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Increasing Community College Completion Rates among Low-Income Students: Evidence from a Randomized Controlled Trial Evaluation

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Abstract

Recent trends in college dropout rates have resulted in what some scholars call a “completion crisis” (Deming, 2017). Identifying successful approaches to raising college completion rates among low-income students is of paramount interest to both policy makers and researchers. Much of the existing policy and research attention to this issue has focused on addressing academic and financial barriers to completion. However, there is ample reason to think that non-academic obstacles – such as housing, transportation, childcare, and other family issues – might be a key driver of dropout rates for students living with the burden of poverty. This study examines the impact of a case management intervention that is designed specifically to help low-income students overcome “life barriers” that threaten their persistence in community college. We evaluate the impact of this intervention through a randomized controlled trial evaluation (RCT) conducted between 2013 and 2016 in Fort Worth, Texas. Eligible students were randomly assigned to a treatment group that was offered case management and emergency financial assistance (EFA), a separate treatment group offered only EFA, or a control group. We use administrative records to track student academic outcomes for three years post random assignment. The results indicate that the program significantly increased persistence and degree completion through six semesters, especially for female students. We find no difference in outcomes between the EFA-only treatment arm and the control group. A back-of-the-envelope calculation using average earnings gains associated with community college completion implies that program benefits exceed program costs after only 4.25 years in the workforce post schooling.

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I. INTRODUCTION

Community college is a crucial component of our nation’s education system, offering students an inexpensive way to achieve higher levels of education and ultimately earnings. Average earnings are 32 percent higher and unemployment rates are 39 percent lower for those with an associate’s degree compared to those with a regular high school degree.¹ College enrollment rates in general have risen, but dropout rates are very high at community colleges, especially among low-income students. Data from the U.S. department of education indicate that six years after first enrolling, nearly 50 percent of community college students have dropped out (Radford et al, 2010). Furthermore, only about 30 percent of first-time, full-time community college students earn a certificate or associate degree within three years (Aud et al., 2013). Over the past few decades, community college completion rates have been falling and time to degree has been rising (U.S. Department of Education, 2016; Bound, Lovenheim, and Turner, 2010, 2012; Turner 2004). These trends have led education scholars to describe a “completion crisis,” emphasizing that the key policy issue is college completion rather than college attendance (Deming, 2017). Figuring out ways to better realize the potential of the community college investment, both for the students themselves and for society more generally, is of great economic and policy importance.²

There are a number of potential explanations for the high rate of non-completion among low-income students. Perhaps the most obvious is financial costs. Although the sticker price for community college can be high, many low-income community college students receive grants, which keeps out-of-pocket tuition costs low. The federal government spends billions of dollars a year subsidizing

¹ Authors’ calculations from the 2015 five-year American Community Survey (Ruggles et al. 2015). We calculate these from an OLS regression model for individuals age 25 to 50 controlling for year of age, race and gender effects. We acknowledge that these simple OLS estimates do not adjust for selection effects; we use them merely to make the point that there are sizable earnings differences, though how much of that wage premium is causal is difficult to pin down.

² Policy makers appear to be quite aware of this challenge. For instance, improving persistence in community college was an explicit priority of the Obama administration, which launched the *American Graduation Initiative* with a goal of producing 5 million more community college graduates by 2020. <http://www.whitehouse.gov/blog/Investing-in-Education-The-American-Graduation-Initiative>

community college attendance. In 2015, the Pell Grant program provided \$30 billion in aid for low-income individuals to attend college and more than a third of Pell recipients attend community college (Baime and Mullin, 2011). States and local governments often provide financial aid and need-based scholarships as well. Nevertheless, low-income students still face financial burdens due to lost earnings while in school. There is also reason to believe that many students arrive at community colleges academically unprepared, which requires them to take many remedial classes. Both the under-preparation itself and the requirement of having to spend the time and money to take remedial classes can lead to elevated rates of dropout.

This paper focuses on the role of other types of challenges that have received less policy and research attention to date, specifically, the non-academic challenges facing many poor and near-poor students. Survey evidence from Johnson et al. (2011) shows that the two leading reasons that students self-report about why they do not return to college are a need to work full time (56 percent) and family reasons (53 percent). In fact, the survey results suggest that factors outside the classroom eclipse tuition cost and academic factors. Given that community college students tend to be older and more likely to have children, it is not surprising that life and family issues often arise, making it difficult for many students, low-income students in particular, to complete their degree. Although these students might not face high tuition costs due to subsidies, school still imposes a significant financial burden through the opportunity cost of lower work hours and earnings. Issues with bills, child care, and transportation also pose problems for many low-income students (Geckeler et al., 2008). Other personal barriers are not so much logistical or financial, but rather issues related to self-efficacy. Students may lack the necessary commitment and/or planning and time management skills necessary to set out a path to graduation and stay committed to that plan. Students who lack clear goals and a genuine understanding of why college is important often become derailed by relatively minor challenges and setbacks (Grubb, 2006).

Many students report having trouble navigating the complex community college system, particularly first generation college students and new immigrants who may have limited knowledge about how colleges function (Bailey, Jenkins, and Leinbach, 2005; Scott-Clayton, 2011). This suggests that for many vulnerable community colleges students, small negative shocks like a family emergency, a necessary vehicle repair, or a missed rent payment can sometimes have lasting impacts on academic outcomes. It is widely recognized in other contexts that vulnerability is an important dimension of poverty and many low-income families live perpetually on the brink of crisis and deep hardship (Barr and Blank 2011; Shipler 2005). Bertrand et al., (2004) describe this aspect of poverty in terms of some families having “narrow margins for error.”

The *Stay the Course* intervention (*STC*) is designed to lessen the impact that non-academic challenges have on community college completion rates for low-income students. The program provides students with two primary services: comprehensive case management and emergency financial assistance. Each *STC* student is paired with a Navigator, a trained social worker who works with students to help them overcome personal barriers to academic progress. Together with their Navigator, students develop a service plan detailing their academic goals, personal financial or logistical challenges, and the steps necessary to overcome them. Navigators work with students throughout their time at TCC, helping them with their individual barriers to degree attainment such as finding affordable child care, selecting courses that keep them on track towards graduation, making decisions about transferring to four-year colleges, and locating social services in the Fort Worth, TX area.

