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Pushing College Advising Forward: Experimental Evidence on Intensive Advising and College Success

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Growing experimental evidence demonstrates that low-touch informational, nudge, and virtual advising interventions are ineffective at improving postsecondary educational outcomes for economically-disadvantaged students at scale. Intensive in-person college advising programs are a considerably higher-touch and more resource intensive strategy; some programs provide students with dozen of hours of individualized assistance starting in high school and continuing through college, and can cost thousands of dollars per student served. Despite the magnitude of this investment, causal evidence on these programs' impact is quite limited, particularly for programs that serve Hispanic students, the fastest growing segment of U.S. college enrollees. We contribute new evidence on the impact of intensive college advising programs through a multi-cohort RCT of College Forward, which provides individualized advising from junior year of high school through college for a majority Hispanic student population in Texas. College Forward leads to a 7.5 percentage point increase in enrollment in college, driven entirely by increased enrollment at four-year universities. Students who receive College Forward advising are nearly 12 percentage points more likely to persist to their third year of college. While more costly and harder to scale than low-touch interventions, back of the envelope calculations suggest that the benefit from increased college graduation likely induced by the program outweighs operating costs in less than two years following college completion.

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Abstract

Growing experimental evidence demonstrates that low-touch informational, nudge, and virtual advising interventions are ineffective at improving postsecondary educational outcomes for economically-disadvantaged students at scale. Intensive in-person college advising programs are a considerably higher-touch and more resource intensive strategy; some programs provide students with dozens of hours of individualized assistance starting in high school and continuing through college, and can cost thousands of dollars per student served. Despite the magnitude of this investment, causal evidence on these programs' impact is quite limited, particularly for programs that serve Hispanic students, the fastest growing segment of U.S. college enrollees. We contribute new evidence on the impact of intensive college advising programs through a multi-cohort RCT of College Forward, which provides individualized advising from junior year of high school through college for a majority Hispanic student population in Texas. College Forward leads to a 7.5 percentage point increase in enrollment in college, driven entirely by increased enrollment at four-year universities. Students who receive College Forward advising are nearly 12 percentage points more likely to persist to their third year of college. While more costly and harder to scale than low-touch interventions, back of the envelope calculations suggest that the benefit from increased college graduation likely induced by the program outweighs operating costs in less than two years following college completion.

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1 Introduction

Despite hundreds of billions of dollars invested over several decades to increase college affordability for students from lower-income backgrounds, socioeconomic disparities in college completion persist and if anything have widened over time (Bailey and Dynarski 2011). In parallel, the volume of students from lower-income backgrounds enrolling in college, especially community colleges and non-selective institutions, has steadily increased over the last several decades (Bastedo and Jaquette 2011). Students from lower-income backgrounds disproportionately enroll at open- and broad-access institutions, and are substantially more likely to undermatch relative to their academic background, which contributes to persistent inequalities in college completion (Goodman, Hurwitz and Smith 2017; Hoxby and Avery 2012; Smith et al. 2013).

In response to rising enrollments among lower-income student populations and persistent disparities in completion, researchers and policymakers have investigated two broad strategies to assist lower-income students with the complexities of the college and financial aid application processes: (1) lower-touch and lower-cost informational and remote, tech-supported advising, and (2) in-person advising programs, in which students are assigned an advisor who provides intensive support throughout the college and financial aid application life cycle. Research increasingly demonstrates that lower-touch intervention strategies have not led to improved rates of postsecondary access or success when implemented at scale (Avery et al. 2020; Bird et al. 2019; Gurantz et al. 2019), despite promising early evidence (Bettinger et al. 2012; Castleman and Page 2015; Hoxby and Turner 2013). Even interventions that pair students with a dedicated remote college advisor have at best modest impacts on the quality of students' college enrollment (Gurantz et al. 2020; Sullivan, Castleman, and Bettinger 2019).

The lack of efficacy of large-scale informational, nudge, and virtual advising interventions has renewed interest in more intensive in-person college advising programs. In contrast to lower-touch informational, nudge, and virtual advising interventions, in which students may have a series of text-based interactions with an advisor or perhaps an hour of remote advising through phone or other channels (Castleman and Page 2015; Sullivan, Castleman, and Bettinger 2019), students receive as many as 10-15 hours of advising through the more intensive in-person models (Barr and Castleman 2019). These programs are orders of magnitude more costly than lower-touch models, but existing evidence demonstrates that they can generate large improvements in college enrollment, enrollment quality, and persistence through college (Avery 2013; Barr and Castleman 2019; Carrell and Sacerdote 2017; Castleman and Goodman 2018).

