggest that non-academic services help students by fostering motivation, effort, and good study habits (Lazowski & Hulleman, 2016; Lotkowski, Robbins, & Noeth, 2004; Robbins et al., 2003). First-year seminars (Schnell, Louis, & Doetkott, 2003), cognitive behavioral therapy (Cook et al., 2014; Heller, Pollack, Ander, & Ludwig, 2013), and coaching (Oreopoulos et al., 2014) have all been shown to improve many academic outcomes. Emerging recent literature suggests that goal-setting interventions also help students earn better grades (Morisano, 2008).

Goals represent conscious and meaningful objectives that people pursue (Elliot, Chirkov, Sheldon, & Kim, 2001), believed to affect both thought and action (Locke et al., 1981; Locke & Latham, 1990, 2002; Wiese & Freund, 2005). It is believed that people regulate their lives through meaningful thought (Bandura, 1997; Locke & Latham, 2002).[4] If students are present-biased, prompting them to think more carefully about their future may help reduce the bias by increasing focus, effort, motivation, and persistence (Lavecchia, Liu, & Oreopoulos, 2016; Locke et al., 1981; Locke & Latham, 2002; Smith, Locke, & Barry, 1990). This leads to the discovery of relevant knowledge and the use of more efficient strategies for achieving desired outcomes. Goal-setting is also believed to decrease stress (Elovainio & Kivimäki, 1996) and increase working memory (see Morisano, 2008, for an overview), making students with clear goals more likely to complete college (Braxton, Hirschy, & McClendon, 2004; Kirby & Sharpe, 2001).

Simply making a list of goals is not sufficient for helping students reach desired outcomes (Koestner, Lekes, Powers, & Chicoine, 2002).[5] For goal setting to be effective, goals must be meaningful, challenging, specific, and attainable. Individuals are more likely to put in effort when a goal is meaningful and difficult (Koestner et al., 2002; Locke & Latham, 2002; Ryan, Sheldon, Kasser, & Deci, 1996), and making goals specific

[4]More than 400 studies find a correlation between goal-setting and task performance (Locke & Latham, 1990, 2002, 2007).

[5]See Morisano and Shore (2010) for a detailed overview of conditions related to successful goal setting (pp. 253).

tends to reduce variation in performance (Locke, Chah, Harrison, & Lustgarten, 1989).[6] Moreover, people who believe that they are making progress toward a goal perform better (Diener, 1984; Koestner et al., 2002). As a result, performance is improved when a large or complex goal is split into smaller goals because regular feedback on progress is then readily available (Latham & Seijts, 1999; Locke & Latham, 2002). For similar reasons, it is important for people to set a time line, create a detailed plan for attaining their goal, list the consequences of their goal, and create alternative plans for when they reach obstacles (Bandura, 1977; Gollwitzer, 1999; Schunk, 1991). Goal-setting interventions guide students through this process in detail.

Morisano et al. (2010) constructed a randomized experimental evaluation of the effects of a one-time goal-setting intervention on the academic performance of struggling undergraduate students at McGill University in Montreal. Interested participants were self-nominated academically struggling students with GPAs below 3.0. They were qualitatively screened for inclusion and assessed for feelings of academic struggle, with a total of 85 students meeting the participation criteria and being included in the study. Students were offered financial remuneration for their time.

Randomly selected treated students were then guided through a sequence of eight online goal-setting exercises, adapted for young adult students from an intervention by Peterson and Mar (2004). Students were instructed that the exercise would take 2 to 2.5 hours. At the outset, they were asked to think about their values and futures and what they hoped to accomplish in a general sense. They were then asked to define seven or eight specific goals and to examine each goal carefully, explaining why each was important and vividly describing potential obstacles and strategies for overcoming them. The treatment group ($n = 45$) exhibited a large and statistically significant increase in mean GPA from 2.25 to 2.91 (an increase of about 70% of a standard deviation), while the control group ($n = 40$) experienced no discernible change. No treated participant dropped below a full course load, while eight of the students in the control group did; two students from the control group withdrew from the university entirely. Subsequent goal-setting interventions have found heterogeneous treatment effects (Schippers et al., 2015) and effects on retention rates but not on GPA (Finnie et al., 2017).

Most goal-setting interventions have a small sample size (e.g., Morisano et al., 2010), use observational data, or rely on pre-post quasi-experimental designs (e.g., Schippers et al., 2015). Given the dramatic estimated effects and the scalability of these interventions, a primary purpose of this study is to test the external validity of these studies with a similar intervention in an experimental setting with a sufficiently large sample size.

A brief goal-setting intervention can push students in the right direction, but it is important for students to maintain confidence in their abilities to reach their goals (Bandura, 1977, 1993). Students with low confidence seek to maintain positive judgments of their ability (Elliot & Dweck, 1988; Leondari & Gialamas, 2002; Robins & Pals, 2002) and often tend to perform poorly because they do not embrace challenges as opportunities for learning more effective strategies for goal attainment (Diener &

[6]As one might expect, the probability of goal attainment declines as goal difficulty progressively exceeds individual ability (Bandura, 1977; Perrone, Civiletto, Webb, & Fitch, 2004; Schunk, 1991), as perceived obstacles present too great a challenge to attainment (Lent, Brown, & Hackett, 2000).

Dweck, 1978, 1980). In contrast, students who believe that ability is to be developed along a journey treat challenges and setbacks as learning experiences, using them to form better strategies and, ultimately, perform better (Dweck & Leggett, 1988).

Many studies find a positive association between academic performance and a growth mindset: the belief that intellectual abilities can be developed (Blackwell, Trzesniewski, & Dweck, 2007; Claro, Paunesku, & Dweck, 2016; Dweck, 2000; Romero, Master, Paunesku, Dweck, & Gross, 2014; Stipek & Gralinski, 1996). A growth mindset is believed to foster the perception that difficult tasks are a medium for growth (Blackwell et al., 2007), encouraging challenging learning experiences (Mueller & Dweck, 1998; Romero et al., 2014). Students who are taught the science behind the malleability of the brain and the benefits associated with a growth mindset perform better than their peers (Aronson, Fried, & Good, 2002).

Paunesku et al. (2015) conduct a randomized experimental evaluation of the effects of a one-time online growth mindset intervention on the academic performance of high school students. A total of 1,594 students from 13 high schools in the United States participated. The growth mindset treatment guided students through an article that explained how the brain can grow through practice and hard work, citing relevant findings from the field of neuroscience. Students were then asked to complete two writing exercises in which they first summarized the article in their own words and then advised a hypothetical discouraged student. The treatment module was designed to last 45 minutes. The authors find a statistically significant interaction between treatment and an indicator for whether the student was at risk prior to treatment, relative to the control group. A follow-up study by Yeager et al. (2016) attempts to improve the efficacy of this intervention by making it more relevant for high school students. The authors find that struggling high school students assigned to complete the revised growth mindset intervention experienced a 0.13 unit increase in GPA, on average.

While these interventions are small in terms of resources and costs, a well-designed intervention makes use of novel mechanisms and targets relevant subjective beliefs to create an impactful experience from the perspective of the student (Yeager & Walton, 2011). Moreover, Morisano et al. (2010) and Paunesku et al. (2015) use the act of writing to encourage students to internalize treatment: Writing requires complex reasoning (Sugiyama, 2001) and has been shown to increase working memory and improve GPA (Klein & Boals, 2001).[7] While the saliency of treatment fades over time, an effective intervention will affect recursive processes (Yeager & Walton, 2011).

This article tests a new goal-setting treatment that was developed by Jordan Peterson (Morisano et al., 2010; Peterson & Mar, 2013; Schippers et al., 2015) and motivated by the growth-mindset literature. Some treated participants are also randomly assigned to regularly receive personalized goal-oriented e-mails or text messages in an attempt to increase the saliency of the treatment in a cost-effective way. Many studies have shown that periodically reminding parents about their students' academic progress increases parental engagement and student achievement (Bergman, 2016; Kraft & Dougherty, 2013; Kraft & Rogers, 2014; Mayer, Kalil, Oreopoulos, & Gallegos, 2015). Other studies

[7]See Smith (1998) for an overview of the benefits associated with expressive writing.

have used text messages to increase the probability of students renewing financial aid (Castleman & Page, 2014) and improve academic outcomes (Castleman & Meyer, 2016).