This paper presents the results of a randomized controlled trial (RCT) evaluation of *STC*. In fall 2013, eligible students at Tarrant County College (TCC) in Fort Worth, Texas were randomly assigned either to a treatment group that was offered coaching, mentoring, and EFA, to a separate treatment group that was offered only EFA, or to a control group that received no special services. Using administrative records, we tracked academic outcomes for study participants for three years post random assignment. The results indicate that the program significantly increased persistence and degree

completion through six semesters, especially for female students. We find no difference in outcomes between the EFA-only treatment arm and the control group. Using average earnings for high school graduates and those who attend or complete community college, we estimate that the program becomes cost-beneficial in just over four years.

II. PREVIOUS RESEARCH ON COMMUNITY COLLEGE INTERVENTIONS

There has been substantial research and policy attention to the issue of academic under-preparation of entering community college students. About 60 percent of students entering community college are referred to at least one remedial education class (Bailey, 2009; Attewell et al., 2006). Community colleges devote upwards of \$2 billion annually towards these developmental education programs (Strong American Schools, 2008). Despite these efforts, students who enroll in remedial courses are 38 percent less likely to complete their degree than other students (Attewell et al., 2006), although much of this difference is likely driven by selection into these remedial courses.

Community colleges have experimented with interventions aimed at improving academic success including learning communities, enhanced student services, and financial incentives. MDRC's "Opening Doors" demonstration project provides some experimental evidence that learning communities encourage persistence (Scrivener et al., 2008). The impact of enhanced student services within the college, such as lowering student-to-counselor ratios and increasing funding to career guidance, were found to be modest at best and dissipated in later semesters (Scrivener and Weiss, 2009). Another MDRC Opening Doors demonstration that provided financial incentives to persist in school found modest but positive impacts on persistence (Richburg-Hayes et al., 2009).

There is some limited evidence of the impact of coaching and mentoring-type interventions on college persistence and degree completion. Bettinger and Baker (2014) reports the results of a random assignment evaluation of InsideTrack, a telephone-based coaching service that helps two- and four-year college students overcome academic and "real-life" barriers to a college degree and to help students

become advocates for themselves. They found that assignment to InsideTrack increased both persistence and degree completion rates. Van der Steeg, van Elk and Webbink (2015) report the results of an experiment that used coaching for students aged 16-20 enrolled in vocational programs in the Netherlands. Their work showed that the coaching reduced dropout rates by 40 percent and the effects were largest for those most likely to drop out.

Perhaps the most promising community college intervention studied to date has been The City University of New York's (CUNY) Accelerated Study in Associates Program (ASAP). This multifaceted intervention offers financial assistance, developmental courses, block-scheduling, career services and academic advisement from advisers with relatively low caseloads ranging from 60:1 to 80:1. MDRC's random-assignment evaluation of the program found that it nearly doubled community college completion rates. The community college intervention studied in this paper differs from these and other existing interventions in several important ways, as we describe in the next section.

III. THE “STAY THE COURSE” INTERVENTION

Stay the Course is a comprehensive, individualized intervention that was designed by Catholic Charities Fort Worth (CCFW) to help low-income community college students address personal obstacles so they can persist in school and complete their intended degree. CCFW is a large nonprofit social service provider with a mission to improve outcomes for low-income families and individuals. They provide services to over 100,000 unduplicated clients each year.

Under STC, each student is assigned a trained social worker (called a Navigator) that will work as their case manager. There are two components to the STC intervention: wrap-around case management and emergency financial assistance. There are three essential features to the case management component of the program. First, upon a student's enrollment in the program, the STC Navigator meets with the student to conduct a client assessment that identifies the client's needs, likely barriers, and their strengths and weaknesses. Based on this assessment, the student and navigator

collaboratively develop and implement a comprehensive service plan that sets out the steps necessary for the student to accomplish their educational goals. The service plan is tailored to 1) address these specific needs and barriers through a range of available services, 2) devise intermediate goals for the student to accomplish along the way, and 3) discuss the action steps necessary to accomplish these goals within established timeframes. Action steps are developed for each specified goal in the service plan. For example, if a participant has a goal of earning a grade of at least a “B” in a specific course the action steps for that goal might include attending all classes for the course, meeting once a week with a tutor, and/or performing well on an upcoming exam. The service plan is reviewed and updated every 90 days. Navigators work with students to make the necessary arrangements so that their life is set up to accommodate class attendance and studying.

Part of the goal of this component of case management is for the Navigators to develop a personal relationship with each of their student clients. This sort of personal relationship is different from the typical relationship that academic advisors at community colleges have with their students, as these advisors tend to have much larger caseloads, and most of the advice they provide is academic in nature. This relationship is important for the second component of case management which is ongoing meetings between the Navigator and the student to work on resolving unforeseen problems that crop up that might threaten the ability of student to complete their degree. Students might encounter situations along many dimensions that could derail their education, such as problems with housing, child-care arrangements, transportation, or work schedules. Students are encouraged from the outset to meet with their Navigator for help addressing such circumstances. The thought behind the implementing agency’s approach is that because many of the problems are very personal, e.g., domestic violence, substance abuse, mental illness, etc., the students are more likely to engage the Navigator for help if they have a trusted relationship with the social worker. As explained by the implementing agency, part of the goal of developing the service plan is for the clients to become more comfortable with the Navigator so they will use their services when problems arise.

The third aspect of STC case management is assistance navigating the community college system. Navigators remind students to register for the necessary and appropriate classes. Depending on student need, Navigators may also assist students in finding campus-provided tutors and help students avail themselves of campus-provided services. STC's coaching and mentoring services are much more comprehensive and intensive than those typically available at community colleges. Each Navigator is assigned a caseload of roughly 34 students, which, as discussed below, is much smaller than other, lighter-touch community college programs, such as those that promote persistence through lower student-to-counselor ratios.

Program guidelines recommend that navigators and students meet in person at least once per month. However, as described below, during the implementation we evaluated, frequency of in-person interactions varied widely. To get a sense of the frequency and nature of Navigator-student interactions, we collected information from Navigator case notes. Table 1 reports summary statistics of all Navigator-student interactions according to CCFW's administrative data from fall 2013 through spring 2016 for students enrolled in the study in fall 2013. On average, Navigators interacted with their clients about 37 times each semester. About half of these interactions were via text or email. About a third of these interactions were over the phone and just over 10 percent of interactions were in person. When students did interact in person, meetings lasted a little over 40 minutes. Figure 1 shows the frequency of discussion topics covered during Navigator-student interactions based on these case notes. We include as Navigator-student interactions in-person meetings, phone calls, or individualized emails/texts, but not mass communication such as group emails or administrative reminders. Academic discussion topics such as class registration and gaining access to tutors were the most popular topics; they were discussed in over 25 percent of Navigator-student interactions. Work/employment issues were discussed in more than 12 percent of interactions, which is consistent with the evidence that this issue is one that often leads low-income students to drop out of community college (Johnson et al., 2011). Almost 9 percent

of interactions resulted in referral to other specialized service programs. Housing, finances, and transportation were each mentioned in at least 5 percent of interactions.