At the same time, evidence on the impact of these programs is relatively limited, considering the hundreds of college advising programs operating throughout the country.[1] Of the rigorous experimental or quasi-experimental studies to date, most studies are either underpowered (Avery 2013; Castleman and Goodman 2018) focus on a relatively homogenous and economically better-off population (Carrell and Sacerdote 2017), or only examine impacts on persistence for a couple years following high school graduation. The exception is Barr and Castleman (2019), which provides precisely-estimated impacts of the Bottom Line college advising model on persistence through students' third year after high school, for a lower-income and diverse population of students.

In this paper, we contribute additional evidence on the impact of intensive college advising on students' enrollment, enrollment quality, and persistence. We focus on the Texas-based College Forward model. College Forward recruits lower-income students from Austin and Houston-area high schools and provides them with one-on-one advising starting at the beginning of their junior year of high school and continuing throughout college. College Forward's high school advising focuses on college entrance exam taking and re-taking; college exploration and applications; financial aid applications; college choice; and the summer transition from high school to college. College Forward primarily serves Hispanic, first generation, and lower-income students. We conducted a multi-cohort randomized controlled trial with College Forward, randomizing at the student-level, within high school, among program applicants. There are 1,445 students in the experimental sample, 869 of whom were assigned to receive College Forward advising. To date we have been able to follow the experimental sample into their third year following high school.

Our analyses yield several primary results. First, College Forward advising has a substantial positive effect on the extensive margin of whether lower-income students enroll in college. Students randomly assigned to College Forward were 7.5 percentage points more likely to enroll than students in the control group (a 13 percent relative increase); this increase was driven entirely by increasing the share of treated students enrolling at four-year institutions. College Forward students enroll at institutions with higher average SAT scores, higher average graduation rates, and higher average annual earnings. The combination of advising during high school and throughout college leads to even larger impacts on continuous enrollment in college. Students in the first experimental cohort were 11.8 percentage points more likely to remain continuously enrolled through their third year in college (a 36 percent relative increase); the pooled effect on continuous enrollment through

[1] See, for instance the National College Advising Network: http://ncan.org

the second year for the first two experimental cohorts nearly nine percentage points.

Our paper makes multiple contributions to the existing literature on intensive college advising programs. College Forward is the most comprehensive advising program of any that have been rigorously evaluated. Its advising starts a year earlier than Bottom Line's, and College Forward provides advising throughout students' college careers, regardless of where they enroll.[2] By starting advising at the beginning of junior year in high school, College Forward may have a bigger effect on students' application choice set because the program influences students' college entrance exam taking and encourages them to engage in an early and comprehensive college search. And by continuing to offer advising throughout college (like Bottom Line, but unlike most programs), College Forward may mitigate challenges students face in college that could lead to withdrawal (Bound et al. 2010; Kuh et al. 2008; Walton and Cohen 2011).

Our paper is the first evaluation of a college advising program serving primarily Hispanic students. As we show in Table 1, prior rigorous evaluations of intensive advising programs have focused on populations with substantially higher shares of white and Asian students.[3] College Forward serves more than twice the share of Hispanic students as any other rigorously-evaluated advising program, and aside from Bottom Line serves the largest share of low-income students. This is a notable contribution, since people of Hispanic origin are the fastest growing segment of the US population, accounting for more than half of the population growth in the last decade (United States Census Bureau 2019; Schaeffer 2019). Hispanic students are also the largest growing segment of college enrollees, increasing by 148 percent from 2000 to 2018, though disparities in college enrollment still exist: 59 percent of Asian 18-to-24 year olds are enrolled in college, compared to 42 percent of White students and 36 percent of Hispanic students (Hussar et al. 2020).

Moreover, a unique set of factors influence college choice and success among the Hispanic student population; our paper demonstrates how intensive college advising may support students to achieve postsecondary success in the context of these factors. Hispanic students are more likely to report that attending college close to home is an important factor in their search process, which may contribute to Hispanic students being less likely to apply to selective institutions (Desmond and López Turley 2009; Smith et al. 2013). College Forward advising may support Hispanic

[2]Bottom Line provides advising to students in college if they enroll at one of Bottom Line's target institutions. See Barr and Castleman (2019) for additional detail.