We hypothesize that goal-setting treatments will positively affect grades and retention rates and that the effect will be larger for students experiencing academic difficulty. We also hypothesize that this effect will fade over time and will fade more slowly for students assigned to receive reminders.

Methodology

Setting, Participants, and Experimental Procedures

We conducted our experiment at beginning of the 2014–2015 academic year at the University of Toronto's satellite campus in Mississauga (UTM). UTM is primarily a commuter campus with approximately 12,500 undergraduate students. Roughly 80% of students at UTM live at home with their parent(s), slightly less than a quarter identify the campus as their first choice, and the majority plan to work at least part-time while attending. Entry grades range from about 75% to 90%, with the median entry high school grade being 82% and the average being 84%. Many of the students are immigrants or children of immigrants. Among those who entered in 2001, only 38% completed a degree in four years, while the six-year graduation rate was about 70%. The rate for students from the lowest quantile of high school grades is 55% (Angrist, Lang, & Oreopoulos, 2009).

At the beginning of the 2014–2015 academic year, all undergraduate students enrolled in an introductory economics course at UTM were asked to participate in an online exercise for 2% of their final grade. Students completed the exercise online during the first two weeks of the fall semester and 1,505 students registered to take the exercise. Only 4% of students enrolled in first-year economics did not register (and did not receive a participation grade), and only 13 students in total did not provide consent for using their data for external research, leaving 1,492 students for our baseline sample. Student-level administrative data were collected for every consenting student through the University of Toronto's centralized student information service. Academic outcomes were monitored for two years after the intervention.

All participating students were required to create an online account and complete a preliminary survey eliciting background information, study habits, and attitudes. Upon completion of the survey, 40% of participating students were randomly assigned to the control group, while the remaining 60% were assigned to treatment.

Among students assigned to treatment, 50% were allocated to complete a goal-setting treatment similar to that of Schippers et al. (2015) and related to Morisano et al. (2010). The other 50% of treated students were given a condensed version of the goal-setting treatment, in addition to an exercise inspired by the growth-mindset literature. Following completion of the designated exercise, 50% of all treated participants were then assigned to regularly receive personalized goal-oriented reminders through e-mail and offered the opportunity to receive reminders through text messages; roughly 75% of students who were offered the opportunity provided a phone number. (See Figure 1 for a visual representation of the complete randomization procedure.) All participants were e-mailed a copy of the answers that they had provided throughout the exercise.

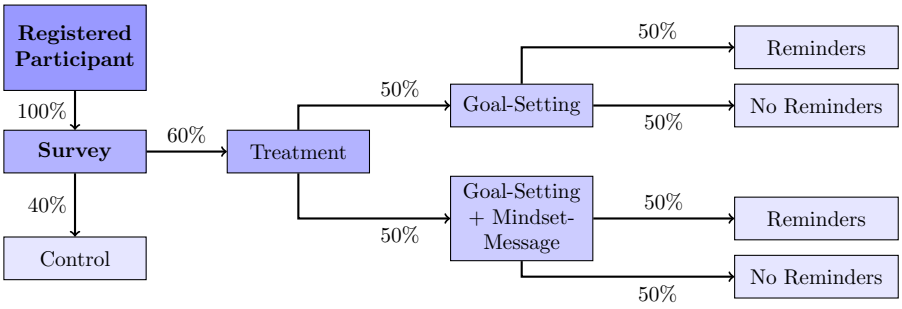

Figure 1. Flowchart illustrating the randomization of registered participants into treatment and control groups.

Table 1. Intended and realized proportions of students assigned to control and treatment groups.

		Treatment group			
	Control	G NR	G R	GM NR	GM R
No. of students	601	216	225	221	229
(i) Fraction of total	40.28%	14.47%	15.08%	14.81%	15.34%
(ii) Intended fraction	40.00%	15.00%	15.00%	15.00%	15.00%
p value of (i) = (ii)	.8253	.5664	.9310	.8372	.7130

Note. G = goal setting; GM = goal setting + mindset message; NR = no reminders; R = reminders.

In Table 1, we fail to reject the null hypothesis that the realized proportions of students assigned to control and treatment groups differ from the intended proportions at any reasonable significance level. This result is expected, since we maintain the full sample of participating students prior to randomization for our analysis. Tables 2 and 3 illustrate that there does not exist a statistically significant difference between the sample means of any baseline characteristics across control and treatment groups, as expected with random assignment. In terms of the descriptive characteristics of this sample, 49% of participants are female, 73% are first-year students, 57% are non-native English speakers, 57% are not Canadian citizens, and the average age is nearly 19. Seventeen percent of participating students lived in residence in the year of the initial treatment, and the mean high school average was 82%.

Treatments

The goal-setting intervention was designed to help students imagine a road map for achieving their goals. This intervention was developed using theory on goal-setting, expressive writing (Smith, 1998), and creativity models (Simonton, 1999). Students were required to provide answers in writing. Minimum word counts and time restrictions were imposed to encourage participants to give each answer an appropriate amount of consideration; to encourage students to write freely, we made it clear that we would delete their written thoughts after e-mailing their completed exercise for reference. Responses to part of a similar exercise reported in Oreopoulos and Petronijevic (2018) suggest that virtually all students took the task very seriously, writing in personal detail. The entire module was designed to take two hours to complete. Figure 2 shows that a large majority of students

Table 2. Descriptive statistics with administrative data.

	Treatment group					
	Control	G NR	G R	GM NR	GM R	
	Sample Mean [*SD*]	Difference with Control [*SE*]	Difference with Control [*SE*]	Difference with Control [*SE*]	Difference with Control [*SE*]	*F*-Stat: No Difference
Female	0.493	0.017	−0.026	0.010	−0.017	0.28
	[0.500]	[0.040]	[0.039]	[0.039]	[0.039]	
Age	18.752	0.216*	−0.103	0.126	0.078	1.56
	[1.339]	[0.119]	[0.117]	[0.118]	[0.117]	
High school average	84.186	0.090	−0.097	0.303	−0.165	0.36
	[4.431]	[0.362]	[0.357]	[0.358]	[0.356]	
Non-English mother tongue	0.572	0.048	−0.030	0.002	−0.022	0.83
	[0.495]	[0.039]	[0.039]	[0.039]	[0.038]	
Non-Canadian citizenship	0.581	0.049	–0.070*	0.003	−0.061	2.28
	[0.494]	[0.039]	[0.039]	[0.039]	[0.038]	
First-year student	0.739	–0.067*	0.016	−0.001	−0.005	1.21
	[0.440]	[0.035]	[0.035]	[0.035]	[0.034]	
Living in residence	0.163	0.008	0.041	0.018	−0.045	1.67
	[0.370]	[0.030]	[0.029]	[0.029]	[0.029]	

Note. G = goal setting; GM = goal setting + mindset message; NR = no reminders; R = reminders.
***$p < .01$. **$p < .05$. *$p < .1$.

Table 3. Descriptive statistics with survey data.

	Treatment Group					
	Control	G NR	G R	GM NR	GM R	
	Sample Mean [*SD*]	Difference with Control [*SE*]	Difference with Control [*SE*]	Difference with Control [*SE*]	Difference with Control [*SE*]	*F*-Stat: No Difference
Expects to get more than undergraduate degree	0.488	−0.014	0.010	−0.029	−0.017	0.23
	[0.500]	[0.040]	[0.039]	[0.039]	[0.039]	
First-generation student	0.382	0.014	−0.008	0.066	0.039	0.91
	[0.486]	[0.041]	[0.040]	[0.040]	[0.040]	
Expects average ≥80	0.564	−0.010	−0.034	0.004	0.008	0.28
	[0.496]	[0.040]	[0.039]	[0.039]	[0.039]	
Expected hours spent studying	20.944	−0.048	−0.214	−0.713	−0.372	0.14
	[12.881]	[1.022]	[1.005]	[1.010]	[0.995]	
Expects to work ≥8 hours/week	0.463	0.044	−0.032	−0.027	−0.035	1.00
	[0.499]	[0.040]	[0.039]	[0.039]	[0.039]	
Procrastinates (1–5)	2.976	0.038	0.028	0.064	0.072	0.35
	[0.934]	[0.074]	[0.073]	[0.073]	[0.072]	
Sure about program of study (1–3)	2.382	−0.035	−0.019	−0.028	−0.007	0.18
	[0.601]	[0.048]	[0.047]	[0.048]	[0.047]	
Sure about career (1–3)	2.261	–0.101*	−0.046	−0.043	−0.064	1.12
	[0.618]	[0.052]	[0.051]	[0.051]	[0.050]	

Note. G = goal setting; GM = goal setting + mindset message; NR = no reminders; R = reminders.
***$p < .01$. **$p < .05$. *$p < .1$.

started the online exercise within ten days of the start of the fall semester, while Figure 3 shows that most students who completed the exercise did so in between 1.5 to 3 hours.

