Educational Evaluation and Policy Analysis
Month 201X, Vol. XX, No. X, pp. 1–20
DOI: 10.3102/0162373717739349

Information and College Decisions: Evidence From the Texas GO Center Project

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We study GO Centers, a college information program that is run by student peers and provides information about all aspects of the college-going process to academically prepared students on the margin of attending college. We use the semi-random rollout of the program along with detailed panel data on the universe of Texas public school students to identify both short- and long-term program impacts. GO Centers led to a large increase in college application rates and a small increase in college enrollment rates, yet no increase in college completion rates. These results underscore the need to assess long-term outcomes in evaluations of educational interventions targeting college enrollment, and suggest that students at the margin of enrolling in college may require additional supports during college to successfully complete college degrees.

Keywords: *econometric analysis, evaluation, high schools, longitudinal studies, postsecondary education, quasi-experimental analysis, regression analyses, retention*

Introduction

Leaders in higher education have long expressed concerns that enrollment rates are "too low," with several factors often cited as inhibiting otherwise academically prepared students from enrolling in college (Hamilton, 2012; Texas Higher Education Coordinating Board [THECB], 2000). One concern is over a culture of aversion toward academic success among low-income and minority students (Fryer & Torelli, 2010; Sacerdote, 2011). Another is that informational asymmetries could exist in the market for higher education, in that students lack information on which colleges are available, how to take standardized tests, what preparatory classes are needed, and how to apply for admission and financial aid (Horn, Chen, & Chapman, 2003). This lack of information is likely the most severe for students with few college-going peers or college-educated parents and for those who attend high schools with few college counseling resources (Avery & Kane, 2004; Page & Scott-Clayton, 2016).

In response to these concerns, education administrators in the state of Texas founded 40 student-run college information programs in high schools around the state in 2003. These "GO Centers" were run by student peers (typically college-bound, 12th-grade students) under the guidance of a staff member and had the goal of providing information to current high school students on college choice, the application process, financial aid, and standardized tests. The program was also charged with the goal of creating a general "college-going culture" in the high school.

Applying to college in Texas is either free or very inexpensive, so it is reasonable to expect that a college information program will lead to an increase in college applications. Conditional on acceptance, it is also reasonable to think that there will be an increase in enrollment. However, students who are induced by such a program to attend college are likely those with marginal academic performance: they must be academically prepared, yet not already committed to attending college. Recent research has demonstrated the challenges inherent in supporting low-performing college students to complete degrees, as well as the benefits of having access to advising programs while attending college (Bettinger & Baker, 2014; Jackson, 2014). Importantly, the GO Center program did not provide additional support and guidance to students once they enrolled in college, and so it would not be surprising to see impacted students.

To explore these issues empirically, we linked data on the location of GO Centers to an extensive panel database that follows the universe of Texas high school students from over 1,000 Texas high school into Texas colleges. Schools to receive GO Centers were chosen by an independent contractor, who was only charged with the task of ensuring that the 40 chosen schools had low past college enrollment rates and were geographically diverse throughout the state. All schools that were offered a GO Center accepted the invitation. Texas high schools that did not receive a GO Center but are similar on observable characteristics thus form a plausible control group. A difference-in-differences matching estimator allows us to isolate the impact of GO Centers on a range of education-related outcomes, and robustness analyses demonstrate that treatment effects are stable across various choices of matched control schools and propensity score model specification.

On average, students who attended GO Center schools were significantly more likely to apply to and be accepted at a Texas college (5.4 and 4.9 percentage points, respectively) but were not more likely to enroll in or complete college. These average effects are most likely lower bounds on the effect of the treatment on the treated, as GO Centers did not target very high achievers (those already committed to attending college) or very low achievers (those not academically prepared to attend college). It is therefore not surprising that the impact of GO Centers was largest among low-income and Hispanic students, groups historically on the margin of college attendance. For example, Hispanic students were 7.6 percentage points more likely to apply to college and 2 percentage points more likely to attend a 4-year college. College completion rates, however, were not impacted among Hispanics or low-income students 8 years after graduating high school.

An important contribution of our article is that we are one of the few studies that assess the long-term impact of a college information campaign, as we observe students 8 years after high school. Observing long-term outcomes is crucial in light of poor college completion rates of traditionally underserved students. Our findings suggest that if programs continue to induce college attendance by marginally prepared students, policymakers should consider also investing in effective support programs to ensure those students can complete their degrees.

Literature Review and Institutional Background

Literature Review

This article contributes to a growing literature examining the effects of programs that aim to influence college-going behavior by providing information, coaching, and/or other types of student support. (A separate literature which we do not discuss here examines the impact of direct financial aid to students.) A number of different types of interventions have shown promise in increasing student access to college and student success once enrolled in college. The program that we study shares some, but not all, of the features of successful programs that have been studied thus far by researchers.

Information barriers are important obstacles to college access. Students may have a limited understanding of the benefits of attending college; the steps required to apply, enroll, and succeed in college; and the best ways to finance a postsecondary education (Page & Scott-Clayton, 2016). Several studies have shown that information on college quality impacts student choice of which school to attend (Griffith & Rask, 2007; Hastings, Neilson, & Ramirez, 2016; Meredith, 2004; Monks & Ehrenberg, 1999). Likewise, interventions demonstrating the benefits of postsecondary education increase student's interest in applying to college (Oreopoulos & Dunn, 2013). Other research finds that better information about college cost and how to complete financial aid applications significantly improves college enrollment outcomes (Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2012).

Information can also come from traditional guidance counselors. Research has shown that in schools with a large number of minority and low-income students, guidance counselors cannot devote the necessary time to college guidance (Avery, Howell, & Page, 2014; Lee & Ekstrom, 1987; McDonough, 2005); but when counselors are able to devote resources to this population, college enrollment increases (Avery, 2010; Castleman, Page, & Schooley, 2014). A growing body of research finds that smaller student-to-counselor ratios improve postsecondary outcomes for high school students (Avery et al., 2014; Hurwitz & Howell, 2014).). However, many school districts cannot afford to hire additional counselors to improve college access.

When school resources are scarce, student-run programs, using the power of peer-to-peer persuasion and information dissemination, have the potential to fill this important role in a relatively cost-effective manner (e.g., Avery & Kane, 2004; Bettinger & Baker, 2014; Bos, Berman, Kane, & Tseng, 2012; Carrell & Sacerdote, 2013; Castleman, Owen, & Page, 2016; Castleman & Page, 2015; Horng et al., 2013; Schneider, Judy, & Mazuka, 2012). Peer-to-peer programs also have the benefit of fostering a "college-going culture" for students, which can normalize the experience of applying to college for students who have limited exposure to postsecondary institutions. An example of one effective program is the comprehensive College Ambition Program (CAP) in Michigan, a program that leverages undergraduate students as mentors to high school students in science, technology, engineering, and mathematics (STEM) courses in addition to providing college counseling, college visits, and financial aid information (Schneider et al., 2012). Interventions that keep regular contact during the summer before college enrollment can reduce "summer melt" and increase college enrollment rates (Castleman & Page, 2015; Castleman et al., 2014). In addition to student mentoring programs, low-cost targeted mailings have been shown to increase college application and enrollment rates among high-achieving, low-income students (Hoxby & Turner, 2013).