The second main component of the STC program is emergency financial assistance (EFA). Students in the *STC* program are eligible to apply for EFA for non-academic expenses or income shortfalls that could negatively impact a student's persistence in college. EFA is not meant to constitute an academic grant or scholarship, but rather to provide the buffer resources that a low-income student might need to stay in school. To receive EFA, students must successfully demonstrate both that they have an imminent financial need and that not meeting this need would be detrimental to their academic progress. Additional factors that determine whether the event would qualify for assistance include the extent to which the event is foreseeable, controllable, and temporary. Examples of qualified costs include a car repair, rent and utilities, a bus pass, or emergency medical care. Eligibility for EFA is restricted to those students with a cumulative GPA of a 2.0 or higher at TCC (unless they are in their first semester) and who are enrolled in at least 9 credits the semester in which they apply. An individual student could apply to receive up to \$500 per semester, capped at \$1,500 total over a three-year period. A program Funds Coordinator makes determinations for all EFA applications, subject to a supervisor's review. Navigators may assist clients in completing the financial assistance application, but they do not attend the student's meeting with the Funds Coordinator nor do they intercede with the Funds Coordinator on behalf of the student. This separation is designed to keep Navigators from having to deny financial assistance from their own clients.

Based on Funds Coordinator records, over a three-year period, students enrolled into the STC treatment group (N = 94) submitted 126 requests for EFA. 101 of those requests (82 percent) were approved, with an average payout of \$276. As shown in Figure 2, 35 percent of the funds were granted for transportation needs, 33 percent for housing, 21 percent for utilities, and 11 percent for other (school supplies, child care, etc.). About half of the students in the program never applied for any

funds, and less than 10 percent of students collected more than \$1,001 over the three-year period. After six semesters, only one *STC* student had collected the max amount of \$1,500.

STC differs from existing interventions in several important ways. First, the wrap-around case management services are more comprehensive and intensive than those typically available at community colleges. Navigators worked with each student to address their unique social, financial, academic, and personal impediments to college success. While other college programs, such as the City University of New York’s Accelerated Study in Associate Programs (ASAP) and Mesa Community College’s Connect 4 Success program have some coaching/mentoring associated with the program, this is not a major focus of these interventions (Scrivener et al., 2015; Felton and Moore, 2013). Second, the case management services provided by *STC* are provided by a professional social worker working for a non-profit agency outside the community college system. These social workers are specifically trained to deal with personal, non-academic issues for a low-income population.

A third important difference is that the caseloads for *STC* Navigators are much lower than those of the typical community college guidance counselor, and are even considerably smaller than recent experiments aimed at promoting persistence through lower student-to-counselor ratios. The ASAP intervention boasted a student to advisor ratio between 60:1 and 80:1 (Scrivener et al., 2015), as compared to a *STC* student-Navigator ratio of 34:1. A fourth difference, is that the *STC* case management services are offered in conjunction with emergency financial assistance.⁴ The financial supports provided in ASAP are limited to metro cards, textbooks, and tuition waivers (received by 3-11 percent of students), whereas *STC* offers a more flexible financial safety net of up to \$1,500 dollars for any negative shock that might affect persistence in school.

The Emergency Financial Assistance (EFA) component of *Stay the Course (STC)* – in particular the stand-alone EFA treatment arm – is most comparable to the “Dreamkeepers” program created by

⁴ Ultimately, our results suggest that providing EFA alone does not improve academic outcomes. However, this evidence does not imply that EFA, offered in conjunction with case management, is ineffective.

Scholarship America.⁵ That program provides monetary assistance to students who face short-term financial emergencies. A descriptive review conducted by MDRC examined the outcomes of recipients of Dreamkeepers funds from 11 different schools in the 2004-2006 period and found that recipients have “disproportionate need” and were “more academically challenged” than the average student, but their reenrollment rates were roughly comparable to other students (Geckeler et al., 2008). Though the findings of that report are consistent with the notion that limited financial assistance can promote persistence, the MDRC study was not an RCT, and the comparisons reported should not be interpreted as indicative of a causal effect of the program.

IV. THE RANDOMIZED CONTROL TRIAL

The Research Design

To determine the impact of this comprehensive case management program on persistence and degree completion in community college, we implemented a randomized controlled trial (RCT) evaluation at Tarrant County College (TCC), a large community college in Fort Worth, Texas enrolling more than 50,000 students in associate degree and technical programs across five campuses. TCC students typically come from disadvantaged backgrounds and have very high dropout rates. Among first-time, degree-seeking students who entered in fall 2011, only 14.8 percent earned a degree in four years and only 2.6 percent graduated in two years. The leadership at TCC is aware of this challenge and readily agreed to partner with the research team and service provider to experiment with an intervention focused on improving persistence and completion. TCC provided dedicated space for the Navigators to meet privately with students.

The study sample was randomly selected in the fall semester of 2013. The universe for the sample consisted of the 8,849 students currently enrolled at the Trinity River campus of TCC. The

⁵ For program details see: <https://scholarshipamerica.org/dreamkeepers/>

research demonstration project took place at a single campus because it was more feasible for CCFW to implement this new intervention on a single campus. RCT eligibility was limited to students who met the following criteria: 1) enrolled in at least 9 credit hours at TCC; 2) degree seeking; 3) age 18 years or older; 4) satisfied at least 1 Texas Success Initiative (TSI) standard; 5) newly enrolled or have earned a Cumulative GPA of at least 2.0 at TCC to date; 6) accumulated less than 30 credit hours at TCC to date; and 7) Pell eligible or fall below 200% of the poverty line (based on reported income on the FASFA). Eligibility criteria (1) through (5) are intended to target students who may feasibly complete a degree in three years. The credit cap in eligibility criteria (6) is meant to target students who might be at risk of dropping out; a student with more than 30 credits is perceived to be successfully on a path to graduation.⁷ The final eligibility rule is to target the demonstration sample to low-income students. Imposing these eligibility criteria left us with a final study sample of 1,168 students.

Table 2 reports summary statistics on all TCC Trinity River Campus students, *STC* study participants, and community college students at the state and national level. Overall, TCC students are similar to other community college students around the nation, with the exception of TCC enrolling considerably more Hispanic and part-time students. *STC* participants differ from typical TCC students and the average community college student in a few important ways. *STC* students are more likely to be female and are on average, over two years younger than other TCC students. Students in the study are much more likely to be full time when compared to the rest of the TCC campus and much more likely to receive Pell grants when compared to the national average. The sharp differences in part time status and Pell receipt is due to the eligibility criteria described above.