The goal-setting treatment encouraged students to set goals that are meaningful, specific, challenging, and attainable. Students were asked to write about one thing that they could do better, things that they would like to learn in the near and distant future, and their current habits. Students were also asked to envision their future social life, future

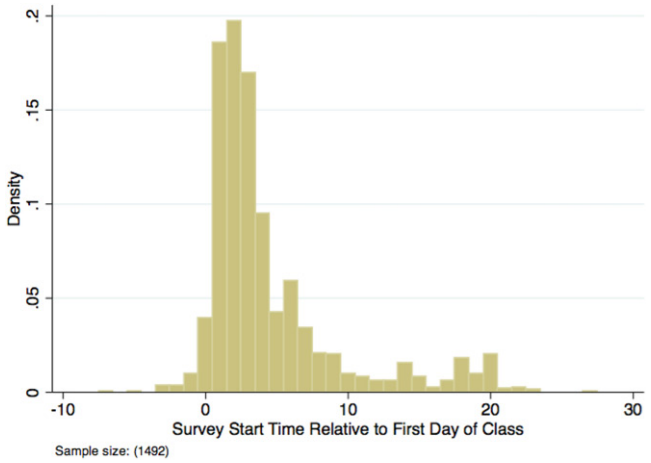

Figure 2. Histogram of the number of days each student took to start the survey relative to the first day of class.

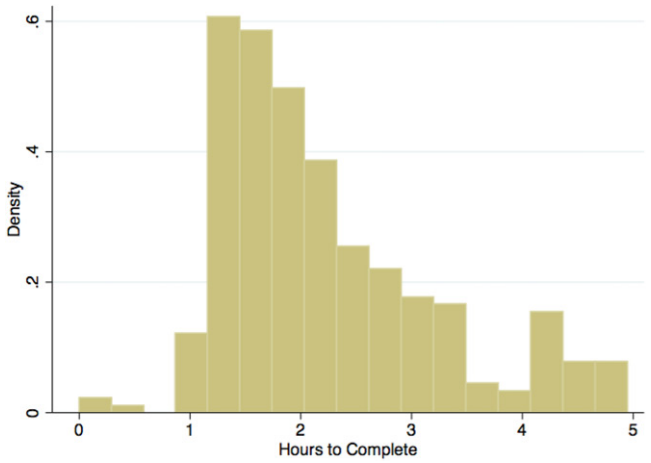

Figure 3. Histogram of the number of hours each student took to complete treatment conditional on completion and truncated at 5 hours.

family life, and future career and to write about how to maintain a balanced life. They were required to list role models and create a title and description for both an ideal future and a future that they would like to avoid.

Next, students were encouraged to identify specific goals and envision steps that they could take to induce the realization of their preferred future. Students were asked to describe their ideal future in detail, identify and prioritize goals from their answers so far, and evaluate their motives for each of these goals. This process was meant to help students identify specific goals that are meaningful to them and to help students avoid the natural tendency to set too many goals at once or goals that conflict with each other (Baumeister & Heatherton, 1996; Koestner et al., 2002). Students were then asked to consider consequences of their goals, create detailed plans for attaining their goals, and identify benchmarks for monitoring their progress along the way.

As a point of clarification, our treatment and that of Schippers et al. (2015) differ from Morisano et al. (2010) in three main ways. First, regarding content, Morisano et al. (2010) did not ask students to write about their future social life, future family life, future leisure activities, or a future to avoid, and they did not ask students to create a title for their ideal future; in addition, they asked students to ascertain their levels of commitment to each of their chosen goals. Second, Morisano et al. (2010) did not impose minimum word counts or required writing times, but instead hand-checked that the exercises were given sufficient consideration. The authors also asked that students write for a minimum of 2 and a maximum of 2.5 hours in one sitting and without taking breaks. Third, the exercises were presented in a different order than in the current study. We discuss the likelihood that these differences explain our contrasting findings in Section V below. All experimental materials for this treatment group are provided in Appendix A.

Our sample also differs from that of Morisano et al. (2010). The sample in Morisano et al. (2010) consists of students who are self-nominated as academically struggling and have a GPA below 3.0 at McGill University. Our sample consists of *all* students taking first-year introductory economics at UTM. McGill and the University of Toronto's main campus, St. George, are both highly selective Canadian universities. UTM does have lower admissions criterion than the main campus. The average incoming student at St. George has a high school average of 90.4%, 6 percentage points higher than the average student at UTM. Moreover, students at St. George have higher expectations, as 68% of students at St. George expect to earn an average grade of 80% or higher (compared to 56% of UTM students) and 71% desire more than a bachelor's degree (compared to 49% of UTM students). In addition, owing to UTM's location and status as a commuter campus, a much larger fraction of students at St. George lives on campus than at UTM (43% at St. George compared to 16% at UTM).[8]

Among students at UTM, a GPA cutoff of 3.0 corresponds approximately to the 75th percentile in the GPA distribution. At the St. George campus, where the distribution of student GPAs likely better resembles the distribution at McGill, this cutoff corresponds to the 60th percentile. It is therefore likely that a larger fraction of the student population at UTM is below the 3.0 GPA cutoff than at McGill.[9] Given the magnitude of the estimated effect in Morisano et al. (2010) and the large mass of students in our sample who would likely meet the inclusion criteria of the original study, we should be able to detect an average treatment effect. Our much larger and representative sample also allows us to split the analyses by several different student subgroups when estimating treatment effects. We therefore should be able to replicate the effects found in the original study in at least the subgroups that bare a closer resemblance to the academically struggling students in Morisano et al. (2010).

Our second intervention, the goal-setting-plus-mindset-message treatment, replaced the second half of the goal-setting treatment—the requirement for students to define eight specific future goals—with material inspired by growth mindset theory. The mindset-message treatment guided students through an article that contrasted the fixed and growth mindsets, outlining how individuals with a growth mindset tend to improve

[8]Summary statistics for the St. George campus reflect the authors' calculations using a sample of students taking first-year introductory economics at St. George during the 2016–2017 academic year.

[9]In addition to having a GPA below 3.0, participants in Morisano et al. (2010) underwent a brief phone interview, designed for screening and assessing feelings of academic difficulty.

performance more quickly over time. Students were then asked to recall related experiences in which hard work led to success and to identify ways that they may apply a growth mindset to deal with obstacles in the future. This treatment aimed to discourage the belief that ability is innate and to encourage students to recognize effort as an effective way to achieve success and to take on challenging learning experiences. The treatment was made with the intention of combining the cores of prior goal-setting and mindset interventions, both of which have been shown to be effective at improving student outcomes. All experimental materials for this treatment group are provided in Appendix B.

The mindset-message material in our second intervention did not explicitly offer the metaphor of the brain being like a muscle, nor did it mention the prospect of increasing one's intelligence over time by working hard on and struggling through challenging tasks (Paunesku et al., 2015). As such, our second intervention is more accurately viewed as being inspired by the growth-mindset literature, but not as an explicit test of a growth-mindset intervention. The intervention does, however, distinguish between fixed and growth mindsets and encourage students to approach difficult tasks with the intention of exerting effort to overcome challenges and to view failure as an opportunity for improvement. One can therefore view our mindset-message intervention as a treatment that is designed to influence students' beliefs about the role and importance of effort throughout the pursuit of goals (Blackwell et al., 2007).

To increase the saliency of treatment, half of the treated students were offered the opportunity to receive reminders. Reminders were sent through e-mail and text messages. These reminder messages consisted mainly of academic tips and motivational support. For students who completed the full goal-setting treatment, some reminders were personalized with goal-oriented messages, making explicit reference to the individual, specific goals each student provided during the completion of the initial treatment. Appendix D documents all the messages we sent throughout the experiment. Students could choose the frequency of reminders and could discontinue reminders at any time, although only four chose to opt out. Text messages were brief, typically three lines in length; e-mails were longer and more detailed. For the 75% of students who provided a cell phone number to contact, each text message was sent together with an e-mail containing similar information but with more detail. Students could respond to either e-mail or text, although we did not prompt them and few actually did.