Recent research has also emphasized the importance of student choices of where to attend college (Dillon & Smith, 2013). Students may undermatch by choosing to attend schools that do not meet their academic potential, or may overmatch if they choose to attend schools that are beyond their academic aspirations or ability; in either case, the returns to college may increase when students make purposeful choices (Howell & Pender, 2016). The evidence on the costs of undermatching are mixed, however, and some studies have found that increases in college quality benefit students even when they are undermatched to the schools they attend (Goodman, Hurwitz, & Smith, 2015).

Once in college, the likelihood that a student will persist and graduate is low (approximately 60% within 6 years), and is lower for disadvantaged students (Ginder, Kelly-Reid, & Mann, 2016). Interventions that actively coach students through the transition to college and provide tools for academic success can increase college retention (Bettinger & Baker, 2014; Bos et al., 2012). Likewise, researchers have found that financial aid programs can be more effective when coupled with nonfinancial student supports such as faculty and student mentoring, peer learning communities, and career counseling (Angrist, Autor, Hudson, & Pallais, 2015; Clotfelter, Hemelt, & Ladd, 2016; Page, Castleman, & Sahawedo, 2016; Scrivener et al., 2015).

As discussed below, the GO Center program was designed to reduce informational barriers in the college application process and encourage college-going for high school students. The initiative shares some aspects with other programs that researchers have found to have a positive impact on college access and success. This study contributes to the literature by providing a new evaluation of an information-based college access intervention. A principal contribution of this study is our ability to provide evidence of program effectiveness over a long-term horizon, adding context to prior work on information initiatives that study short-term metrics of effectiveness.

The GO Center Program

The THECB designed the GO Center model with the goals of increasing awareness about college and, ultimately, attendance and completion.[1] A GO Center is a dedicated classroom with computers, Internet access, and printed information about the college application process. Each center is staffed by a full-time employee whose job is to help students research colleges, sign up for entrance exams, apply for financial aid, and submit applications.

Administrators recognized that this supply of resources may not sufficiently motivate students to expend the effort to begin and complete the college application process. Therefore, the second element of the GO Center model entails a group of motivated, college-bound high school seniors known as the "G-Force." The faculty advisor was responsible for recruiting the G-Force which contained anywhere from 10 to 20 members, depending on the size of the school. These peer advisors attended a week-long summer training session at which they learned techniques to create a "college-going culture" within the high school, generating excitement about the college application process while helping to alleviate students' fears and concerns. G-Force members were encouraged to form one-to-one relationships with their student-advisees. The THECB provided resources for the faculty advisor and the G-Force, including templates for posters to hang in halls, suggestions for activities to encourage college-awareness, and techniques for interacting with students. However, beyond this general guidance, schools were given wide latitude to implement the GO Center as they saw fit and we unfortunately do not know the specifics of how GO Centers were implemented in individual schools. Although it may be desirable from a policy point of view to allow schools to customize the program to best suit their needs, it prevents us as researchers from learning deeper insights into the impacts of specific elements of the GO Center model.[2]

Pilot GO Center Schools

The GO Center program began at the start of the 2004 academic year, and we use the rollout of the program to estimate its effect on students. In the spring of 2003, an independent contractor was hired by the THECB to choose a pilot group of 40 schools in which to implement GO Centers. Only two restrictions were placed on the contractor's choice of schools: that they (1) had low past college enrollment rates and (2) were geographically diverse throughout the state. Unfortunately, we do not know the contractor's decision-making process in choosing the pilot schools and a concern is that the schools were selected based on expectations of their suitability for the program. Through discussions with the THECB staff who oversaw the GO Center program, we learned two pieces of information that help to partially allay such concerns. First, GO Centers at the time were a new initiative being formulated by a small group of administrators at the THECB, making it unlikely that principals or district superintendents could lobby for a GO Center in their school. Second, all of the schools that were approached by the contractor accepted to be part of the pilot program, further helping to rule out unobserved self-selection.

In addition to these logical arguments supporting the exogenous placement of GO Center schools, our empirical strategy below employs a difference-in-differences matching estimator that uses the same observable data on student characteristics (demographics, standardized test scores, college-going rates, etc.) that were available to the contractor. Thus, the crucial, yet untestable assumption we rely upon to identify the causal impact of GO Centers is that there were no time-varying, unobservable school characteristics driving the contractors' choice of schools. We discuss this assumption further in the following section.

The THECB continued support for the original set of GO Center schools in 2005 and also asked the contractor to identify an additional set of schools to receive GO Centers. Twenty-one new schools were identified but, as it is unclear from administrative records whether GO Centers were actually implemented in these new schools, we exclude them completely from our analysis.

Subsequent to the 2005 academic year, the THECB decided that schools themselves could run the GO Center program and they therefore discontinued centralized funding and support. Thus, we do not have data on whether schools continued the program, nor whether new schools adopted a version of the program independently after our study period.

Contextualizing the GO Center Program in the Literature

The GO Center program aimed to improve college access and student's postsecondary success by encouraging them to apply to and attend college. Researchers have found that college access can be expanded by programs that reduce informational barriers about college, establish a college-going culture, help students find the best match of schools and program, and/or guide students through the college application process. From a college access perspective, the GO Center program was successful in sharing information with students about college and building a college-going culture in high school by allowing student mentors to run the centers.

At the same time, it is unclear whether the GO Center program as applied was rigorous in ensuring the application of other features of successful college-going initiatives. First, the GO Center model did not have explicit guidance on how staff or G-Force members were to guide students to make purposeful choices about applying to colleges where they would most likely succeed. While the finding that GO Centers induced students to attend 4-year colleges as opposed to 2-year colleges is interesting in light of recent evidence suggesting poor results associated with community college attendance (Goodman et al., 2015; Hanushek, Woessmann, & Zhang, 2011; Long & Kurlaender, 2009; Sandy, Gonzalez, & Hilmer, 2006), this evidence of a push for high school students to apply and attend 4-year schools shows that the GO Centers initiative may not have considered the importance of student matches to particular schools. Our finding of no program impact on completion from a 4-year school brings into question whether the educational choices and/or school match were optimal.

Second, the GO Center model also did not have explicit guidance for staff or G-Force members on how to guide and monitor students throughout the college application and college choice process. After students overcame the barrier of applying to schools, it is unclear how much assistance was given about the financial aid process or other issues that might arise before a student enrolls in college. This lack of guidance may be one of the reasons that the GO Center program had larger impacts on college application and acceptance rates than on college enrollment.

Last, the GO Center model did not include any explicit programming or support for students after they enrolled in college, which perhaps explains why we do not find any impacts of the program on college persistence or graduation.