At the close of the academic enrollment period on August 20, 2013, the Office of Institutional Intelligence and Research (OIIR) at TCC extracted data necessary to identify the eligible sample (N =

⁷ At TCC, an associate's degree typically requires 60 credit hours.

1,168).⁸ We randomly assigned eligible students into one of three groups (see Figure 3 for a consort diagram): 1) the *STC* treatment group (430 students) that was offered comprehensive coaching and mentoring as well as access to emergency financial assistance, 2) the *EFA* treatment group (299 students) that was offered only access to emergency financial assistance, or a control group (439 students) that received no additional services, but still had full access to any existing college or community services, just as they would in the absence of this intervention. The study includes two treatment arms to help determine how much of the effectiveness of the fully implemented program could be achieved with only the financial assistance feature. The *EFA* treatment group is smaller because the provider had limited resources to provide this separate treatment arm.

After the random assignment was completed by the research team, we notified TCC of the results and the college sent treatment arm specific emails and letters by regular mail, signed by the president of the college, to each student selected for the treatment groups. These emails and letters introduced the program and explained that the student had been randomly selected to participate. TCC also sent a data file to CCFW containing student IDs, names and contact information. The letters and emails directed the students selected to participate to a web page to electronically sign a consent form for services and enroll in the program (<http://www.staythecourse-cc.org/>). Of the 430 students offered the *STC* treatment, 94 students completed the intake process to enroll in *STC* a take-up rate of 22 percent. The *EFA* treatment group had 126 students enroll, reflecting a take-up rate of 42 percent.

We confirmed that this randomization procedure generated balance in pre-intervention characteristics across groups. Table 3 provides descriptive information about the students in the study for both treatment groups and the control group for the fall of 2013.⁹ As shown by the p-values in

⁸ We have continued to enroll and randomize additional students into *STC* in more recent semesters, but this paper will focus on the fall 2013 cohort, as this is the only group for which we currently have outcome data six semesters after enrollment.

⁹ We calculate a propensity score of earning a degree after six semesters by estimating a probit model for the control group that includes as controls the observable characteristics used in the main regressions. See Section VI for more details.

column 4, in all cases the data fail to reject the hypothesis that the mean characteristics are the same across the STC treatment group and the control group, indicating that the randomization procedure generated appropriate balance across groups. We find similar evidence of balance when comparing the EFA treatment group to the control group.

Data and Methods

Our empirical analysis relies on student level administrative school records provided to us from TCC. These data include the student baseline characteristics that were used to determine eligibility, additional characteristics used in the analyses, and academic outcomes. Through TCC we were able to link these records to data from the National Student Clearinghouse (NSC), which allows us to observe whether a student transfers to a two- or four-year college and completes a degree at another post-secondary institution.¹⁰

The outcomes we consider include:

- **Enrolled in Classes at TCC:** An indicator for whether a student was enrolled in classes at TCC in the relevant semester, which is defined as spring 2016 in six semester results, spring 2015 in four semester results, and spring 2014 in two semester results.
- **Enrolled in Classes Anywhere:** An indicator for whether a student was enrolled in classes at TCC or any other NSC reporting institution at the start of the relevant semester.
- **Earned a Degree Anywhere:** An indicator for whether a student earned a degree (certificate, associate's, or bachelor's) at TCC or any other NSC reporting institution by the end of the relevant semester.

¹⁰ Founded in 1993 by the higher education community, the National Student Clearinghouse is a nonprofit and nongovernmental organization that works with more than 3,600 colleges and universities to provide accurate longitudinal data on student outcomes. The NSC participating colleges enroll 98% of all students in public and private U.S. institutions.

- **Earned a Degree or Enrolled in Classes Anywhere:** An indicator for whether a student was enrolled in classes at the start of the relevant semester or earned any degree by the end of the relevant semester according to the NSC.
- **Earned Associate’s Degree:** An indicator for whether a student earned an associate’s degree at TCC or any other NSC reporting institution by the end of the relevant semester.¹¹
- **Cumulative GPA:** Cumulative TCC GPA by the end of the relevant semester.

A few months after the end of each semester, the Office of Institutional Intelligence and Research (OIIR) at TCC sent the research team a file containing descriptive characteristics, course grades, credits completed, and degree and enrollment status records from both TCC and the NSC.

Because we are utilizing random assignment, we measure the impact of STC by comparing outcomes for students in the treatment and control groups. We estimate the differences in outcomes using a standard intent-to-treat (ITT) model:

$$y_i = \beta_0 + T_i\beta_1 + \mathbf{X}_i\beta_2 + \varepsilon_i \tag{1}$$

where y_i is an indicator for one of our outcome measures in the semester of interest, T equals 1 if the respondent is in the relevant treatment group and zero otherwise, and ε_i is an individual-level error term that is assumed to be i.i.d. The vector \mathbf{X}_i includes a set of person-level characteristics: age, age squared, gender, whether a student is White, Hispanic, Black, Asian or a different race, the number of basics skills assessments the student has passed at entry (out of three: reading, writing, and mathematics), family income, and family income squared. When measuring the effect of the full STC intervention, the estimation sample includes the STC treatment group (treatment arm 1) and the control group; it excludes students in the EFA treatment group (treatment arm 2). When measuring the effect of EFA,

¹¹ While we also have data on whether a student has completed a certificate or a bachelor’s degree, we do not report these outcomes separately because they occur infrequently—after 6 semesters less than 3 percent of the sample had obtained a certificate, and about 0.5 percent had obtained a BA degree.

the estimation sample includes the EFA treatment group and the control group; it excludes students in treatment arm 1.

Our main results focus on outcome measures six semesters after enrollment in the study, but to examine how any impact of the intervention changes over time, we also report some shorter-term results. Because many students assigned to the treatment groups do not participate in services (the take-up rate was 22 percent for the STC treatment group and 42 percent for the EFA treatment group), we also estimate the effect of the intervention for those who participate, or the treatment-on-the-treated (TOT) effect. Specifically, we estimate:

$$y_i = \gamma_0 + P_i\gamma_1 + \mathbf{X}_i\gamma_2 + \eta_i \tag{2}$$

where P_i is an indicator for participation in the program. We estimate these effects via an instrumental variable (IV) model, using assignment to treatment (T_i) as an instrument for participation in the program (P_i). Program participation (or take-up) is defined as attending the intake meeting and completing an intake form.