The control group was given a personality test measuring the Big Five personality traits. This exercise was intended to require an equivalent amount of time and effort as the treatments but without affecting grades or retention rates, thus making it an appropriate control group exercise and making our results comparable to other goal-setting interventions. All experimental materials for the control group are provided in Appendix C.

Results

Empirical Strategy

We estimate treatment effects by comparing means in a regression framework. Since randomization was successful (see Tables 1–3), the ordinary least squares estimator for

each coefficient is a consistent estimator of the average causal effect of being offered the opportunity to complete the corresponding treatment on the outcome of interest relative to the control group. Given that 1,399 out of a total of 1,492 registered students completed the exercise, these estimates are likely close to the unconditional average treatment effects.

Our primary specification estimates the effect of any treatment. We also estimate the effect of the goal-setting treatment, the effect of the goal-setting-plus-mindset-message treatment, the effect of any treatment with reminders, the effect of any treatment without reminders, and the effect of each treatment with and without reminders. We further present results by subsamples more at risk of poor academic performance, results corresponding to alternative specifications that account for student characteristics, and student characteristics and course fixed effects.

Our main outcomes of interest are course grades and registration status. Course grades are increasing in student performance on a scale ranging from 0 to 100 and recorded at the end of every semester. Registration status is a binary outcome equal to 1 if and only if the participant is officially registered as a student at the University of Toronto. Registration status is recorded at the beginning of every school year. In part, course grades were chosen because evidence suggests that grades proxy for knowledge retention and are the best predictor of college completion (Pascarella & Terenzini, 2005). While registration status is a standard outcome variable within the existing literature on goal-setting interventions, Morisano et al. (2010) focus on GPA instead of grades. But course grades provide us with more power to estimate treatment effects and allow for us to control for course difficulty with course fixed effects. To be sure that this does not affect the results, we estimate treatment effects for an array of alternative dependent variables, including GPA.

When the dependent variable is course grades, reported course grades are stacked for every student, the regression is run at the course-student level, and standard errors are clustered by student identification numbers. All other specifications are run at the student level.

Main Results

Table 4 presents the estimated effect of each treatment on two years of course grades by semester and registration status in the year following treatment. Each row is associated with a given outcome variable. Each element of column (1) reports the mean and standard deviation of the corresponding outcome variable for the control group. Columns (2) through (10) present the estimated average causal effect of each treatment relative to the control group and the corresponding standard error. We observe no evidence of an effect of treatment with estimates precise enough to discern a 1–percentage point increase in course grades at a 5% significance level; this is equivalent to a 7% standardized performance effect.

Figures 4 and 5 illustrate the distributions of grades by treatment group. There is no observable effect of treatment on the distribution of grades, and a Kolmogorov-Smirnov test fails to reject the null hypothesis that control and treatment group grade distributions are the same.

Table 4. Treatment effects on grades and registration status. Standard errors clustered by student identification number.

	Treatment Group										
Dependent variable	Control Mean [*SD*]	G NR Effect [*SE*]	G R Effect [*SE*]	G NR + R Effect [*SE*]	GM NR Effect [*SE*]	GM R Effect [*SE*]	GM NR + R Effect [*SE*]	G + GM NR Effect [*SE*]	G + GM R Effect [*SE*]	G + GM NR + R Effect [*SE*]	Sample size
First semester (2014–2015)	65.700	−1.120	0.513	−0.268	0.814	1.690	1.259	−0.131	1.098	0.501	2,304
Grades	[13.368]	[1.176]	[0.982]	[0.845]	[1.006]	[1.052]	[0.816]	[0.855]	[0.809]	[0.693]	
Second semester (2014–2015)	69.399	−1.967	−1.833	−1.897*	0.614	−0.680	−0.053	−0.656	−1.249	−0.962	2,040
Grades	[14.228]	[1.502]	[1.336]	[1.098]	[1.240]	[1.252]	[0.992]	[1.075]	[1.021]	[0.867]	
All grades (2014–2015)	66.798	−1.197	−0.329	−0.743	−0.009	0.569	0.281	−0.589	0.112	−0.229	6,671
	[14.925]	[1.106]	[1.024]	[0.827]	[0.983]	[0.941]	[0.763]	[0.815]	[0.778]	[0.661]	
Registration status (2015–2016)	0.852	−0.060*	−0.003	−0.031	−0.001	−0.031	−0.017	−0.031	−0.017	−0.024	1,493
	[0.355]	[0.031]	[0.028]	[0.023]	[0.028]	[0.029]	[0.023]	[0.023]	[0.023]	[0.019]	
First semester (2015–2016)	69.453	0.195	−0.172	0.001	0.019	−0.987	−0.486	0.103	−0.575	−0.246	2,935
Grades	[13.928]	[1.062]	[1.122]	[0.871]	[1.073]	[1.122]	[0.873]	[0.854]	[0.888]	[0.734]	
Second semester (2015–2016)	68.910	0.188	0.886	0.551	0.362	0.856	0.614	0.274	0.871	0.582	3,160
Grades	[14.211]	[1.099]	[1.158]	[0.896]	[1.207]	[1.036]	[0.889]	[0.909]	[0.877]	[0.749]	
All grades (2015–2016)	68.775	−0.059	0.349	0.152	0.021	0.107	0.065	−0.018	0.228	0.108	7,712
	[14.320]	[0.927]	[1.054]	[0.781]	[0.987]	[0.889]	[0.742]	[0.755]	[0.766]	[0.633]	

Note. G = Goal setting; GM = goal-setting + mindset message; G + GM = G and GM combined; NR = no reminders; R = reminders; NR + R = NR and R combined.
***$p < .01$. **$p < .05$. *$p < .1$.

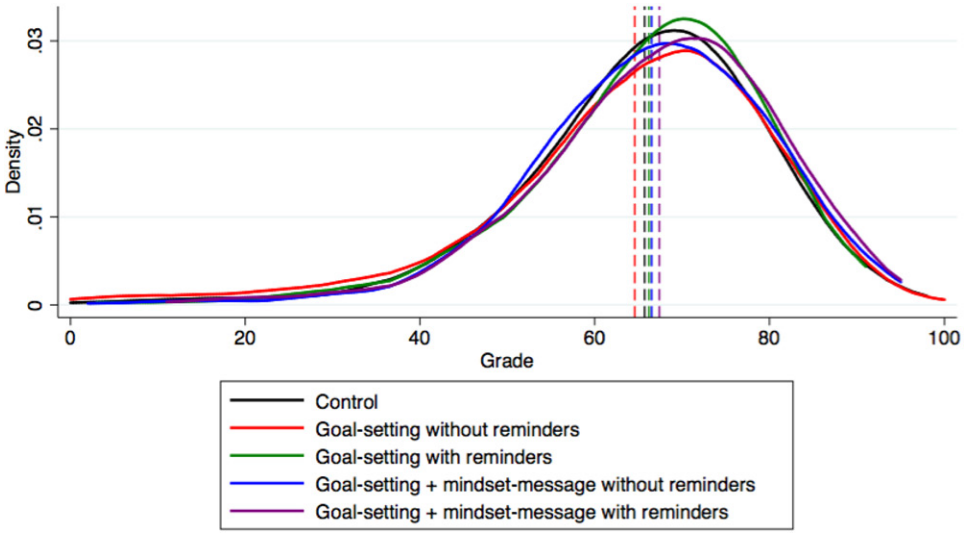

Figure 4. Kernel density of first semester (2014–2015) grades by treatment group. Dashed lines represent group means.