[3]Note that Avery (2013) reports only the percentage of students from the Hmong ethnic group, which is included in the "Asian" row.

students to identify colleges and universities that optimally balance their preferences for proximity to home and their match to institutions. Solórzano and Ornelas (2004) find that Hispanic students disproportionately lack access to advanced placement courses, and as a result may not receive the same level of college preparation within their high school as non-Hispanic peers both in terms of academics and information provided by teachers. Hispanic students tend to have lower rates of college aspirations than other ethnic groups, which is driven in part by students' lack of information about college (Kao and Tienda 1998). These results suggest that Hispanic students may particularly benefit from the intensive and individualized college and financial aid advising offered by College Forward.

2 Empirical Strategy

We worked with College Forward to modify their application process to implement an RCT for the high school classes of 2017 through 2020. The application pool contained students at 11 local high schools in Austin and Houston, Texas; we used high school as a randomization block. We assigned approximately 60 percent of the applicants from each high school who met the College Forward eligibility requirements to the offer of College Forward advising, an offer which virtually all students took up, with the balance assigned to the control group that received no advising services from College Forward.[4]

2.1 Data

We combine two main data sources to conduct our analysis: student application data from College Forward and National Student Clearinghouse college enrollment data. Student applications provide baseline demographic and academic information such as gender, race/ethnicity, GPA, parental and sibling education levels, primary household language, and receipt of Free and Reduced Price Lunch.[5] In Table 2 we provide summary statistics of these student-level measures and provide the results

[4] In order to be eligible for the program, students must be in the top 60% of their high school class and be either the first person in their immediate family to go to college or qualify for free and reduced priced lunch.

[5] Note that we cannot include measures of academic performance in this analysis, as students apply to the program prior to taking the ACT/SAT, and we do not have access to PSAT data. Additionally, we have a measure of GPA, but it is not standardized across high schools and can take on different ranges (i.e. out of 4.0, 5.0, etc).

of our tests for baseline equivalence across the treatment and control groups.[6] Over 65 percent of students in our sample are Hispanic and another 13 percent are Black. Seventy-five percent of students are first generation, and 68 percent receive Free and Reduced Price Lunch. Additionally, 43 percent of the sample speaks a primary language other than English at home. As noted previously, when comparing the College Forward student population to that of similar advising programs (Table 1), College Forward serves over double the share of Hispanic students as other programs and one of the highest shares of low-income students. The sample is well-balanced except for a modest significant difference in the share of White students in the treatment group, which may arise probabilistically given the number of tests we conduct. Table B2 in Appendix B demonstrates that the treatment and control groups are also well-balanced within each of the three cohorts of students included in this analysis.

We match students to the National Student Clearinghouse (NSC), which contains detailed term-level college enrollment data for the students in the sample. Additionally, we match NSC enrollment records to the College Scorecard to create indicators of college quality.

2.2 Empirical Model

We estimate the impact of being offered College Forward advising on a variety of college enrollment, enrollment quality and persistence outcomes. Our main specification takes the following form:

$$y_i = \beta_0 + \beta_1 Treatment + \beta_2 X_i + \beta_3 FE_{HS*COHORT} + \epsilon_i \quad (1)$$

where y_i is the college outcome of interest for student i, $Treatment$ is an indicator for being offered advising, and vector X_i contains student-level covariates as outlined in Table 2. We include a set of high-school by cohort fixed effects to account for the level at which we randomized students. The coefficient of interest is β_1, the impact of being offered advising.

[6] In Fall 2019, College Forward noticed the evaluation IDs previously assigned to the student-level files did not uniquely identify students in their database. College Forward used raw application data to match students back and assigned them a new evaluation ID, resulting in a 94% match rate. There are no compositional differences between the students who matched and those who did not. All data used in this paper comes from the matched sample. For further detail on this data matching issue, see Appendix A.

3 Results

3.1 Impacts on Enrollment and Enrollment Quality

In Table 3 we present estimates of the impact of College Forward advising on enrollment in college during the fall semester immediately following high school. We also report impacts separately on enrollment at four-year and two-year institutions. Table 3 presents impact estimates pooled across all three experimental cohorts, using models that include the full set of covariates described in Table 2. College Forward increases the share of students enrolling in college by 7.5 percentage points, a 13 percent increase relative to the control group. This effect is driven entirely by increasing the share of students attending a four-year college or university; the increase in four-year enrollment is a 21 percent increase relative to the control group.