Empirical Strategy and Identification

We estimate the effect of GO Centers on various student-level outcomes using a difference-in-differences matching model. GO Centers were not randomly assigned to schools, yet there are over 1,000 schools in Texas that did not receive a GO Center for which we observe student outcome data. Given the targeted nature of GO Centers (e.g., chosen schools were required to have low college enrollment rates), we first implement a propensity score matching algorithm to identify a set of schools that are observably similar to GO Center schools. These matched schools serve as the counterfactual outcome for GO Center schools. The main limitation of a propensity score matching estimator is that there could still be unobservable characteristics that are both correlated with adoption of a GO Center and our outcomes of interest.

The school-level propensity score model is of the following form:

$$GoCenter_s = \alpha + \mathbf{X}_{s,pre}\Pi + \mathbf{Y}_{s,pre}\Theta + \varepsilon_s, \qquad (1)$$

where s indexes the school, $GoCenter_s$ is an indicator for being a pilot GO Center school, $\mathbf{X}_{s,pre}$ is a vector of pretreatment (prior to academic year 2004) school-average student characteristics (e.g., high school exit exam scores, family income), and $\mathbf{Y}_{s,pre}$ is a vector of pretreatment school-average college-related variables (e.g., college application rates).

It is well known that the choice of matching method involves a trade-off between precision and bias (Caliendo & Kopeinig, 2008): potential bias is reduced by forcing the set of control units to be more observably similar to treatment schools, while precision is improved with a larger set of control units. In practice, we find sufficient sample size by using a restrictive matching algorithm of both common support and five nearest neighbors (5NN). That is, we include a non-GO Center school as a control school if its estimated propensity score (a) falls in common support of the distribution of the estimated propensity scores of GO Center schools and (b) is among the five nearest neighbors of the propensity score of a GO Center school. The set of comparison schools is drawn with replacement for each treatment school, though individual comparison schools are not included more than once in the estimation. We show below that our results are robust to this choice of a matching algorithm.

We further account for potential nonrandom selection of GO Center schools by comparing over-time changes in student outcomes between treatment and matched control schools, as follows:

$$Y_{isc} = \beta_0 + \beta_1 \left(GoCenter_s \times Post_c \right) + \beta_2 GoCenter_s + \beta_3 Post_c + \mathbf{X}_{i,pre}\delta + \mu_s + \varepsilon_{isc}. \quad (2)$$

Y_{isc} is an outcome of interest for student i in school s in cohort c, and $Post_c$ is an indicator for being in the 11th or 12th grade in the 2004 academic year (the year GO Centers became operational). μ_s are school-level fixed effects, and $\mathbf{X}_{i,pre}$ is a matrix of observable pretreatment student characteristics that control for residual factors that may be correlated with both the outcome of interest and the location of first-year GO Centers. The estimated parameter β_1 identifies the effect of being in a GO Center school on the outcome of interest. Standard errors are clustered at the school level to account for possible within-school correlation of the error term.

GO Centers targeted students in both the 11th and 12th grades, implying that students who were in the 11th grade when the program began were exposed for 2 years. It is conceivable that the effects of treatment are a function of exposure time, and so we estimate Equation 2 for both of these cohorts separately.[3]

Finally, we note that we do not have data on which students within GO Center schools used the program. It is unlikely that all students in a school were exposed to GO Centers because the program only targeted students who were deemed college-ready (e.g., they had completed course-work sufficient to gain acceptance to college), and therefore, β_1 is likely a lower bound of positive Treatment on the Treated effects.

Data

We use several administrative databases maintained by the THECB in our analysis. The first is student-level data provided by the Texas Education Agency (TEA) on all Texas public high school graduates, including courses taken and various programs a student participated, whether a student is eligible for free school lunch (which is indicative of belonging to a low-income family), whether the student is bilingual or Limited English Proficient, the students' gender and race/ethnicity, and a TEA-defined indicator for being at risk of not graduating high school.[4] We also use the following high school–level variables when estimating the propensity score model: average years of teacher's experience, average teacher salary, the student–teacher ratio, and high school graduation rate.

To this TEA data, we merge student-level data collected by THECB from Texas colleges, including applications, acceptances, enrollments, and graduations from all Texas 4-year public colleges; enrollment and graduation from 2-year public colleges (there is no formal application process to 2-year schools); and enrollment and graduation (but not applications or acceptances) for the small number of private colleges in Texas. We do not observe whether students apply to, attend, or graduate from colleges outside of Texas. This is likely a minor limitation, however, as the vast majority of Texans attend college at public schools in state. For example, 88% of Texas high school graduates who enrolled at a 4-year college in 2002 enrolled at a Texas public college (Snyder, Dillow, & Hoffman, 2007), and this percentage is likely to be higher for the low-income populations targeted by GO Centers.

To capture the long-term effects of GO Centers (arguably the effects of most interest to policymakers), we track students 8 years after high school graduation.

Summary Statistics

Table 1 contains selected summary statistics for the preintervention (academic year 2003) cohort of graduating 12th graders. Column 1 summarizes the 40 schools that received a GO Center in 2004, and column 2 summarizes the remaining 1,087 high schools in Texas that did not receive a GO Center in 2004.

GO Center schools are relatively low-income (on average 53.4% of students are eligible for free lunch) and largely Hispanic (56% of students on average). Students take a wide array of courses in the 11th grade, with a large variation across schools (many courses at this level are not mandatory under common statewide curricula). Only about a third of students ever applied to a 4-year college (33.7%), but most of those who applied were accepted to at least one school, reflecting the relatively high admission rates (and low admission standards) for many of the regional colleges in Texas. Enrollment rates at 4-year schools are even lower, at 25.8%, and only 50% of those enrolling receive a bachelor's degree within 8 years. A majority of students attend 2-year schools (46.2%), but the degree-attainment rate is even lower than at 4-year schools, with 8.7% and 7.5% of students receiving certificate and associate's degrees, respectively.

Column 4 shows that GO Center schools are significantly different in some dimensions from non–GO Center schools. For example, GO Center schools, compared with non–GO Center schools, tend to have more Hispanic students, fewer Black and White students, more students from low-income families, more students at risk of not graduating, and students with worse college-related outcomes. These differences highlight the need to identify a subset of non–GO Center schools that closely approximate the counterfactual outcomes of students in GO Center schools had they not been subject to the program. In the next section, we describe the matching exercise we use to identify this set of control schools.

Results

Propensity Score Matching

We estimate the propensity score (Equation 1) as a probit, and the full set of estimated coefficients can be found in Appendix Table A1. Observations are at the school level, and the sample includes all high schools in Texas except the 21 new GO Center schools started in 2005. $\mathbf{X}_{s,pre}$ and $\mathbf{Y}_{s,pre}$ include a large and exhaustive set of variables related to student demographics, past high school course taking behavior, and college-going outcomes.[5]

Not surprisingly, coefficient estimates in the propensity score model broadly reflect the differences between GO Center and non–GO Center schools as seen in Table 1 (column 1 vs. column 2). Figure 1 shows the distribution of estimated propensity scores for treatment and control schools (note the differing scales on the vertical axes). Importantly, there is considerable overlap of support between the distributions of GO Center and non–GO Center schools, with a common support in the range of 0.006 to 0.51: 38.8% of non–GO Center schools (422 schools) have propensity scores below 0.006, and 7.5% of GO Center schools (three schools) have propensity scores above 0.51.