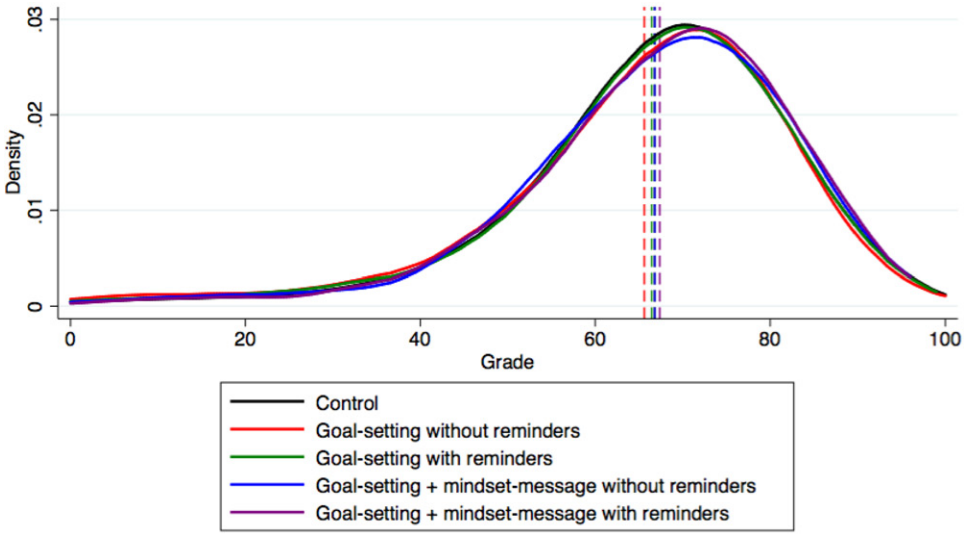

Figure 5. Kernel density of all 2014–2015 grades by treatment group. Dashed lines represent group means.

Heterogeneous Treatment Effects, Alternative Outcomes, and Alternative Specifications

We find no evidence that any treatment had an effect on student achievement. In this subsection, we take advantage of our large, representative sample and estimate separate treatment effects across various student subgroups.

First, we attempt to examine a population similar to the one for which treatment was most effective in Morisano et al. (2010) by focusing on students who are in the bottom

quantile of the incoming high school grades distribution and students whose mother tongue is English.[10] Second, we estimate effects for men and ethnic-minority students,[11] two populations found to be influenced by goal-setting in Schippers et al. (2015). Looking beyond studies directly testing goal-setting interventions, we explore treatment effects across students with higher or lower self-expectations for university grades, which might proxy for student confidence. We do so because research on other social-psychology interventions suggests that directly presenting information about how a task or technique is useful can have positive effects on confident students but negative effects on students with low confidence (Canning & Harackiewicz, 2015; Hulleman, Godes, Hendricks, & Harackiewicz, 2010).[12] Finally, research on brain development suggests that the neurological limitations in adolescent brains may make it difficult to overcome reward-seeking impulses to deviate from plans designed for goal achievement (Casey, 2015; Steinberg, 2015). Consistent with this research, working with a similar sample of students from the University of Toronto, Beattie et al. (2016) find that low-performing students have a high tendency to procrastinate, as measured by a self-reported habit to start assignments late. We therefore explore whether treatment effects are stronger for older students (who potentially have more mature neurobiology in the brain) and for students who report a lower tendency to procrastinate.

The results are reported in Table 5. Students in the bottom quantile of the incoming high school grades distribution do not experience statistically significant treatment effects, suggesting that treatment was not more effective among academically struggling students (as proxied by high school grades).[13] Because high school grades are a strong predictor of college success, it is unlikely that the treatments are effective in a subsample of struggling college students.

Comparing native English speakers to non-native speakers, there is a positive effect on grades from the treatment that combined goal-setting- and mindset-message-related materials but still no effect from the primary goal-setting intervention. The combined treatment also has a small effect on female students, although the effect is only marginally statistically significant. The primary goal-setting treatment again has no effect on men or women.

Treatment effects also do not differ by Canadian citizenship status, as no treatment has statistically significant effects on achievement. Distinguishing between students who expect to earn an average grade of 80% (A−) or higher and those who do not indicates that the combined goal-setting and mindset-message treatment may have improved performance among students with low expectations, providing evidence against the hypothesis that traces of the direct-persuasion method of communication in our intervention potentially harmed students with low confidence. Turning to hypotheses of brain development and procrastination tendency, we find that none of the treatment effects differ

[10]The intervention in Morisano et al. (2010) was most effective among native English-speaking students who are self-nominated as academically struggling and had pre-treatment GPAs lower than 3.0.

[11]We proxy for ethnic minority status with Canadian citizenship.

[12]Negative effects on low-confidence students can be undone by communicating information via "self-persuasion" methods, in which participants generate some information themselves instead of passively reading material provided by the researchers.

[13]In addition, treatment effects for the top quantile of students are not statistically different from zero at the 5% significance level. The bottom quantile of students had a high school average of 77% and the top quantile of students had an average of 88%.

Table 5. Treatment effects on all 2014–2015 grades by subsample. Standard errors clustered by student identification number.

	Treatment Group										
Subsample	Control Mean [*SD*]	G NR Effect [*SE*]	G R Effect [*SE*]	G NR + R Effect [*SE*]	GM NR Effect [*SE*]	GM NR + R Effect [*SE*]	GM C Effect [*SE*]	G + GM NR Effect [*SE*]	G + GM R Effect [*SE*]	G + GM NR + R Effect [*SE*]	Sample size
Full sample	66.798	−1.197	−0.329	−0.743	−0.009	0.569	0.281	−0.589	0.112	−0.229	6,671
	[14.925]	[1.106]	[1.024]	[0.827]	[0.983]	[0.941]	[0.763]	[0.815]	[0.778]	[0.661]	
HS avg. in bottom quantile	63.018	−1.258	−0.961	−1.075	−3.547*	−0.476	−1.822	−2.399	−0.746	−1.423	1,400
	[15.307]	[2.039]	[1.821]	[1.543]	[2.022]	[1.921]	[1.580]	[1.627]	[1.511]	[1.328]	
English mother tongue	67.341	−1.213	0.754	−0.114	0.117	2.789**	1.504	−0.494	1.773*	0.726	3,380
	[14.020]	[1.777]	[1.258]	[1.158]	[1.350]	[1.253]	[1.041]	[1.196]	[1.012]	[0.913]	
Non-English mother tongue	66.237	−1.072	−1.532	−1.298	−0.137	−2.123	−1.101	−0.618	−1.816	−1.203	3,291
	[15.790]	[1.395]	[1.622]	[1.178]	[1.435]	[1.367]	[1.113]	[1.118]	[1.178]	[0.953]	
Female	66.936	−0.552	0.503	−0.03	1.035	2.303*	1.671*	0.246	1.421	0.831	3,382
	[14.449]	[1.408]	[1.371]	[1.092]	[1.225]	[1.211]	[0.985]	[1.048]	[1.032]	[0.876]	
Male	66.653	−1.932	−1.047	−1.442	−1.095	−1.211	−1.154	−1.495	−1.125	−1.299	3,289
	[15.413]	[1.736]	[1.504]	[1.242]	[1.547]	[1.419]	[1.163]	[1.263]	[1.154]	[0.989]	
Canadian citizen	67.858	−1.519	0.015	−0.598	0.532	1.746	1.177	−0.359	0.873	0.335	3,421
	[13.378]	[1.608]	[1.208]	[1.064]	[1.313]	[1.270]	[1.017]	[1.114]	[0.986]	[0.862]	
Non-Canadian citizen	65.755	−0.686	−1.154	−0.896	−0.695	−1.482	−1.064	−0.69	−1.313	−0.976	3,250
	[16.242]	[1.527]	[1.734]	[1.261]	[1.457]	[1.317]	[1.121]	[1.184]	[1.217]	[0.999]	
Expects average ≥80	68.836	−2.282	−0.402	−1.324	−1.802	−0.877	−1.326	−2.034*	−0.65	−1.325	3,908
	[13.945]	[1.606]	[1.348]	[1.135]	[1.312]	[1.188]	[0.986]	[1.119]	[0.995]	[0.866]	
Expects average <80	64.060	0.06	0.129	0.098	2.581*	2.359	2.473**	1.346	1.139	1.239	2,709
	[15.574]	[1.403]	[1.536]	[1.178]	[1.458]	[1.514]	[1.177]	[1.148]	[1.212]	[0.991]	
20 or older	63.344	−0.914	−0.918	−0.916	0.566	0.413	0.494	−0.104	−0.19	−0.145	1,325
	[17.550]	[2.971]	[2.912]	[2.252]	[2.361]	[2.406]	[1.890]	[2.054]	[2.055]	[1.687]	
19 or younger	67.625	−1.217	−0.35	−0.753	0.041	0.689	0.372	−0.585	0.147	−0.202	5,346
	[14.104]	[1.154]	[1.065]	[0.866]	[1.063]	[0.998]	[0.818]	[0.869]	[0.822]	[0.703]	
Procrastinates	65.950	−0.68	−0.257	−0.464	−2.154	−0.613	−1.318	−1.43	−0.449	−0.912	1,624
	[15.770]	[2.240]	[2.063]	[1.718]	[2.091]	[1.731]	[1.561]	[1.728]	[1.553]	[1.407]	
Does not procrastinate	67.221	−1.588	−0.45	−0.985	0.66	0.967	0.811	−0.428	0.225	−0.095	4,993
	[14.492]	[1.280]	[1.186]	[0.948]	[1.100]	[1.124]	[0.872]	[0.923]	[0.904]	[0.748]	

Note. G = Goal setting; GM = goal-setting + mindset message; G + GM = G and GM combined; NR = no reminders; R = reminders; NR + R = NR and R combined.
***$p < .01$. **$p < .05$. *$p < .1$.

across older and younger students or across students who procrastinate and those who do not.