In Table 4 we present estimates of the impact of College Forward advising on several dimensions of institutional quality: the share of students attending an institution with average SAT scores above 1000, 1150, and 1300; the share of students attending an institution with graduation rates above 30, 50, and 80 percent; and the share of students attending an institution with average annual earnings among graduates above $40,000, $50,000 and $60,000. There is a clear pattern of College Forward advising leading students to attend higher-quality institutions, with the largest impacts on enrollment at moderately selective institutions. For instance, students assigned to College Forward are six percentage points more likely to attend an institution with average SAT scores of 1000, a 23 percent increase relative to the control group. College Forward students are not more likely to attend institutions with average SAT scores higher than 1150, however. College Forward students are significantly more likely to attend institutions with higher average graduation rates. For instance, College Forward students are 5.4 percentage points more likely to attend institutions with graduation rates above 50 percent, a 24 percent increase relative to the control group. We observe a similar pattern of impacts when we focus on average annual earnings as an institutional quality measure.

3.2 Impacts on College Persistence

In Table 5 we investigate the impact of College Forward advising on persistence into the second and third year of college, which we can respectively investigate for the first two experimental cohorts (pooled) and for just the first cohort. The second row of the table shows that students who receive

College Forward advising are 8.8 percentage points more likely to stay enrolled at the same college as their first year during their second year of college (a 22 percent relative increase), meaning treated students are transferring or dropping out at lower rates than control students. This effect continues into the third year of college, with treated students 6.7 percentage points (a 25 percent relative increase) more likely to be enrolled in the same college as their first year. This result may imply that students who receive College Forward advising pursue a well-matched institution with their initial enrollment, and are thus less likely to either transfer schools or drop out altogether. Row three of Table 5 demonstrates that College Forward has a large impact on continuous enrollment in college, defined as enrolling in all Fall and Spring semesters since high school: treated students were 8.6 percentage points more likely to remain continuously enrolled into the second year of college (a 19 percent relative increase) and 11.8 percentage points more likely to remain continuously enrolled into the third year of college (a 36 percent relative increase). This impact on third year continuous enrollment is nearly two-thirds larger than the initial enrollment impact. We view this increasing magnitude of impacts on continuous enrollment as suggestive evidence of the beneficial effect of College Forward's ongoing advising while students are in college.

3.3 Subgroup Impacts

We explored whether the impacts of College Forward vary by the student-level characteristics described in Table 2. As can be seen in Table B1 in Appendix B, overall we do not find evidence of heterogeneous program impacts on any of our primary outcomes. There is suggestive evidence of larger impacts for students who are not the first in their family to go to college (e.g. 73 percent of non-first generation students in the treatment group enroll in four-year colleges immediately following high school compared with 59 percent of non-first generation students in the control group), but this subgroup comprises a small share of the overall sample (21 percent) and this difference may just reflect an accumulation of Type I error across multiple subgroup tests, so we interpret this result with caution.

4 Discussion

Our results demonstrate large impacts on college enrollment, enrollment quality, and continuous enrollment in college from College Forward advising, the most comprehensive college advising model

that has been rigorously evaluated to date. College Forward's impacts operate at the extensive margin of college enrollment, supporting students who would otherwise not enroll in college to not only pursue postsecondary education but to do so at four-year colleges and universities.

Over sixty-five percent of students served by College Forward are Hispanic; this is more than double the share of Hispanic students served by any other rigorously-evaluated college advising program. These results are both important and policy-relevant given that Hispanic students are the most rapidly growing share of the college-going population in the U.S. and face a unique set of barriers to postsecondary participation, including a lack of access to advanced coursework and information about college, and stronger preferences to stay close to home after high school. Absent additional advising like College Forward provides, these factors may lead students to forego college or to pursue local but lower-quality options.