As described above, we use these estimated propensity scores to define our matched control group as schools in the common support and among the five nearest neighbors of a treated school. This exercise yields 37 treatment and 81 control schools. Summary statistics for this matched control group are in column 3 of Table 1. Column 5 makes it clear that the matched control samples look much more similar to GO Center schools in terms of demographics and other observable variables than does the set of all non–GO Center schools in the state; none of these differences are statistically significant. For example, while 31.5% of students in non–GO Center schools are Hispanic, 59.6% are Hispanic in the matched control group compared with 68.9% Hispanic in GO Center schools. Similarly, while 27.7% of students in non–GO Center schools are from low-income families, 48.7% are low income in matched control schools compared with 56.8% in GO Center schools. The common support restriction, through the exclusion of some treatment schools, makes the treatment and control groups even more similar ex ante than they appear in Table 1.

The Effect of GO Centers on College-Going Outcomes

Table 2 presents our main results, and Figure 2 presents effect sizes graphically. Each parameter is the estimated coefficient β_1 from a separate

TABLE 1

Preintervention Characteristics of the 12th-Grade Cohort in Texas Public High Schools

	GO Center schools		All schools in Texas without a GO Center		Matched schools: Common support and 5NN		Difference	Difference
	(1)		(2)		(3)		(1) – (2)	(1) – (3)
	M	(*SD*)	*M*	(*SD*)	*M*	(*SD*)	(4)	(5)
Number of high schools	40		1,087		118			
Number of students in 12th-grade cohort	7,868		178,349		22,121			
Texas college outcomes (within 8 years after high school graduation)								
Ever applied to a 4-year public college	0.337	(0.151)	0.377	(0.144)	0.331	(0.140)	−0.040	0.005
Number of 4-year public applications	0.570	(0.323)	0.637	(0.335)	0.596	(0.464)	−0.066	−0.026
Ever accepted at a 4-year public college	0.318	(0.155)	0.353	(0.138)	0.317	(0.139)	−0.035	0.001
Number of 4-year public acceptances	0.490	(0.290)	0.531	(0.265)	0.517	(0.404)	−0.040	−0.027
Ever enrolled in college (2- or 4-year)	0.583	(0.124)	0.622	(0.119)	0.605	(0.127)	−0.039	−0.021
Ever enrolled in a 2-year college	0.462	(0.121)	0.446	(0.131)	0.474	(0.129)	0.016	−0.011
Ever enrolled in a 4-year college	0.258	(0.110)	0.329	(0.133)	0.277	(0.114)	−0.071***	−0.019
Attended any college for at least 2 years	0.428	(0.123)	0.477	(0.127)	0.444	(0.135)	−0.049*	−0.015
Received any degree	0.217	(0.091)	0.284	(0.108)	0.226	(0.094)	−0.067***	−0.009
Received certificate degree	0.087	(0.052)	0.083	(0.060)	0.088	(0.057)	0.004	−0.001
Received associate's degree	0.075	(0.042)	0.080	(0.058)	0.074	(0.044)	−0.005	0.001
Received bachelor's degree	0.130	(0.074)	0.193	(0.097)	0.142	(0.073)	−0.063***	−0.012
Demographic variables								
Male	0.506	(0.065)	0.501	(0.087)	0.507	(0.069)	0.005	−0.0002
Black	0.113	(0.152)	0.108	(0.170)	0.142	(0.223)	0.005	−0.029
Hispanic	0.560	(0.340)	0.267	(0.274)	0.478	(0.370)	0.293***	0.082
White	0.316	(0.316)	0.607	(0.292)	0.369	(0.326)	−0.291***	−0.053
"At risk" of not graduating	0.500	(0.208)	0.335	(0.202)	0.471	(0.217)	0.165***	0.028
Limited English Proficiency	0.045	(0.062)	0.013	(0.027)	0.034	(0.045)	0.032**	0.012
Low income	0.534	(0.250)	0.320	(0.216)	0.486	(0.258)	0.213***	0.048
Gifted and talented	0.106	(0.060)	0.120	(0.093)	0.097	(0.070)	−0.014	0.009
Special education	0.125	(0.050)	0.131	(0.073)	0.123	(0.058)	−0.006	0.003
Courses taken in 11th grade								
AP/IB course	0.156	(0.102)	0.176	(0.161)	0.163	(0.144)	−0.020	−0.007
English 3	0.593	(0.216)	0.632	(0.251)	0.603	(0.249)	−0.038	−0.009

(continued)

TABLE 1 (CONTINUED)

	GO Center schools		All schools in Texas without a GO Center		Matched schools: Common support and 5NN		Difference (1) – (2)	Difference (1) – (3)
	(1)		(2)		(3)			
	M	(*SD*)	*M*	(*SD*)	*M*	(*SD*)	(4)	(5)
English 4	0.022	(0.030)	0.013	(0.034)	0.0227	(0.037)	0.009	−0.001
Calculus	0.008	(0.019)	0.008	(0.031)	0.010	(0.026)	0.001	−0.002
Precalculus	0.143	(0.089)	0.157	(0.128)	0.139	(0.103)	−0.014	0.004
Algebra 1	0.052	(0.082)	0.027	(0.047)	0.050	(0.088)	0.025	0.001
Algebra 2	0.471	(0.160)	0.437	(0.195)	0.440	(0.179)	0.034	0.031
Geometry	0.158	(0.131)	0.187	(0.187)	0.198	(0.167)	−0.029	−0.040
Physics	0.128	(0.123)	0.139	(0.173)	0.113	(0.134)	−0.011	0.015
Chemistry	0.388	(0.133)	0.391	(0.220)	0.389	(0.204)	−0.003	−0.001
Biology	0.110	(0.102)	0.094	(0.130)	0.100	(0.114)	0.016	0.011
Debate/public speaking	0.162	(0.103)	0.178	(0.160)	0.161	(0.124)	−0.016	0.001
Music/band	0.162	(0.085)	0.167	(0.119)	0.154	(0.090)	−0.005	0.008
Art	0.179	(0.085)	0.171	(0.136)	0.174	(0.108)	0.008	0.005
Theater	0.073	(0.059)	0.102	(0.115)	0.072	(0.064)	−0.029**	0.001

Note. (1) The sample in column 2 excludes the 21 schools that were identified to receive GO Centers in 2005. (2) Students are classified as "at risk" of not graduating if they meet any of the 13 criteria defined by the Coordinating Board (see Note 4). (3) Low income is an indicator for students who are eligible for free school lunch. (4) AP/IB course = Advanced Placement/International Baccalaureate course. (5) Applications are observed only for Texas public colleges. Enrollments and degree completion are observed for both public and private Texas colleges. (6) 2-year college application data are not available as all 2-year schools in Texas have open enrollment. 5NN = five nearest neighbors.
**p* < .10. ***p* < .05. ****p* < .01.