We find no effects of the goal-setting treatment in any of the subgroups considered in our primary analysis of heterogeneous treatment effects. To provide a completely thorough investigation, Tables 6 and 7 provide a secondary analysis of heterogeneous treatment effects, reporting estimates across several other student subgroups. The estimates generally do not show a positive effect associated with treatment—only 8 out of 306 estimated effects are statistically different from zero at a 5% significance level, 5 of which are negative. At the 5% significance level, we would expect that about 15 of the 306 estimated effects would be significant because of sampling error. Therefore, we interpret the statistically significant negative effect estimated for students who do not expect to earn more than an undergraduate degree with some skepticism, as this impact is no longer significant after performing a simple Bonferroni correction for multiple hypothesis testing.[14]

Overall, these results suggest that none of the treatments were able to improve students' academic outcomes, both in the full sample and across several student subgroups. Table 8 reports the estimated effect of treatment on alternative outcomes. We observe no discernible effect of treatment on first-year GPA, quantiles of GPA, the number of credits taken, the number of credits failed, or the number of credits received. All results hold independent of the chosen specification. We continue to observe no evidence of any effects when we control for a broad range of student characteristics or when we control for student characteristics and course fixed effects. See the online appendix for all results under these secondary and tertiary specifications.[15]

Discussion

One-time online interventions may provide a cost-effective way to help students perform better in and complete college. But we find no effect associated with an intervention designed to help college students carefully consider future goals and guide them through the process of developing detailed plans for achieving them. We also find no effect associated with a new intervention in which students set goals and complete an exercise designed to teach students about the role and importance of effort in the pursuit of those goals. Moreover, goal-oriented reminders were not able to induce a positive effect. These results hold by subsample, for various outcome variables, and across several specifications. We have statistical power to rule out small effects, including those as small as 7% of a standard deviation for the full sample.

In contrast, Morisano et al. (2010) test a related intervention on a sample of McGill students with GPAs less than 3.0 and report a treatment effect on GPA of more than

[14]We perform a conservative correction, assuming that we test 72 hypotheses (nine treatment effects for each the seven primary subgroups above and the full sample), which results in a significance level of .0007. The p value for the largest negative effect is .008, more than an order of magnitude higher than the corrected significance level. Performing the correction using all hypotheses tested would result in an even lower significance threshold.

[15]Moreover, to explore whether treatment caused students to change the composition of their classes, we estimated the effect of treatment on dropping economics (a course in which all students are initially enrolled) and on average course GPA in the following semester. The effect of treatment on economics enrollment is −0.007 with a standard error of 0.021. The effect of treatment on average course GPA is −0.005 with a standard error of 0.012. Standard errors were clustered by student identification numbers. These estimates are not statistically different from zero.

Table 6. Treatment effects on all 2014–2015 grades by subsample. Standard errors clustered by student identification number.

	Treatment Group										
Subsample	Control Mean [*SD*]	G NR Effect [*SE*]	G R Effect [*SE*]	G NR + R Effect [*SE*]	GM NR Effect [*SE*]	GM R Effect [*SE*]	GM NR + R Effect [*SE*]	G + GM NR Effect [*SE*]	G + GM R Effect [*SE*]	G + GM NR + R Effect [*SE*]	Sample size
Full sample	66.798	−1.197	−0.329	−0.743	−0.009	0.569	0.281	−0.589	0.112	−0.229	6,671
	[14.925]	[1.106]	[1.024]	[0.827]	[0.983]	[0.941]	[0.763]	[0.815]	[0.778]	[0.661]	
HS avg. above median	68.643	−1.902	−0.013	−0.977	1.826	1.609	1.715	−0.071	0.817	0.373	2,976
	[14.540]	[1.719]	[1.614]	[1.285]	[1.418]	[1.242]	[1.065]	[1.238]	[1.133]	[0.978]	
HS avg. below median	64.161	−1.166	−0.49	−0.781	−1.759	−0.032	−0.93	−1.488	−0.282	−0.855	2,805
	[14.898]	[1.391]	[1.440]	[1.132]	[1.409]	[1.461]	[1.134]	[1.115]	[1.145]	[0.947]	
First-year student	67.241	−0.85	−0.394	−0.597	−0.012	1.096	0.549	−0.4	0.331	−0.012	5,007
	[14.106]	[1.400]	[1.117]	[0.956]	[1.134]	[1.058]	[0.864]	[0.968]	[0.862]	[0.748]	
Non-first-year student	65.437	−1.56	−0.311	−1.017	−0.01	−1.254	−0.622	−0.864	−0.789	−0.829	1,664
	[17.137]	[1.774]	[2.430]	[1.650]	[1.941]	[1.945]	[1.579]	[1.522]	[1.737]	[1.384]	
Expects to get more than	67.495	1.409	−0.128	0.598	1.558	2.002	1.783*	1.484	0.900	1.182	3,453
undergraduate degree	[14.112]	[1.447]	[1.296]	[1.074]	[1.245]	[1.279]	[1.007]	[1.061]	[1.027]	[0.872]	
Does not expect more than	66.257	−4.294***	−0.671	−2.401*	−1.507	−1.021	−1.264	−2.831**	−0.847	−1.816*	3,164
undergraduate degree	[15.560]	[1.629]	[1.620]	[1.265]	[1.497]	[1.362]	[1.135]	[1.221]	[1.175]	[0.991]	
First-generation student	65.764	−2.184	−1.546	−1.849	−2.395	0.666	−0.908	−2.299	−0.428	−1.355	2,128
	[14.538]	[1.960]	[1.859]	[1.466]	[1.834]	[1.505]	[1.334]	[1.459]	[1.334]	[1.146]	
Not first-generation student	67.361	−0.261	0.163	−0.042	2.053*	0.029	1.049	0.878	0.1	0.483	3,874
	[14.987]	[1.325]	[1.358]	[1.053]	[1.196]	[1.355]	[1.012]	[1.007]	[1.063]	[0.862]	
Lives in residence	69.078	−3.81	−1.632	−2.632	−1.186	−1.817	−1.433	−2.476	−1.699	−2.107	1,170
	[12.686]	[2.483]	[1.957]	[1.716]	[2.245]	[1.622]	[1.663]	[1.827]	[1.545]	[1.407]	
Does not live in residence	66.302	−0.625	−0.081	−0.342	0.235	1.078	0.676	−0.184	0.518	0.182	5,501
	[15.326]	[1.235]	[1.182]	[0.938]	[1.092]	[1.052]	[0.852]	[0.910]	[0.881]	[0.743]	

Note. G = Goal setting; GM = goal-setting + mindset message; G + GM = G and GM combined; NR = no reminders; R = reminders; NR + R = NR and R combined.
***$p < .01$. **$p < .05$. *$p < .1$.

Table 7. Treatment effects on all 2014–2015 grades by subsample. Standard errors clustered by student identification number.