The magnitude of College Forward's impacts are particularly noteworthy in the context of several recent studies that find little to no impact of virtual college advising models on college access or success (Gurantz et al. 2019; Sullivan, Castleman, and Bettinger 2019). The contrast in program efficacy raises the question of why in-person models are so much more effective than their virtual counterparts. We offer several hypotheses. By recruiting from local high schools and operating in local communities, in-person models may be more effective at establishing trust with students and their families and maintaining engagement with students than virtual models. This is reflected in the substantially higher intensity of interactions between students and advisors in in-person relative to virtual college advising models. Barr and Castleman (2019) report that students in the Bottom Line program have an average of 10-15 hours of interaction with their advisors just during high school; College Forward's intensity of interaction is similar, with students participating in 10-15 meetings with their advisors per year in high school. These frequent high school interactions plus additional meetings in college translate to dozens of hours of engagement over the life of the program.[7] By comparison, the national virtual college advising program CollegePoint reports an average of an hour or less of interaction between students and coaches (Sullivan, Castleman, and Bettinger 2019). Additionally, advisors in programs like College Forward that operate locally may have more local contextual knowledge, both about students' schools and environments as well as about local higher education options and financial supports.

The magnitude of its impacts notwithstanding, College Forward and advising models like

[7]Engagement estimates are based on College Forward's internal analysis.

it are more expensive to operate and harder to scale given their reliance on in-person, intensive advising. Yet our back-of-the-envelope calculations, shown in Table 6, suggest the benefits of programs like College Forward likely exceed costs. We estimate the return to College Forward from estimated increases in bachelor's degree attainment, based on the increases in college persistence we observe for the first cohort of 395 students. Continuous enrollment into the third year of college is nearly 12 percentage points higher for students in the treatment group. Based on this 12 percentage point figure, we initially estimate the returns to College Forward assuming the program leads to a 10 percentage point increase in bachelor's completion. College Forward estimates the cost per student over the life cycle of the program to be around $4,000 ($1,200 for each year in high school and $400 for each year in college). For the 395 treated students in the first cohort, this brings total cost to $1.58 million dollars. Assuming a 10 percentage point increase in bachelor's completion induced by treatment means an extra 39 students graduating with a bachelor's degree, so the cost per student induced to earn a bachelor's degree comes to slightly more than $40,500. The median earnings for students with bachelor's degrees is $24,900 higher than students with high school diplomas and no college experience (Ma, Pender and Welch 2019). Assuming this difference is constant year over year implies that College Forward has a positive rate of return just two years after students graduate college. Using a more conservative estimate of a 6 percentage point increase in bachelor's completion, as can be seen in column 2 of Table 6, we estimate the benefits of College Forward to exceed costs less than three years after graduation. Similarly, we estimate this return based on the earnings premium for students who earn bachelor's degrees as compared to students with some college but no degree, which is $19,100 (panel 2 of Table 6). Our most conservative estimates of a 6 percentage point increase in bachelor's attainment and a $19,100 earnings premium for earning a bachelor's degree imply that benefits of the program exceed costs within 4 years after graduation. These calculations show that while intensive advising programs are more expensive than nudge-based or virtual programs, they result in large and fast returns on investment.

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Tables

Table 1: Background Characteristics, College Forward and Similar Programs

	College Forward	Bottom Line	CollegePoint	College Possible	NH Peer Mentor
Female	0.700	0.701	0.54	0.59	0.425
First Gen	0.754	0.811	0.51		
Low Income Proxy	0.718	1.00	0.45		0.286
White	0.068	0.027	0.40		0.799
Black	0.139	0.324	0.07		
Hispanic	0.666	0.317	0.17		
Asian	0.036	0.237	0.26	0.691	
Race - Other	0.076	0.095	0.06		
Observations	869	1687		134	871

Notes: College Forward sample presented is treated students from all three cohorts included in this analysis. Demographics for each organization, starting in column 2, are from: Table 1 of Barr and Castleman (2019); Table 5 of Sullivan, Castleman, and Bettinger (2019); Table 2 from Avery (2013); and Table 1 from Carrell and Sacerdote (2017). Note that Table 2 from Avery (2013) presents statistics for only students from the Hmong ethnic group, which is recorded under the "Asian" column.