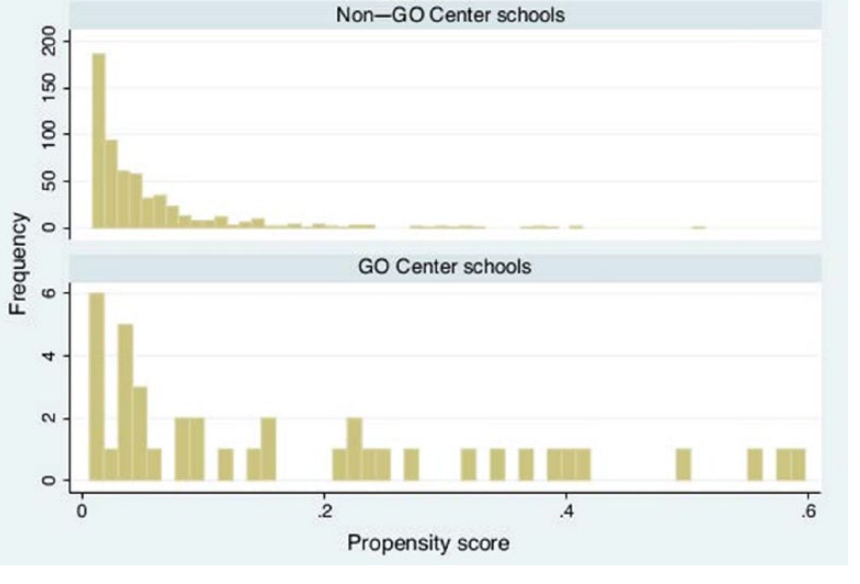

FIGURE 1. *The distribution of propensity scores for Go Center and non–Go Center schools.*

TABLE 2

The Impacts of GO Centers Within 8 Years of High School Graduation

Sample =	Both cohorts (1)	Cohort exposed for 1 year only (2)	Cohort exposed for 2 years (3)
Applications and acceptances: HS graduation year			
Apply to any 4-year Texas public college	0.0537**	0.0380	0.0689***
	(0.0230)	(0.0231)	(0.0254)
Number of 4-year public applications	0.140***	0.106**	0.173***
	(0.0488)	(0.0476)	(0.0559)
Accepted at any Texas 4-year public college	0.0491**	0.0340	0.0630**
	(0.0230)	(0.0235)	(0.0251)
Number of 4-year public acceptances	0.113**	0.0855**	0.140***
	(0.0440)	(0.0432)	(0.0491)
Enrollment: 1 year after HS graduation			
Enroll in Texas college (2- or 4-year)	0.0240	0.0134	0.0335*
	(0.0153)	(0.0150)	(0.0181)
Enroll in Texas 2-year college	0.0145	0.00676	0.0221*
	(0.0102)	(0.0106)	(0.0124)
Enroll in Texas 4-year college (public or private)	0.0152	0.00971	0.0199*
	(0.0100)	(0.0111)	(0.0117)
Applications and acceptances: Within 8 years after HS graduation			
Ever applied to a 4-year public college	0.0522**	0.0387*	0.0653***
	(0.0223)	(0.0228)	(0.0234)
Number of 4-year public applications	0.150***	0.115**	0.185***
	(0.0521)	(0.0514)	(0.0590)
Ever accepted at a 4-year public college	0.0489**	0.0361	0.0606***
	(0.0222)	(0.0229)	(0.0231)
Number of 4-year public acceptances	0.121***	0.0943**	0.147***
	(0.0452)	(0.0448)	(0.0499)
Enrollment: Within 8 years after HS graduation			
Ever enrolled in Texas college (2- or 4-year)	0.00679	−0.000172	0.0130
	(0.0143)	(0.0143)	(0.0158)
Ever enrolled in a Texas 2-year college	−0.00275	−0.00986	0.00440
	(0.0106)	(0.0112)	(0.0118)
Ever enrolled in a Texas 4-year college	0.0156	0.00789	0.0225
	(0.0124)	(0.0133)	(0.0137)
2-Year persistence: Within 8 years after HS			
Attended any college for at least 2 years	0.00327	0.000156	0.00562
	(0.0148)	(0.0159)	(0.0157)
Completion: Within 8 years after HS graduation			
Received any degree	0.000476	0.000230	−0.000212
	(0.0106)	(0.0121)	(0.0111)
Received certificate degree	−0.00274	−0.00149	−0.00504
	(0.00477)	(0.00600)	(0.00487)
Received associate's degree	−0.00207	−0.00359	−0.000963
	(0.00514)	(0.00578)	(0.00552)
Received bachelor's degree	0.00572	0.00165	0.00946
	(0.00927)	(0.00972)	(0.0103)
Observations	86,943	58,456	57,579

Note. (1) Each estimate is the coefficient on Treat × Post from an OLS regression of Equation 2 for the outcome listed. Standard errors in parentheses clustered at the school level. (2) All samples include GO Center schools in the common support and non–GO Center schools in the common support and within the five nearest neighbors of a GO Center school (see the "Empirical Strategy and Identification" section). (3) The cohort exposed for only 1 year was in the 12th grade in academic year 2004, whereas the cohort exposed for 2 years was in the 11th grade in academic year 2004. (4) 2-year persistence is categorized by a student attending college for at least 2 years (including nonconsecutive enrollment years) within the 8 years following high school graduation. HS = high school; OLS = ordinary least squares.
*$p < .10$. **$p < .05$. ***$p < .01$.

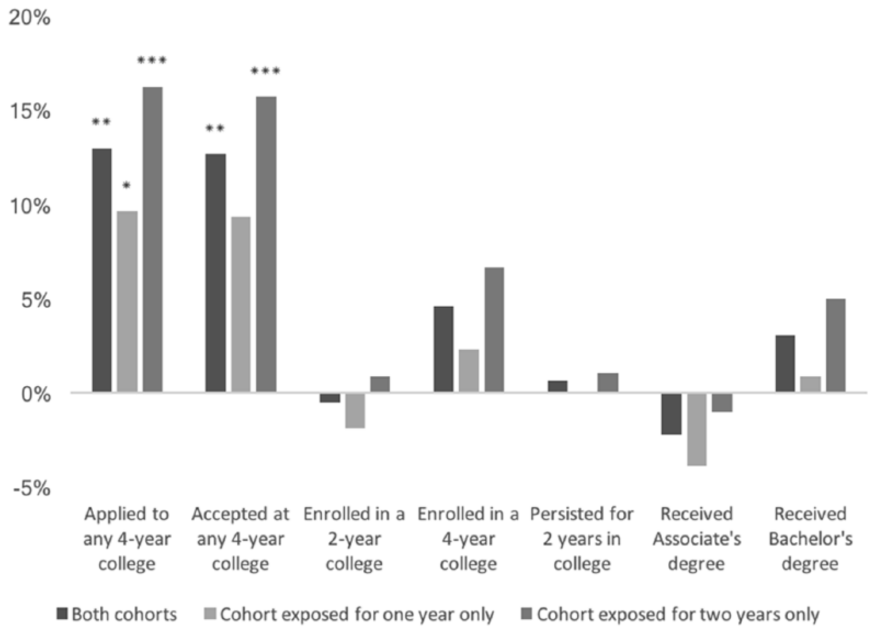

FIGURE 2. *The impact of GO Centers on selected outcomes, percent change from preintervention levels.*
Note. Effect sizes are calculated from the estimates in Table 2.
$^{*}p < .10$. $^{**}p < .05$. $^{***}p < .01$.

ordinary least squares (OLS) regression of Equation 2. Column 1 contains estimates from the sample that includes both the 11th- and 12th-grade cohorts in academic year 2004, while estimates in columns 2 and 3 are for these cohorts separately.