V. SIX SEMESTER RESULTS

Table 4 reports the six-semester results associated with the STC intervention. We report results for the full sample (excluding treatment arm 2 participants, as described above), as well as separately by gender. For each outcome, we report both ITT and TOT effects. As a benchmark for the magnitude of these effects, we report the mean of each outcome for the control group in the ITT columns and the control complier mean in the TOT columns.¹² As reported in the table, STC has a large effect on

¹² The control complier mean is calculated as the mean of the outcome for the compliers (those who take-up the treatment) in the treatment group less the IV estimate. For binary outcomes, sampling variation can produce negative estimates of the control complier mean (CCM). For these cases we report the CCM as zero, following (Kling, Liebman, and Katz, 2007). To determine the nature of selection into take-up based on observable characteristics, we examine the mean characteristics of treatment compliers and non-compliers respectively (Appendix Table 1). Students who take up the program tend to be slightly older, but overall the mean characteristics of compliers and non-compliers are very similar. We observe that those who take up the program have a slightly lower propensity score of earning a degree *ex ante*, though the difference is not statistically significant.

persistence in school after six semesters, but the estimate is only marginally significant at the 10 percent level. The point estimate indicates that students in the treatment group are 5.6 percentage points more likely to be enrolled in school after six semesters. Adjusting for incomplete take-up, the TOT estimate indicates that those who participate in *STC* are 25.1 percentage points more likely to persist, more than double the rate for the control group. For the full sample, all the other estimates are positive, indicating improved outcomes for the treatment group, but none of these estimates are statistically significant.

The positive effect of *STC* is particularly noticeable for females. Females assigned to the *STC* treatment group are 8.4 percentage points more likely to still be enrolled in college after six semesters than females in the control group, and this difference is statistically significant. The TOT estimate (0.358) indicates that female program participants were nearly three times more likely to persist in college relative to the CCM. While the effect for completing any degree is only marginally significant, there is a large and statistically significant effect on completing an associate's degree for females. Three years after enrollment in the study, females in the treatment group are 7.4 percentage points more likely to have completed an associate's degree than females in the control group, corresponding to a TOT effect of 35.8 percentage points. There is little evidence of a positive effect of *STC* participation for male students.

We also investigate whether there are heterogeneous treatment effects by other key student characteristics. The data do not reveal any meaningful statistical differences along obvious cuts of the sample. Table 5a reports results separately for white and non-white students and separately for those with family income above and below the *STC* sample median. Those in the *STC* treatment group with family income greater than the median family income of the study sample are 8.3 percentage points (standard error 4.8) more likely to stay enrolled in classes through their sixth semester (Table 5a, column 3), which implies a TOT effect of 44.1 percentage points. The ITT estimate for students with lower levels of family income implies a much smaller, 2.4 percentage point increase (standard error 4.7). Given the standard errors, we cannot reject similar effects across income groups.

In terms of a comparison between white and non-white students, recall that the *STC* sample is majority non-white (more than 70 percent). Accordingly, the estimated effects for non-white students are generally quite similar to what we report for the full sample in Table 4. The estimated TOT effect for non-white students implies a 31.8 percentage point increase in the likelihood of being enrolled in college after six semesters (standard error 18.1). However, when we limit the sample to whites, the estimated TOT estimate is very small (0.023) but has a large standard error (0.284). Given the large standard error associated with that estimate, we cannot reject similar effects by race.

Table 5b reports estimates separately for students with more or fewer initial credit hours than the median and by “degree propensity,” or the estimated propensity to earn a degree based on baseline characteristics. Our motivation for looking separately by credit hours was to observe whether students who appeared *ex ante* better prepared demonstrated larger (or smaller) treatment effects. The data do not indicate statistical differences across students based on this simple cut of the data. To investigate this possibility more formally, we estimate a baseline probability of degree completion based on a full set of initial characteristics. To estimate this degree propensity, we use the sample from the control group and estimate a probit as a function of the observed characteristics at the time of randomization. We then use the estimated coefficients to predict the probability of completing a degree for everyone in the sample. We then divided the study sample into three subsamples based on the students’ predicted probability of completing a degree. Results for these subsamples show that *STC* was most effective for students in the upper third of propensity scores. The results suggest that *STC* increases enrollment in classes anywhere across the lower, middle and upper third of the degree propensity distribution by -3.5, 10.4, and 54.0 percentage points, respectively, with this last result being statistically significant. The estimated TOT impact for the group in the middle third of the propensity score is a large relative size (10.4 percentage points on a base of 55 percent) but the standard errors on the coefficient is too large to make any meaningful conclusion about the results for this group. The point estimates also indicate that those in the top third of propensity scores were more likely to earn a degree, but this difference is

not statistically significant. Similarly, the effect of STC on GPA is also the largest for those in the top third, but the estimate is not significant. The results for those in the bottom third indicate that STC had little effect on academic outcomes for this group (Table 5b, column 5). The point estimates for this group are all small, not statistically significant, and occasionally have the wrong sign.

All of the analysis discussed up to this point has focused on the differences in outcomes between the STC treatment group, which was offered comprehensive case management and access to emergency financial assistance, and the control group. Our research design also allows us to directly estimate the effect of providing only emergency financial assistance, by comparing the EFA treatment group to the control group. We report these results in Table 6 for the same outcomes reported above. After six semesters, those who had access to emergency financial assistance earned degrees and remained enrolled in classes at remarkably similar rates to the control group. We find no statistically significant differences in outcomes in the overall sample or for the male and female subsamples. In nearly all cases the point estimates are small, and in many cases they are negative. However, given the fairly large standard errors we are unable to reject the hypothesis of small positive effects. Although this evidence suggests that EFA, offered by itself, does not have a sizeable impact on persistence and degree completion in community college, this does not mean that EFA is not effective when offered in conjunction with other services as is the case with the full STC intervention.

VI. TWO- AND FOUR-SEMESTER RESULTS

Because we have received outcome data from TCC each semester, we are able to examine how the impact of STC evolves over time. Comparing short and medium-term outcomes helps us understand whether the intervention has an immediate impact or whether effects appear more gradually. In particular, many community college students drop out after just one or two semesters, so an intervention like STC has the potential to affect outcomes nearly immediately. In our study sample, about 20 percent of students drop out by the end of the second semester.

Table 7a reports two semester results for the same six outcomes as reported after six semesters in Table 4, plus the additional outcome of total credits earned. We do not report this outcome with the six-semester results because we only observe credits earned at TCC and by six semesters after enrollment in the study only about a quarter of the study sample is still enrolled at TCC. After just two-semester, however, more than three-quarters of the study sample is still enrolled at TCC, so we observe total credits for most of the sample. We impute credits for students who are no longer enrolled at TCC, but are classified in the NSC data as enrolled in classes somewhere. For these groups we impute credits earned for semesters where these data are missing using information on credits earned in the most recent semester for which credits are observed for that student.