	Treatment Group										
Subsample	Control Mean [*SD*]	G NR Effect [*SE*]	G R Effect [*SE*]	G NR + R Effect [*SE*]	GM NR Effect [*SE*]	GM R Effect [*SE*]	GM NR + R Effect [*SE*]	G + GM NR Effect [*SE*]	G + GM R Effect [*SE*]	G + GM NR + R Effect [*SE*]	Sample size
Full sample	66.798	−1.197	−0.329	−0.743	−0.009	0.569	0.281	−0.589	0.112	−0.229	6,671
	[14.925]	[1.106]	[1.024]	[0.827]	[0.983]	[0.941]	[0.763]	[0.815]	[0.778]	[0.661]	
Expects study hours ≥30	67.218	1.687	2.032	1.885	2.566	5.159**	3.820**	2.167	3.459**	2.850*	1,266
	[15.239]	[2.452]	[2.090]	[1.782]	[2.474]	[2.051]	[1.816]	[1.929]	[1.693]	[1.513]	
Expects study hours <30	66.858	−1.998	−1.046	−1.508	−0.674	−0.564	−0.618	−1.327	−0.804	−1.059	5,351
	[14.691]	[1.232]	[1.170]	[0.929]	[1.058]	[1.037]	[0.832]	[0.895]	[0.869]	[0.730]	
Sure about program of study	68.123	–2.912*	0.353	−1.192	−1.995	−0.277	−1.096	–2.438**	0.03	−1.143	2,983
	[13.536]	[1.563]	[1.346]	[1.120]	[1.444]	[1.308]	[1.063]	[1.147]	[1.032]	[0.883]	
Not sure about program of study	65.898	−0.107	−0.883	−0.514	1.549	1.044	1.302	0.741	0.035	0.383	3,634
	[15.745]	[1.555]	[1.478]	[1.190]	[1.343]	[1.337]	[1.080]	[1.148]	[1.132]	[0.959]	
Sure about career	66.512	−1.64	0.236	−0.705	−0.894	0.337	−0.271	−1.276	0.286	−0.491	2,322
	[13.653]	[1.793]	[1.581]	[1.300]	[1.843]	[1.665]	[1.338]	[1.382]	[1.254]	[1.061]	
Not sure about career	67.164	−1.223	−0.768	−0.977	0.348	0.469	0.409	−0.393	−0.16	−0.272	4,295
	[15.402]	[1.409]	[1.328]	[1.068]	[1.150]	[1.138]	[0.928]	[1.010]	[0.990]	[0.841]	
Expects to work ≥8 hours/week	65.375	−1.600	0.561	−0.548	−0.417	1.976	0.784	−1.031	1.263	0.103	2,891
	[15.616]	[1.594]	[1.622]	[1.268]	[1.554]	[1.320]	[1.166]	[1.247]	[1.189]	[1.028]	
Expects to work <8 hours/week	68.105	−0.86	−1.171	−1.033	0.219	−0.726	−0.259	−0.275	−0.953	−0.635	3,726
	[14.044]	[1.539]	[1.323]	[1.091]	[1.248]	[1.311]	[1.002]	[1.067]	[1.026]	[0.855]	
Registered early	67.707	1.241	1.173	1.203	0.005	1.47	0.708	0.57	1.311	0.955	4,323
	[14.327]	[1.130]	[1.074]	[0.881]	[1.162]	[1.128]	[0.912]	[0.913]	[0.880]	[0.756]	
Registered late	64.927	–4.059**	−3.402	–3.753**	0.059	−0.311	−0.142	−2.157	−1.736	−1.945	2,348
	[15.931]	[2.042]	[2.089]	[1.589]	[1.810]	[1.599]	[1.351]	[1.529]	[1.442]	[1.221]	

Note. G = Goal setting; GM = goal-setting + mindset message; G + GM = G and GM combined; NR = no reminders; R = reminders; NR + R = NR and R combined.
***$p < .01$. **$p < .05$. *$p < 0.1$.

Table 8. Treatment effects on alternative 2014 − 2015 outcomes. Standard errors clustered by student identification number.

	Treatment Group										
Dependent variable	Control Mean [*SD*]	G NR Effect [*SD*]	G R Effect [*SD*]	G NR + R Effect [*SD*]	GM NR Effect [*SD*]	GM R Effect [*SD*]	GM NR + R Effect [*SD*]	G + GM NR Effect [*SD*]	G + GM R Effect [*SD*]	G + GM NR + R Effect [*SD*]	Sample size
First-year GPA	2.248	−0.056	0.022	−0.016	−0.061	−0.040	−0.051	−0.059	−0.009	−0.034	1,351
	[1.002]	[0.085]	[0.084]	[0.067]	[0.084]	[0.083]	[0.067]	[0.067]	[0.067]	[0.057]	
Number of first-year credits taken by end of first year	3.080	−0.026	0.137	0.058	0.020	−0.026	−0.003	−0.002	0.055	0.027	1,351
	[1.321]	[0.106]	[0.104]	[0.084]	[0.105]	[0.104]	[0.083]	[0.084]	[0.083]	[0.071]	
Number of first-year credits failed	0.307	0.053	0.032	0.042	0.012	−0.020	−0.004	0.032	0.006	0.019	1,351
	[0.632]	[0.055]	[0.054]	[0.043]	[0.054]	[0.054]	[0.043]	[0.043]	[0.043]	[0.036]	
Number of first-year credits received	2.774	−0.078	0.104	0.015	0.009	−0.007	0.001	−0.034	0.049	0.008	1,351
	[1.496]	[0.121]	[0.119]	[0.096]	[0.120]	[0.119]	[0.095]	[0.096]	[0.095]	[0.081]	
2014–2015 GPA ≥1	0.878	0.009	−0.005	0.002	−0.034	−0.021	−0.027	−0.013	−0.013	−0.013	1,351
	[0.328]	[0.028]	[0.028]	[0.022]	[0.028]	[0.027]	[0.022]	[0.022]	[0.022]	[0.019]	
2014–2015 GPA ≥1.5	0.787	−0.039	−0.007	−0.023	−0.055	−0.016	−0.035	−0.047*	−0.012	−0.029	1,351
	[0.410]	[0.035]	[0.035]	[0.028]	[0.035]	[0.034]	[0.028]	[0.028]	[0.028]	[0.023]	
2014–2015 GPA ≥2	0.642	−0.023	0.005	−0.009	−0.008	−0.001	−0.004	−0.015	0.002	−0.006	1,351
	[0.480]	[0.040]	[0.040]	[0.032]	[0.040]	[0.039]	[0.031]	[0.032]	[0.031]	[0.027]	
2014–2015 GPA ≥2.5	0.434	0.009	0.007	0.008	−0.010	0.016	0.003	−0.001	0.011	0.006	1,351
	[0.496]	[0.042]	[0.041]	[0.033]	[0.041]	[0.040]	[0.032]	[0.033]	[0.032]	[0.028]	
2014–2015 GPA ≥3	0.252	−0.020	0.012	−0.004	0.026	−0.004	0.011	0.003	0.004	0.004	1,351
	[0.438]	[0.037]	[0.036]	[0.029]	[0.036]	[0.036]	[0.028]	[0.029]	[0.029]	[0.024]	

Note. G = Goal setting; GM = goal-setting + mindset message; G + GM = G and GM combined; NR = no reminders; R = reminders; NR + R = NR and R combined; GPA = grade point average.
***$p < .01$. **$p < .05$. *$p < .1$.

half a standard deviation. To be clear, our intervention is not exactly the same as the intervention tested in Morisano et al. (2010). Designed by Jordan Peterson, the goal-setting intervention tested in this research is similar to the intervention in Schippers et al. (2015) and is closely related to the Self Authoring modules of Peterson, Higgins, Pihl, and Schippers.[16] While these modules overlap to a large degree with the intervention in Morisano et al. (2010), they are different in the ways described above and it is possible that these differences explain our null findings. We believe, however, that the discrepancies between the two interventions are very slight, and it therefore seems unlikely that they would generate such strikingly different results.

There are at least five other potential explanations for the contrast between our results and those in the pilot study by Morisano et al. (2010). First, the sample in our study is untargeted and consists of mainly first-year students enrolled in an introductory economics course, whereas the sample in Morisano et al. (2010) consisted of students with at least some university experience, university GPAs below 3.0, and (self-identified) feelings of academic struggle. Considering first that our sample was mainly first-year students while Morisano et al. (2010) did not have any first-year students in their sample, we note that Schippers et al. (2015) do find effects of a goal-setting intervention on first-year students, suggesting that such interventions can be effective even for students with limited postsecondary experience. Further, we provide evidence that our results do not depend on the fact that our sample mainly consists of first-year students (see Table 6).