Focusing first on column 1, we see that the program had a strong positive impact on applications: a student in a GO Center school was 5.37 percentage points more likely to apply to a Texas 4-year public college by the year after graduating than a similar student in a similar non–GO Center school. This impact is quite large in economic terms, representing a 12% increase over the preintervention application rate. GO Centers also induced students to apply to more 4-year schools, a strongly significant increase of 0.14 applications (representing a 20% increase).

In unreported results, we find that most of the increased applications were submitted to relatively nonselective Texas public colleges with virtually open admission policies. We are therefore not surprised that the increased applications were in large part accepted. However, the fact that not all new applications were accepted is evidence that students were reaching for better quality colleges.

The estimates in columns 2 and 3 suggest there is a cumulative impact of longer exposure to the GO Center program on applications and acceptances. All point estimates are larger for those exposed to the program for 2 years (column 3) instead of just 1 year (column 2). Several mechanisms for these results are likely at play. First, more exposure to the program and the ability to see its impact on one's more senior cohort can induce students to expend the effort to apply to college. Second, students in the 11th grade have more flexibility to adjust their course load in the senior year so that they are college-ready (and increasing their chances of a successful application). Third, the implementation of the program may have improved in the second year, with administrators learning from their past experiences.

Despite the large impacts on college applications and acceptances, there is only modest evidence that GO Centers increased college enrollment rates 1 year after high school. Point estimates for ever enrolling in a college, whether a 2- or 4-year school, are small and not distinguishable from zero for the combined cohorts (column 1). But, looking at the sample of students exposed for 2 years (column 3),

TABLE 3

Robustness of the Main Result on the Propensity to Apply to a 4-Year Texas Public College

Sample trim (both cohorts) =	Common support	Common support and 5NN	Common support and 5NN	Common support and 5NN	No exclusion
	Ever applied to a 4-year Texas public college	Ever applied to a 4-year Texas public college	Ever applied to a 4-year Texas public college	Ever applied to a 4-year Texas public college	Ever applied to a 4-year Texas public college
Outcome =	(1)	(2)	(3)	(4)	(5)
GoCenter × Post	0.0581***	0.0705***	0.0593***	0.0819***	0.0709***
	(0.0215)	(0.0208)	(0.0209)	(0.0203)	(0.0202)
Propensity score variables					
School demographics	Yes	Yes	Yes	Yes	
Course taking variables	Yes	Yes	Yes		
1-year lagged outcomes	Yes	Yes			
2-year lagged outcomes	Yes				
Individual covariates	Yes	Yes	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	386,735	102,488	107,502	113,974	557,768

Note. (1) Estimates are from OLS regressions of Equation 2. Standard errors in parentheses clustered at the school level. (2) Samples in all columns include cohorts exposed to Go Centers for both 1 and 2 years. (3) The full list of propensity score variables can be found in Appendix Table A1. 5NN = five nearest neighbors; OLS = ordinary least squares.
$^*p < .10$. $^{**}p < .05$. $^{***}p < .01$.

point estimates are slightly larger and significant at the 10% level. For example, GO Centers increased enrollments at any college by 3.35 percentage points ($p = .10$). While this is a small overall increase, it represents an economically meaningful 5% increase over the pre–GO Center enrollment rate of 67%.

Eight years after high school graduation, there appears to be a shift in the type of college students attend: although not statistically significant, the point estimates suggest that GO Center students are more likely to attend a 4-year college (1.56 percentage points more likely) while not more likely to attend a 2-year college (–0.275 percentage points).

Not surprisingly, given the small effects of GO Centers on college enrollment, we see no impact on persistence through 2 years of college or on college completion, even among the cohort that was exposed to the program for 2 years.

Importantly, however, these are Intent-to-Treat estimates, in the sense that we do not observe whether students actually utilize the GO Center in their school. In fact, the program was only intended to target college-ready students.[6] If GO Centers did not have a negative effect on student's college-going outcomes, the estimates above should be taken as lower bounds on the full effect of the average individual student's use of a GO Center.

Robustness to Specification of Propensity Score Model

Our results are robust to the choice of propensity score model, as seen in Table 3. For parsimony, we show robustness checks for only the outcome of ever having applied to a Texas 4-year college within 8 years of graduating, but we find similar results for other outcomes (available upon request).

Column 1 shows that the restriction to only include the five nearest neighbors of non–GO Center school within the common support does not change the point estimate appreciably: The point estimate is 0.0581 compared with 0.0522 with the 5NN restriction. Columns 2, 3, and 4 test the robustness of our estimates to the inclusion of different sets of variables in the propensity score model (and keeping both the common support and 5NN restrictions). Cumulatively, we drop in turn the 2-year lagged outcomes, the 1-year lagged outcomes, and the course taking variables: Point estimates change slightly but are largely robust. Finally, column 5 shows a specification that does not use propensity score matching at all, therefore including all schools in the state (except the 21 new GO Center schools in 2005). The point estimate on the outcome of ever applying to a 4-year college (0.0709) is still very similar to that from our preferred propensity score matching model. This gives us confidence that the other econometric balancing techniques we employ—differencing across time, controlling for preprogram covariates, and including school fixed effects—are working in conjunction with the restriction in sample imposed by the common support and 5NN restrictions.

Heterogeneous Effects of the Program

As discussed above, one limitation of our data is that we do not observe whether students in GO Center schools were in fact exposed to the services (this data were never collected). We do know that GO Centers mainly targeted students who were deemed "college-ready," yet may not otherwise submit an application. Unfortunately, there is no direct measure of "college-readiness" available in our data; therefore, in an attempt to more closely estimate the Treatment on the Treated effect, we next look at various subpopulations that have historically had different propensities to attend college: low- versus high-income families, White versus Black versus Hispanic students, and students who were characterized by the state as being "at risk" for not completing high school.