The data indicate that after just two semesters, not enough time has passed for students to obtain a degree—only 0.7 percent of the control group has completed a degree by this point. It is thus not surprising that we find no effect on degree completion for the full sample or for the female and male subsamples. However, the data indicate that two semesters is enough time to observe an effect on intermediate outcomes. The TOT estimate for enrolled in classes at TCC indicates that STC participation leads to a 28.9 percentage point increase (standard error 12.1). In terms of gender comparisons, the data already start to show some indication that the effect is stronger for females. When looking at whether the student is enrolled anywhere, however, we do not see a noticeable difference between the treatment and control groups after two-semester. It appears that after only two semesters, STC is effective at keeping kids from transferring from TCC, but not necessarily at increasing overall persistence in community college. We also find that the treatment group has accumulated more credits. STC participants have nearly 5 more credit hours (the equivalent of 1.66 additional classes), but this difference is marginally significant.

Table 7b reports four-semester results, which includes the summer between years one and two. The summer between the first and second year is a time during which many community college students drop out. This is evident in our four-semester results, by which point more than half the

sample is no longer at TCC, and only about three-fifths of the sample is still enrolled in school. After four semesters, we still see the positive effect on credit hours that was evident after two semesters, and the effect is statistically significant for females. However, we still see no effect of STC on degree completion or enrollment at any college, and we no longer see an effect of STC on enrollment at TCC.

Together, our results after two, four, and six semesters indicate that the intervention did not have a meaningful impact on enrollment in college or degree completion until after six semesters. This suggests that the STC intervention is more effective at keeping students in school after they have been enrolled for several semesters than it is at preventing dropouts in the short-run. Perhaps this is because it takes time for the Navigators and students to develop the relationship that allows comprehensive coaching and mentoring to have a substantive impact on persistence and completion, so the impact of these efforts on success in school is not evident until after a few years.

Another possible explanation is related to the implementation of the program. Throughout the course of this intervention, the provider, CCFW, has been monitoring what services the Navigators provide and how they provide it in an effort to ensure fidelity of implementation. In the Spring 2015 semester, the provider re-emphasized to the Navigators the importance of regular, direct interaction with their students, and case notes indicate a rise in student-Navigator interactions after this point. This increased engagement may have contributed to the impact of the program after six semesters.

VII. DISCUSSION OF RESULTS

Estimated benefit-to-cost ratio

The Stay the Course (STC) intervention is a “heavy touch” intervention with relatively high per student costs. It is thus important to consider the positive effects of the program alongside the costs. The total cost per student for three years of STC case management (including access to EFA) is \$5,640, or \$1,880 per year. This cost includes STC staff salary (manager, Navigators, and an EFA coordinator), fringe benefits, training, and EFA payouts. To measure program benefits, we plan to follow the

students in this RCT demonstration project for additional years and link their student records to administrative earnings records. We will then compare the causal impact on earnings to the program costs. However, until enough time has elapsed to permit such an earnings evaluation, we cannot calculate a benefit to cost ratio based on realized earnings. Instead, we conduct a back-of-the-envelope calculation using average earnings differences observed in national survey data.

Our main IV point estimate for the full sample indicates that for each additional student who takes up services, the number of associate's degrees increases by 0.16 (TOT estimate in Table 4). Data from the 2015 five-year ACS for individuals age 25-39 indicate that those with an associate's degree earn about \$7,050/year more than people with less than a year of college education.[1] In addition, the IV point estimate for the full sample suggests that STC participation increases enrollment in school after six semesters by 25 percentage points (TOT estimate in Table 4 for "enrolled in classes anywhere"). Some of this increase is the result of students who persist in order to obtain a degree, so we net out the additional persistence that comes from degree completion (i.e. $0.25 - 0.16 = 0.09$), and assume greater persistence means enrolling in college beyond one year. This implies that for each additional treated student who does not earn an associate's degree, 0.09 more students persist in school beyond one year. ACS data show that individuals with at least a year of college (without an associate's degree) earn about \$2,200 more than people with less than a full year of college.

Combining these estimated returns to community college with our estimates from the full sample indicates that treating an additional student increases annual earnings by $0.16 * 7050 + 0.09 * 2200 = \$1,326$. Comparing this benefit to the total three-year program cost of \$5,640, indicates that program costs are offset by increased earnings in about 4.25 years. This estimate overstates the pay-back period as it does not allow for the possibility that those with an associate's degree eventually earn a bachelor's degree.

Additional interpretation issues

The estimated results raise three critical questions. First, why did the program appear to help females but not males? Second, why did the EFA program not yield any discernible benefits? Third, are these results replicable? We will pursue further answers to these questions in future research, but offer some speculative observations here.

On the issue of the female-specific benefits, we note that all case managers in the program were female. This was not by design, but rather a consequence of the social work profession, from which STC navigators are drawn, being overwhelmingly dominated by females. Perhaps a program that so heavily relies on personal connection is more effective when the mentor/mentee pair is of the same gender. Future implementations of the program would benefit from the recruitment of male caseworkers to the Navigator role so that this hypothesis could be explored. A second possibility is that many of the females in the program sample are single mothers who would have previous familiarity with a case management relationship through engagement with safety net programs. The research team is in collaboration with a researcher with a PhD in social work who has experience studying the implementation of programs. We anticipate that this collaboration and the associated implementation report(s) will yield insight into the reasons for this gender difference in treatment effects.

As described above, we also investigated the implementation of a low cost alternative to the full STC program: access to emergency financial assistance (EFA) without associated case management. This treatment arm yielded no measurable benefits, and in some cases, the data indicated that the program might lead to a worsening of outcomes. Note that this does not necessarily imply that EFA is not an important component of the full intervention that also includes comprehensive coaching and mentoring, as there might be important interactions between the two components of STC. It would seem that giving students access to cash aid without the requirement or benefit of having a case manager to help address the causes of the underlying financial distress is not sufficient for this very low-income population. Perhaps with a less disadvantaged population, a one-time infusion of cash

could help. But for students in our sample, who all have family income less than 200 percent of the FPL, we found no evidence that enrollment persistence is increased simply by having access to up to \$1,500 to cover non-tuition financial shocks.