Table 2: Demographic Characteristics and Balance

	Control Mean	Treatment
Female	0.689	-0.001
		(0.025)
First Gen	0.752	-0.002
		(0.024)
Receive FRPL	0.681	0.020
		(0.024)
White	0.106	-0.032**
		(0.015)
Black	0.135	-0.000
		(0.018)
Hispanic	0.632	0.024
		(0.026)
Asian	0.031	0.005
		(0.010)
Race - Other	0.082	0.004
		(0.015)
Non-English at Home	0.434	0.000
		(0.027)
Observations	576	869

Notes: Column 1 presents the control mean for each demographic characteristic (row title). Column 2 presents results from a regression of the demographic characteristic (row title) on a treatment indicator, controlling for high school by cohort. Balance across missing indicators for all variables not shown, but is met. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Effects on College Enrollment,
First Fall after High School Graduation

	Control Mean	Treatment
Enrolled, Anywhere	0.582	0.075***
		(0.026)
Enrolled, 4 Year	0.352	0.074***
		(0.025)
Enrolled, 2 Year	0.229	0.001
		(0.023)
Observations		1445

Notes: Results from a regression of the enrollment outcome (row title) on a treatment indicator, controlling for the covariates shown in Table 2 and including high school by cohort fixed effects. All outcomes are measured the student's first fall after graduating high school. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Effects on College Quality,
First Fall after High School Graduation

	Control Mean	Treatment
Average SAT Score Above...		
1000	0.264	0.060**
		(0.023)
1150	0.109	0.022
		(0.016)
1300	0.003	0.004
		(0.003)
Average Graduation Rate Above...		
30%	0.356	0.068***
		(0.025)
50%	0.227	0.054**
		(0.022)
80%	0.080	0.039***
		(0.015)
Average Earnings Above...		
40K	0.314	0.067***
		(0.025)
50K	0.108	0.028*
		(0.016)
60K	0.003	0.003
		(0.003)
Observations		1445

Notes: Results from a regression of the enrollment outcome (row title) on a treatment indicator, restricting sample to students enrolled their first fall after high school. Regression controls for the covariates shown in Table 2 and includes high school by cohort fixed effects. All outcome measures constructed from College Scorecard data. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Effects on College Persistence

	Control Mean	Treatment
Second Year Enrollment		
Enrolled, Second Fall	0.540	0.072**
		(0.032)
Enrolled, Same College	0.401	0.088***
		(0.032)
Continuously Enrolled	0.447	0.086***
		(0.032)
Observations		1009
Third Year Enrollment		
Enrolled, Third Fall	0.482	0.044
		(0.043)
Enrolled, Same College	0.270	0.067*
		(0.038)
Continuously Enrolled	0.327	0.118***
		(0.040)
Observations		621

Notes: Results from a regression of the enrollment outcome (row title) on a treatment indicator, controlling for the covariates shown in Table 2 and including high school by cohort fixed effects. Second year enrollment outcomes are estimated for students in Cohorts 1 and 2. Third year enrollment outcomes are estimated for students in Cohort 1. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Benefit-Cost Analysis, First Cohort

	10pp Increase	6pp Increase
Comparison Group: HS Degree		
Number of Students Induced to Graduate	39	23
Cost per Student Induced to Graduate	$40,513	$68,696
Earnings Premium per Student Induced to Graduate	$24,900	$24,900
Number of Years for Benefit to Exceed Cost	1.63	2.76
Comparison Group: Some College, No Degree		
Number of Students Induced to Graduate	39	23
Cost per Student Induced to Graduate	$40,513	$68,696
Earnings Premium per Student Induced to Graduate	$19,100	$19,100
Number of Years for Benefit to Exceed Cost	2.12	3.60

Notes: This table presents a back-of-the-envelope benefit-cost analysis for the first cohort of College Forward students. Column 1 assumes a 10 percentage point increase in graduation from college induced by College Forward advising, and column 2 assumes a 6 percentage point increase in graduation. Earnings premium estimates are from Ma, Pender and Welch (2019). Panel 1 uses the earnings premium for bachelor's degree recipients as compared to high school graduates with no college experience. Panel 2 uses the earnings premium for bachelor's degree recipients as compared to students with some college experience but no degree.

Appendix A: Data Matching Issue

As noted in footnote 6, prior to requesting NSC data in Fall 2019 for the first three cohorts of students, a member of the College Forward team noticed that the evaluation IDs previously assigned to the student-level files did not uniquely identify students in College Forward's identifiable student database. College Forward used the student-level data (e.g. demographic characteristics, responses to open-ended questions) contained in the original raw application data sent to the research teams for randomization to manually match student records back to the College Forward identifiable student database. This resulted in nearly a 94% match rate. In addition to the 6% of students in the original sample who were not in the matched sample, i.e. College Forward did not have a record of these student application records in their database, there were 24 students assigned to the control group who received treatment, and 25 students assigned to treatment who were in the control group (less than 4% of the matched sample in total).