Table 4 contains these results, the difference-in-differences estimates from Equation 2 using the combined cohorts of students exposed to GO Centers. First, looking at columns 1 and 2, we see that program impacts on applications and acceptances among low-income students are almost double compared with those for non-low-income students. Impacts on enrollment are higher in magnitude among low-income students (e.g., a 2.1 percentage point increase in 4-year college enrollment for low income compared with a 1.07 percentage point increase for non-low income), but standard errors are too small to distinguish these impacts from each other or from zero. Although again not significant, among the low-income students, point estimates suggest the program shifted individuals away from 2-year colleges and toward 4-year colleges.

Next, columns 3, 4, and 5 split the sample by race. The impact of GO Centers on applications and acceptances is largely concentrated among Hispanic students (perhaps not a surprising result as Hispanic students are more likely to be low income). Enrollment in 4-year colleges among Hispanics exposed to GO Centers increased a significant 2.87 percentage points, an economically meaningful increase on a base enrollment rate of about 30% among Hispanics. There is still no evidence of an impact of GO Centers on college completion among Hispanics. Impacts on Black students are noisier (standard errors are larger partly based on the smaller sample size), and point estimates suggest an imprecise reduction in applications and acceptances, little change in enrollment, but a significant decrease in completion (e.g., a 2.41 percentage point reduction in completing any degree).

Finally, columns 6 and 7 present impacts of GO Centers on the samples of students who were and were not "at risk" of not graduating. This indicator is an aggregation of many state-defined factors that are predictive of not completing high school, but it is plausible to think that "at-risk" students would be those who could be persuaded to change their college-going decisions in response to the GO Center intervention. Indeed, the results in column 6 for the "at risk" population largely mirror those for the low-income and Hispanic populations: Most of the impact of GO Centers is among this population, impacting applications, acceptances, and enrollment, but not impacting college completion.

TABLE 4

The Impact of GO Centers on Various Subgroups

	Family income		Race			Graduation risk	
	Low income	Not low income	Hispanic	Black	White	At risk	Not at risk
Sample (both cohorts) =	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Applications and acceptances: HS graduation year							
Apply to any 4-year Texas public college	0.0657**	0.0342	0.0778***	0.000270	0.0186	0.0750***	0.0345
	(0.0277)	(0.0212)	(0.0296)	(0.0262)	(0.0238)	(0.0224)	(0.0256)
Number of 4-year public applications	0.187***	0.0811*	0.197***	−0.0126	0.0485	0.138***	0.144**
	(0.0645)	(0.0422)	(0.0671)	(0.0543)	(0.0460)	(0.0396)	(0.0660)
Accepted at any Texas 4-year public college	0.0631**	0.0284	0.0761***	−0.00583	0.00704	0.0750***	0.0249
	(0.0271)	(0.0222)	(0.0291)	(0.0237)	(0.0243)	(0.0226)	(0.0259)
Number of 4-year public acceptances	0.151***	0.0664*	0.165***	0.000752	0.0296	0.115***	0.114*
	(0.0576)	(0.0386)	(0.0606)	(0.0416)	(0.0409)	(0.0373)	(0.0587)
Enrollment: 1 year after HS graduation							
Enroll in Texas college (2- or 4-year)	0.0354**	0.0120	0.0344*	0.00812	0.00417	0.0375**	0.00262
	(0.0165)	(0.0196)	(0.0190)	(0.0288)	(0.0223)	(0.0158)	(0.0151)
Enroll in Texas 2-year college	0.0180*	0.0109	0.0122	0.0196	0.0141	0.0185	0.00387
	(0.0103)	(0.0165)	(0.0128)	(0.0259)	(0.0177)	(0.0137)	(0.0114)
Enroll in Texas 4-year college (public or private)	0.0222*	0.00768	0.0287**	−0.0132	−0.00225	0.0252***	0.00499
	(0.0117)	(0.0124)	(0.0116)	(0.0180)	(0.0179)	(0.00856)	(0.0139)
Applications and acceptances: Within 8 years after HS graduation							
Apply to any 4-year Texas public college	0.0659**	0.0321	0.0758**	−0.0166	0.0219	0.0668***	0.0345
	(0.0263)	(0.0213)	(0.0291)	(0.0253)	(0.0210)	(0.0222)	(0.0229)
Number of 4-year public applications	0.196***	0.0929*	0.201***	−0.0622	0.0861	0.136***	0.160**
	(0.0646)	(0.0513)	(0.0692)	(0.0699)	(0.0536)	(0.0426)	(0.0693)
Accepted at any Texas 4-year public college	0.0658**	0.0265	0.0755***	−0.0200	0.0107	0.0695***	0.0255

(continued)

TABLE 4 (CONTINUED)

	Family income		Race			Graduation risk	
	Low income	Not low income	Hispanic	Black	White	At risk	Not at risk
Sample (both cohorts) =	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(0.0261)	(0.0213)	(0.0286)	(0.0257)	(0.0211)	(0.0218)	(0.0234)
Number of 4-year public acceptances	0.158***	0.0742*	0.167***	−0.0376	0.0572	0.112***	0.125**
	(0.0566)	(0.0433)	(0.0612)	(0.0523)	(0.0447)	(0.0375)	(0.0603)
Enrollment: Within 8 years after HS graduation							
Enroll in Texas college (2- or 4-year)	0.0130	0.00217	0.0155	0.00727	−0.0161	0.0166	−0.0110
	(0.0167)	(0.0167)	(0.0186)	(0.0282)	(0.0183)	(0.0156)	(0.0131)
Enroll in Texas 2-year college	−0.00325	0.000234	−0.000586	0.00912	−0.0144	−0.000103	−0.0143
	(0.0117)	(0.0157)	(0.0132)	(0.0314)	(0.0174)	(0.0134)	(0.0124)
Enroll in Texas 4-year college (public or private)	0.0210	0.0107	0.0286*	−0.0199	−0.000253	0.0297***	−0.00142
	(0.0136)	(0.0156)	(0.0147)	(0.0233)	(0.0187)	(0.0113)	(0.0154)
2-Year persistence: Within 8 years after HS							
Attended any college for at least 2 years	0.00656	0.00247	0.0121	−0.0133	−0.00612	0.0138	−0.0136
	(0.0168)	(0.0178)	(0.0175)	(0.0242)	(0.0231)	(0.0136)	(0.0166)
Completion: Within 8 years after HS graduation							
Any degree (2- or 4-year)	−0.00149	0.00253	0.00373	−0.0241*	0.00405	0.00459	−0.00845
	(0.0123)	(0.0133)	(0.0131)	(0.0143)	(0.0175)	(0.0108)	(0.0131)
Certificate degree	−0.00567	0.000122	−0.00390	−0.0000265	−0.00529	0.00152	−0.0101*
	(0.00583)	(0.00695)	(0.00652)	(0.0102)	(0.00785)	(0.00659)	(0.00561)
Associate's degree	−0.00582	0.00430	0.0000611	0.000373	−0.00738	−0.00643	−0.00191
	(0.00542)	(0.00736)	(0.00595)	(0.00769)	(0.00844)	(0.00512)	(0.00761)
Bachelor's degree	0.00803	0.00259	0.00928	−0.0264**	0.0141	0.00993	−0.00103
	(0.00994)	(0.0123)	(0.0113)	(0.0126)	(0.0154)	(0.00856)	(0.0116)
Observations	43,230	4,3713	51,999	10,891	22,402	44,624	42,319

Note. (1) Each estimate is the coefficient on Treat × Post in Equation 2 for the outcome listed. Standard errors in parentheses clustered at the school level. (2) Sample includes cohorts exposed to GO Centers for 1 and 2 years. HS = high school.
$*p < .10$. $**p < .05$. $***p < .01$.