With regard to replicability, we emphasize that this RCT implementation of Stay the Course was designed with the goal of subsequent replication. The research team has worked closely with our implementing partners over the past three years to avoid “mission drift” and to keep the program elements focused and measurable. We are now collaborating with the implementing agency partner, CCFW, to roll out the program in an RCT context on other college campuses in Fort Worth. In addition, we are in the process of working with other social service agencies outside of Fort Worth to implement the program with an RCT research design on other campuses. It will be instructive to investigate whether the results are reproduced with a different implementing agency and set of social workers, with a different student population, and in a different community college setting.

A related replication question is whether it is fundamental to the effectiveness of the intervention that the program is implemented by a third-party non-profit rather than community college counselors. This too is something worth directly testing in future implementations. We offer the observation that the implementing agency, CCFW, considers individualized case management to be their “bread and butter,” or as we might say, it is perhaps appropriately considered their comparative advantage. To the best of our understanding, this tends not to be the particular focus or training of community college counselors. Perhaps that dedicated focus is what makes this application of the program so effective. If individuals without a background in social work, or with a different background in social work, were to serve as Navigators, the results might be different. Again, this points to a need for replication to learn under what contexts specifically such a program can be expected to generate beneficial effects for students.

That said, the general lesson of this paper extends beyond the particular application of this case management program. The main finding is that a program that focuses on addressing the individual set

of barriers that arise to threaten a low-income student's persistence in community college can be an effective way to improve educational outcomes and increase degree completion rates. This supports the notion that low-income students face obstacles that extend beyond academic under-preparation that they often cannot overcome without the help of a dedicated case manager.

VIII. CONCLUSION

This paper has investigated whether a case-management intervention could increase the rates of enrollment persistence and degree completion among low-income community college students. To study this question, we conducted an RCT evaluation of the *Stay the Course* intervention. The main elements of this program are comprehensive case management conducted by a trained social worker with a caseload of no more than 34 students at a time, along with access to limited emergency financial assistance for non-tuition needs. The paper has described an RCT evaluation of this program implemented by the research team in partnership with a local social service agency at a community college campus in Fort Worth, Texas.

The results indicate that female students randomly assigned to the case management program showed significant increases in school persistence and degree completion through six semesters. Intention-to-treat estimates based on regression-adjusted differences between females randomly assigned to case management services and those randomly assigned to a control group show a 7.4 percentage point increase in the likelihood of earning an associate's degree (standard error of 3.3), off a control group mean of 15.7 percent. This translates into a treatment-on-the-treated effect of 31.5 percentage points (standard error of 14.1).

Point estimates for the full sample of females and males combined are positive, but not statistically significant. We report a back-of-the-envelope calculation that takes as program benefits the point estimates for the full sample combined with projected earnings increases. This calculation suggests that the benefits of the program, as captured by increased earnings, exceeds the per-student

costs (\$5,640 total for three years of enrollment) after only 4.25 years in the workforce post schooling. There is no evidence of a positive effect of a limited version of the program that only offered access to emergency financial assistance (EFA) without associated case management services. We offer speculative explanations above for why the program was particularly effective for females and why the EFA-only treatment did not lead to positive outcomes.

This paper contributes to multiple literatures. First, it contributes to the literature on college completion, in particular, the sets of studies focusing on ways to increase college completion rates among low-income students. As noted in the introduction, income gaps in college completion have widened despite expansions to the Pell Grant program that have made financial aid more generous for low-income families (Demming, 2016). Research and policy attention to this challenge has tended to focus on interventions run through community colleges themselves, in particular, academic programs and enhanced school counseling. The research demonstration project studied in this paper is novel in that it is an intensive case-management program run by a third party non-profit with a particular expertise in case management.

The paper contributes more generally to the literature on anti-poverty strategies and ways to effectively help individuals achieve economic self-sufficiency. There is increasing interest in the role of case management in helping individuals who live with the associated challenges of poverty. Case management takes a holistic approach to helping individuals and families address a range of barriers, including help with physical and mental health limitations, the need for housing, transportation, and childcare support, and other potential barriers. This paper has demonstrated that case management can be a cost-effective way to increase rates of educational persistence and degree completion among poor and near poor students. Future work will follow these same students to investigate longer term effects on earnings. A supplementary project being conducted by a subset of the research team is investigating the effectiveness of case management in improving a wide variety of economic outcomes for a non-student population in the same community. Together, this body of research will contribute to our

collective knowledge about the types of barriers facing low-income individuals and the most cost-effective ways of helping them achieve economic security.

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Table 1
Summary of Navigator-Student Interactions for the STC Program

Variable	Mean per Student
Total Interactions per Semester	36.83 (13.93)
In-Person Meetings per Semester	4.32 (3.37)
Duration of In-Person Meeting (Minutes)	41.09 (29.57)
Text/Email Interactions per Semester	17.70 (8.43)
Phone Interactions per Semester	12.10 (7.07)
Number of Students	94

Notes: Calculations were made using CCFW case note data from Fall 2013 through Spring 2016 for the 94 treatment compliers in semesters where they were still active in the program, so these means are conditional on students having at least one interaction. Information on duration is from data from the first four semesters, as these data are not available for later semesters. Standard deviations are in parentheses.

Table 2
Descriptive Characteristics of Community College Students

Variable	U.S. (1)	Texas (2)	TCC (3)	Full <i>Stay the Course</i> Sample (4)
Age	28.00		26.92	24.21
Under 30 years old	0.71	0.719	0.750	0.833
30 years old and over	0.28	0.280	0.251	0.167
Female	0.57	0.558	0.579	0.655
Male	0.43	0.442	0.421	0.345
White, non-Hispanic	0.51	0.342	0.389	0.273
Black, non-Hispanic	0.14	0.132	0.181	0.198
Asian/Pacific Islander	0.06	0.044	0.044	0.031
Other Race	0.09	0.062	0.033	0.030
Hispanic	0.19	0.420	0.354	0.468
Part Time	0.60	0.748	0.869	0.446
Full Time	0.40	0.252	0.131	0.554
Receive Pell Grants	0.33			0.986
First Generation College Student	0.36			0.583
N	7.3 million	700,963	8,849	869

Notes: National statistics are taken from the American Association of Community Colleges (AACC) 2014 Fact Sheet. Texas statewide statistics were collected from txhighereddata.org. The TCC statistics represent averages from the Trinity River Campus in Fall 2013. Due to the limited age data available, the age ranges for the TCC column are under 31 and 31 and over. For students in the *Stay the Course* sample, full time students are defined as students who are enrolled in 12 or more credits at the Fall 2013 census date.