In order to confirm the validity of the RCT with the matched sample, we conducted additional balance tests to ensure that the updated matched sample is balanced across the treatment and control groups and that it is similar on observable characteristics to the original sample. Table 1 shows that the matched sample is balanced across observable characteristics, so our estimate of College Forward's impact still has internal validity. We also compare the matched sample with the original applicant sample College Forward sent to our research team to ensure that there are not compositional differences between the original and matched sample. As we show in Table B3 in Appendix B, the two samples are very similar on student demographics.[8] After analyzing the results from these two tests, we are confident that the integrity of the randomized controlled trial holds up despite the data discrepancy and that we can continue to estimate the causal effect of College Forward on students' college outcomes.

[8]Note that in returning the matched sample, College Forward was able to fill in some previously missing baseline data points for students who matched their records, contributing to the decrease in missingness in the matched sample.

Appendix B: Supplemental Tables

Table B1: Effect on Initial Enrollment by Subgroup,
First Fall after High School Graduation

	Control Mean	Treatment	Observations
Female	0.577	0.078**	1005
		(0.031)	
Male	0.591	0.055	433
		(0.050)	
First Generation	0.587	0.045	1088
		(0.030)	
Non-First Generation	0.590	0.154***	297
		(0.059)	
Free and Reduced Priced Lunch	0.566	0.070**	1016
		(0.032)	
Non-Free and Reduced Priced Lunch	0.631	0.082	289
		(0.059)	
White	0.574	0.102	120
		(0.111)	
Black	0.654	-0.060	199
		(0.068)	
Hispanic	0.544	0.085**	943
		(0.033)	
Non-English at Home	0.560	0.114***	641
		(0.041)	
English at Home	0.601	0.048	790
		(0.034)	

Notes: Results from a regression of an indicator for enrollment in college the first fall following high school on a treatment indicator for the subgroup listed in the row title, controlling for the covariates shown in Table 2 and including high school by cohort fixed effects. Control Mean refers to the mean for the students in the given subgroup in the control group. Standard errors in parentheses. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B2: Demographic Characteristics and Balance by Cohort

	Cohort 1		Cohort 2		Cohort 3	
	Control Mean	Treatment	Control Mean	Treatment	Control Mean	Treatment
Female	0.699	-0.022	0.650	0.056	0.711	-0.026
		(0.040)		(0.048)		(0.045)
First Gen	0.695	0.027	0.798	-0.015	0.781	-0.029
		(0.039)		(0.041)		(0.041)
Receive FRPL	0.628	0.053	0.626	0.064	0.791	-0.065
		(0.038)		(0.049)		(0.042)
White	0.088	-0.021	0.135	-0.044	0.102	-0.037
		(0.022)		(0.032)		(0.027)
Black	0.212	-0.009	0.074	0.026	0.096	-0.012
		(0.033)		(0.029)		(0.028)
Hispanic	0.588	0.010	0.675	0.025	0.647	0.043
		(0.040)		(0.048)		(0.046)
Asian	0.035	0.014	0.049	-0.012	0.011	0.009
		(0.017)		(0.020)		(0.012)
Race - Other	0.049	0.012	0.067	-0.003	0.134	0.000
		(0.020)		(0.027)		(0.033)
Non-English at Home	0.425	0.008	0.436	-0.021	0.444	0.009
		(0.042)		(0.051)		(0.048)
Observations	226	395	163	225	187	249

Notes: Columns 1, 3 and 5 present the control mean for each demographic characteristic (row title) within the cohort listed in the column heading. Columns 2, 4 and 6 present results from individual regressions of the demographic characteristic (row title) on a treatment indicator, controlling for high school, for the cohort listed in the column heading. Balance across missing indicators for all variables not shown, but is met. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B3: Demographics of Original and Matched Samples

	Original Sample	Matched Sample
Female	0.690	0.696
First Gen	0.755	0.753
Receive FRPL	0.703	0.703
White	0.080	0.083
Black	0.134	0.138
Hispanic	0.652	0.653
Asian	0.032	0.034
Race - Other	0.078	0.078
Non-English at Home	0.451	0.444
Observations	1542	1445