Conclusion

In this article, we have studied the impacts of a novel program implemented by the state of Texas that was intended to improve college outcomes among historically underserved students. We find large and meaningful impacts of the GO Center program on college applications and acceptances, but much more muted impacts on college enrollment, and no impact on college completion. The positive impacts on college access are more concentrated among those students with historically low college enrollment rates and thus have the largest potential to be swayed by the intervention: Hispanic students, those from low-income families, and those "at risk" of not graduating high school.

Information interventions like GO Centers are gaining popularity due to a growing body of evidence that they can boost college access and are relatively inexpensive to administer (the GO Center program cost only about US $400 per high school graduate). However, the types of students who are likely to be induced to enroll in college by interventions these are often those with historically low college enrollment rates. A growing body of research demonstrates that such students often require additional wrap-around support programs to be successful in college. This may explain the lack of long-term effects of GO Centers on college completion, and suggests that practitioners may consider ways to ensure that students who enroll in college due to informational interventions like GO Centers have access to a robust set of supports once they enroll in college. For example, in the context of GO Centers, one might consider drawing upon the Collegiate G-Force to provide mentoring to students after they enroll in college.

More generally, our findings also underscore the need to study long-term outcomes, as a short-term study of the impacts of GO Centers on applications would appear to be very cost-beneficial. Indeed, for those students who were induced to attend college as a result of the program, yet did not graduate, attending may have been a poor decision.

Appendix

TABLE A1

The Propensity Score Model Describing Which Schools Received GO Centers

	GO Center school	
Outcome =	Coefficient	(*SE*)
High school campus level means (2003 cohort)		
Score on Texas math standardized test (TAKS)	0.00407	(0.00738)
Teacher experience	0.00489	(0.0106)
Student–teacher ratio	0.0669	(0.0537)
Teacher salary	−0.0000437	(0.0000365)
High school graduation rate	−1.610	(1.382)
High school graduation rate (missing value indicator)	15.18	(12.67)
Total students	0.000856	(0.000902)
Gifted and talented	−0.0444	(1.322)
Special education	−0.597	(1.637)
Male	2.477**	(1.264)
Black	3.738	(4.393)
Hispanic	4.300	(4.293)
White	3.185	(4.362)
"At risk" of not graduating	0.387	(0.487)
Limited English Proficiency	4.828*	(2.541)
Low income	−0.427	(0.769)

(Continued)

TABLE A1 (CONTINUED)

	GO Center school	
Outcome =	Coefficient	(*SE*)
AP/IB course	0.201	(0.776)
English 3	0.408	(0.491)
Calculus	1.956	(3.123)
Precalculus	1.396	(1.009)
Algebra 1	1.888	(1.476)
Physics	0.0454	(0.800)
Chemistry	0.247	(0.623)
Biology	−0.436	(0.895)
Debate/public speaking	−0.646	(0.686)
Music/band	0.286	(0.904)
Art	−0.209	(0.771)
Theater	−0.869	(1.068)
Lagged outcomes (2003 cohort)		
Apply to any 4-yearr Texas public college	−3.117	(4.675)
Accepted at any Texas 4-year public college	1.835	(4.915)
Enroll in Texas 2-year college	0.592	(1.173)
Enroll in Texas 4-year college (public or private)	1.776	(2.172)
1-year certificate degree	2.635	(2.425)
Associate's degree	−1.763	(2.736)
Bachelor's degree	−4.801*	(2.477)
Lagged outcomes (2002 cohort)		
Ever applied to a 4-year Texas public college	−3.743	(5.218)
Ever accepted at a Texas 4-year public college	7.941	(5.484)
Ever enrolled in a Texas 2-year college	−1.227	(1.140)
Ever enrolled in college a 4-year college (public or private)	−6.883***	(2.365)
Received certificate degree	0.969	(2.453)
Received associate's degree	−1.180	(2.624)
Received bachelor's degree	3.523	(2.435)
Constant	−4.407	(4.988)
Chi-squared statistic	87.47	
Observations (No. of schools)	1,127	

Note. Estimates are from a probit model at the school level. AP/IB course = Advanced Placement/International Baccalaureate course. TAKS = Texas Assessment of Knowledge and Skills.
*$p < .10$. **$p < .05$. ***$p < .01$.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Notes

1. The name Go Center comes from the state's marketing motto "Education: Go Get It!"
2. We designed a survey to retrospectively ask schools about the specific activities in the pilot GO Center schools; however, virtually no schools had staff members who were still employed and could recall the specifics of the program over 10 years in the past.

3. For the 11th-grade cohort, the lagged controls in X_i reflect courses and time-varying characteristics in the 10th-grade academic year.

4. The indicator for being at risk of not graduating high school identifies students who have any of 13 characteristics that have historically predicted high school dropout, the most common of which are failing at least two courses in the basic high school curriculum, being retained within grade, being pregnant or a parent, having been expelled, or being on parole. The full list of characteristics can be found at http://ritter.tea.state.tx.us/peims/standards/1314/index.html?e0919.

5. In particular, $\mathbf{X}_{s,pre}$ includes the following school-level characteristics from 2003: the average state-mandated standardized test score in math (Texas Assessment of Knowledge and Skills [TAKS]); average years of teacher's experience and teacher salary; the student–teacher ratio; the graduation rate and the total number of students; the percent of students in gifted/talented and special education programs; the percent of students who are male, white, black, and Hispanic; the percent at risk of not graduating, of Limited English Proficiency, and receiving free lunch; and the proportion of students taking Advanced Placement/International Baccalaureate (AP/IB) courses, third-year high school English, calculus, precalculus, algebra 1, physics, chemistry, biology, debate/public speaking, music/band, art, and theater. $\mathbf{Y}_{s,pre}$ includes the following school-level characteristics for both the 2003 and 2002 cohorts: the fractions of students applying any 4-year Texas public college, being accepted at any Texas 4-year public college, enrolling in a 2-year college, enrolling in a 4-year college, obtaining a 1-year certificate degree, obtaining a 2-year associate's degree, and obtaining a bachelor's degree.

6. Granted, virtually any high school student in Texas is able to attend a 2-year school with only a high school diploma or General Educational Development (GED), but many students are likely unaware of this fact.

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Manuscript received August 17, 2016
First revision received May 30, 2017
Second revision received September 18, 2017
Accepted September 22, 2017