Next, considering that participants in the original study were screened for experiencing academic difficulty, recall that our estimated null effects hold for the bottom quantile of students in the incoming high school grades distribution. It is possible that the entrance criterion at UTM truncates the sample of students who would have been affected by the treatment, but this seems unlikely because UTM's entrance criterion is significantly lower than McGill's, where Morisano et al. conduct their study. We do note, however, that incoming high school grades are an imperfect proxy for academic struggle in university. Students having university experience and self-identifying as academically struggling based on that experience may be an important way to select a sample where goal-setting interventions are likely to be effective.[17] The inclusion criteria in Morisano et al. (2010) effectively made their goal-setting program targeted toward academically struggling students. Targeted interventions have been shown to be more effective than universal interventions across several domains, including programs designed to prevent eating disorders (Stice & Shaw, 2004), obesity (Stice, Shaw, & Marti, 2006), and depression (Stice, Shaw, Bohon, Marti, & Rohde, 2009).

Second, it is possible that differences in institutional resources across McGill University and UTM differentially mediated the impacts of treatment between Morisano et al. (2010) and the current study. In a failed replication attempt of an affirmation

[16]The Self Authoring modules can be found at https://www.selfauthoring.com/.

[17]While our sample does not allow us to identify a subset of students that would correspond to the self-nominated academically struggling students in Morisano et al. (2010), we note that our estimates are precise enough to discern a 7% standardized effect on grades. The reported effect in the original study is 70% of a standard deviation on GPA. Assuming that this is the real effect for the students in our sample who are similar to those in Morisano et al. (2010) and that the effect is zero for everyone else, these students would have to compose less than 10% of our total sample in order for us to not detect a significant effect on performance.

intervention, Dee (2015) discusses the role of complementary and supportive learning environments as a potential explanation for the null findings. In the current context, goal-setting interventions may, for example, cause students to take up support resources on campus and earn better grades as result. Differences in the quality of such services across institutions could then explain differences in the effectiveness of goal-setting interventions. It is also possible that peer effects may operate differently across schools, with students at one institution having peers who are likely to be more supportive of behavioral change.

While Morisano et al. (2010) do not discuss institutional features as potential treatment moderators, it is unlikely that differences in institutional quality drive our null results. The University of Toronto and McGill both consistently rank among the top and most selective Canadian schools on both Canadian and international rankings.[18] Support services available to students are similar across both schools and students, at UTM have access to most of the same resources as students at the University of Toronto's main campus, St. George; in fact, some programs allow students to freely switch between taking courses at either campus, and the university runs a free shuttle bus service between campuses.[19] As we have noted, however, student quality at UTM is lower, on average, than at McGill and St. George, suggesting that perhaps peer groups at UTM are less supportive of behavioral change induced by a goal-setting intervention than students at McGill. Here, we note that students tend to self-select into peer groups of students who are like them. As reported above, we also find null effects for students with incoming high school grades in the top quantile—a group of students who are likely to be more supportive of efforts to improve performance.

Third, it may be the case that the results of the pilot study are spurious. We have nearly 80 times the number of observations and sufficient power to discern a 7% standardized performance effect at a 5% significance level. Indeed, despite the potential promise of goal-setting interventions, it is not clear that such interventions should cause significant improvement in college student outcomes. Research on brain development in adolescents suggests that youth have a heightened sensitivity to gaining immediate rewards (Casey, 2015). Reoccurring environmental cues can stimulate the pursuit of such rewards at the expense of behaviors that are more conducive to the realization of long-run goals. Indeed, adolescents often have difficulty forgoing actions that lead to certain and immediate rewards in favor of actions that lead toward uncertain and future payoffs (Lavecchia et al., 2016). Considering such neurobiological constraints, recent research has argued that it is potentially more cost-effective to limit opportunities for youth to exercise poor judgment rather than attempting to influence how they think through instruction-based interventions (Steinberg, 2015), such as goal-setting treatments or nudge-based approaches.[20]

[18]For examples of Canadian rankings, see Maclean's Education Hub (http://www.macleans.ca/education-hub/), and for examples of international rankings, see Times Higher Education World University Rankings (https://www.timeshighereducation.com/).

[19]Faculty members who teach courses in the economics department at UTM also teach at the St. George campus in both the graduate and undergraduate programs and quite often have offices on both campuses.

[20]Another strand of research, however, argues that neurobiological constraints do not necessarily make goal-setting interventions unfeasible. Students who have clear goals may strengthen goal-directed behavior in the face of conflicting temptations, as such temptations make long-run goals more salient and further trigger goal-pursuant behavior (Schippers et al., 2015). Research also suggests that teaching adolescents to perform mental contrasting and to specify

Fourth, despite effort to preserve the feel of the intervention in the pilot study, and in addition to the differences already documented above, there may exist further unknown, but crucial, differences in design. If so, this only accentuates the difficulties associated with scaling interventions. Fifth, it is possible that the results of the pilot study stem from an error in data collection or estimation or an unintentional treatment effect associated with recruitment or design.

The fact that our mindset-message treatment did not produce an effect does not necessarily contradict the existing literature on growth-mindset interventions. As mentioned, because our intervention does not discuss the brain being like a muscle or hide its intention to benefit the participant, it is better viewed as being inspired by the growth-mindset literature but not as a direct test of a growth-mindset intervention. In particular, we view our mindset-message treatment as designed to influence students' beliefs about the role and importance of effort throughout the pursuit of goals (Blackwell et al., 2007). Our intervention tries to highlight that effort is more important than innate ability and that setbacks are normal and rectifiable through effort, patience, and practice.

Furthermore, contrasting our mindset-message treatment with the other interventions in the growth-mindset literature points to two main limitations with respect to content presentation in our intervention. First, our intervention discusses both the fixed and growth mindsets, an approach that has proven less effective at improving outcomes than simply teaching the growth mindset view and avoiding any mention of the fixed mindset (Yeager et al., 2016). Second, our mindset-message treatment was shorter than modules in most previous work and therefore may not have been long enough to induce an effect.

In terms of content order, our mindset-message treatment appeared at the end of a condensed goal-setting module and combining treatments may not always increase the magnitude of the effect of a treatment (Good, Aronson, & Inzlicht, 2003; Paunesku et al., 2015; Yeager et al., 2014). Although a growth mindset is generally associated with better goals (Elliot & Dweck, 1988; Leondari & Gialamas, 2002; Robins & Pals, 2002), our mindset-message treatment was unable to affect the goals that students set because it was placed at the end of the exercise. Given its position in the treatment material, it is also possible that students were cognitively exhausted by the time that they had reached the mindset-message exercise.

Despite the initial treatment having no effect on student performance, it is not clear that the follow-up reminder treatment should have been ineffective. Indeed, continuing to reinforce students' goals throughout the academic year could have increased the saliency of these goals, potentially causing more frequent engagement in goal-oriented behavior among students in the reminder treatment group. Our e-mail and text message reminders also consistently included study tips with specific actions students could take to improve performance. The null effects for the reminder treatment therefore suggest that helping students keep goals and positive academic strategies top of mind may not be enough to influence academic performance.[21]

implementation intentions can be effective strategies for strengthening goal-pursuant behavior (see, for example, Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2010).

[21]In related work (Oreopoulos & Petronijevic, 2018), we show that a more intensive text-messaging campaign is also unable to cause an improvement in academic outcomes, highlighting the difficulty with using virtual coaching to cause and sustain productive study habits.

The null results in the current study underscore the importance of testing earlier promising student interventions with larger samples and in different contexts. Goal-setting interventions and other motivational or mindset interventions in social psychology have garnered much research interest recently, primarily because of their relatively low cost and high scalability. As such, researchers are increasingly attempting to replicate the effects of previous studies (see, for example, Dee, 2015, and Hanselman, Rozek, Grigg, and Borman, 2017). Ideally this effort is done in collaboration with previous authors and others with experience in the field to avoid deviations from past interventions that may alter crucial influential elements or even potentially harm participating subjects.[22] This article represents a step toward identifying what works and what does not in goal-setting interventions. These interventions are attractive for their low cost and high scalability, but more research is required to evaluate the conditions by which goal-setting interventions can be used to help students perform well in school.

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[22]In the current study, all experimental materials were generously provided by Jordan Peterson (Morisano et al., 2010; Peterson & Mar, 2013; Schippers et al., 2015) and were approved by a multidisciplinary ethics board that deemed the study to be low risk.

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