Table 3
Mean Characteristics of Treatment Groups and Control Group, Fall 2013

Variable	<i>Means by Group Assignment</i>			<i>P-value on Test that Means are the Same Across Groups</i>	
	STC Treatment	EFA Treatment	Control	STC & Control	EFA & Control
	(1)	(2)	(3)	(4)	(5)
Age at Entry	24.09	24.865	24.33	0.664	0.388
Female	0.628	0.642	0.681	0.099	0.272
TSI's Remaining at Entry	0.537	0.525	0.572	0.477	0.382
Dependent	0.516	0.552	0.519	0.928	0.386
Cumulative Hours Earned Prior to Entry	11.34	11.505	11.15	0.795	0.660
Family Income	\$22,576	\$22,906	\$20,756	0.111	0.098
Between 0% and 50% of FPL	0.228	0.264	0.262	0.244	0.946
Between 50% and 100% of FPL	0.291	0.241	0.294	0.919	0.112
Between 100% and 150% of FPL	0.216	0.221	0.198	0.511	0.459
Between 150% and 200% of FPL	0.158	0.167	0.15	0.751	0.537
Above 200% of FPL	0.107	0.107	0.096	0.581	0.615
Estimated Family Contribution (FAFSA)	\$768	\$761	\$650	0.242	0.292
Age < 20	0.449	0.421	0.405	0.197	0.666
Age 20 - 25	0.256	0.274	0.301	0.140	0.438
Age 26+	0.295	0.304	0.294	0.961	0.760
Black	0.184	0.241	0.216	0.229	0.437
White	0.405	0.418	0.408	0.926	0.780
Asian	0.027	0.037	0.035	0.522	0.469
Other Race	0.377	0.304	0.349	0.387	0.211
Hispanic	0.477	0.438	0.460	0.624	0.556
Degree Propensity	0.180	0.186	0.177	0.512	0.116
N	430	299	439		

Notes: Means are from TCC administrative data for Fall 2016 for subgroups of the full STC study sample (N = 1,168). Degree propensity is the predicted probability of earning a degree after six semesters, which is estimated on the control group using a probit model that includes as controls observable characteristics at baseline. See Section V of the text for more details.

Table 4
The Effect of STC on Outcomes after Six Semesters for Main Sample and by Gender

Outcomes	Full Sample		Female Sample		Male Sample	
	ITT (1)	TOT (2)	ITT (3)	TOT (4)	ITT (5)	TOT (6)
Enrolled in Classes at TCC	0.027 (0.030) [0.255]	0.121 (0.135) {0.188}	0.051 (0.038) [0.258]	0.218 (0.161) {0.115}	-0.033 (0.049) [0.250]	-0.169 (0.254) {0.394}
Enrolled in Classes Anywhere	0.056* (0.033) [0.440]	0.251* (0.152) {0.238}	0.084** (0.041) [0.425]	0.358** (0.178) {0.134}	-0.003 (0.058) [0.471]	-0.014 (0.293) {0.498}
Cumulative GPA	0.026 (0.067) [2.495]	0.116 (0.295) {2.520}	0.046 (0.084) [2.490]	0.195 (0.352) {2.428}	-0.005 (0.112) [2.504]	-0.025 (0.552) {2.686}
Earned a Degree Anywhere	0.037 (0.026) [0.182]	0.165 (0.119) {0.058}	0.065* (0.034) [0.187]	0.278* (0.146) {0.000}	-0.009 (0.042) [0.171]	-0.046 (0.212) {0.207}
Earned Associate's Degree	0.036 (0.025) [0.159]	0.162 (0.115) {0.029}	0.074** (0.033) [0.157]	0.315** (0.141) {0.000}	-0.025 (0.040) [0.164]	-0.129 (0.205) {0.258}
N	869	869	569	569	300	300

Notes: The Main Sample includes students assigned to the full STC treatment and those assigned to the control group. ITT estimates (β_1 from equation 1) are from OLS regressions of the outcomes listed in each row on assignment to treatment age, age squared, income, income squared, an indicator for female, and a set of race dummies. TOT estimates (γ_1 from equation 2) are from 2SLS regressions using assignment to treatment as an instrument for program participation. Take up = 1 if client completes an intake form. 20 observations are lost when analyzing cumulative GPA (11 females, 9 males) due to missing data. In instances in which the Control Complier Mean (CCM) is negative, it is reported as zero--see Section V of the text for more details. Statistics reported under point estimate: (Standard error) [Mean outcome in control group] {CCM}. *Significant at the 10% level, **significant at the 5% level.

Table 5a
The Effect of STC on Outcomes after Six Semesters by Subsamples

Outcomes	\leq Median Income		$>$ Median Income		White		Non-White	
	IIT	TOT	IIT	TOT	IIT	TOT	IIT	TOT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Enrolled in Classes at TCC	0.044 (0.041) [0.209]	0.170 (0.155) {0.080}	0.002 (0.044) [0.306]	0.013 (0.233) {0.368}	0.008 (0.055) [0.220]	0.035 (0.239) {0.335}	0.032 (0.036) [0.279]	0.144 (0.162) {0.148}
Enrolled in Classes Anywhere	0.024 (0.047) [0.413]	0.091 (0.178) {0.371}	0.083* (0.048) [0.469]	0.441* (0.259) {0.083}	0.005 (0.066) [0.424]	0.023 (0.284) {0.533}	0.069* (0.039) [0.455]	0.318* (0.181) {0.156}
Cumulative GPA	0.009 (0.101) [2.354]	0.033 (0.374) {2.496}	0.031 (0.088) [2.647]	0.166 (0.461) {2.599}	-0.039 (0.125) [2.803]	-0.168 (0.528) {2.962}	0.053 (0.079) [2.391]	0.238 (0.356) {2.310}
Earned a Degree Anywhere	0.024 (0.036) [0.161]	0.092 (0.135) {0.100}	0.050 (0.039) [0.206]	0.267 (0.210) {0.000}	0.035 (0.051) [0.203]	0.155 (0.224) {0.104}	0.041 (0.031) [0.176]	0.189 (0.142) {0.004}
Earned Associate's Degree	0.029 (0.034) [0.135]	0.109 (0.128) {0.045}	0.045 (0.038) [0.187]	0.240 (0.204) {0.000}	0.065 (0.048) [0.153]	0.289 (0.217) {0.000}	0.028 (0.030) [0.157]	0.127 (0.136) {0.043}
N	435	435	434	434	231	231	618	618

Notes: Results are for subgroups of the Main Sample that includes students assigned to the full STC treatment and those assigned to the control group. Statistics reported under point estimate: (Standard error) [Mean outcome in control group] {CCM}. *Significant at the 10% level, **significant at the 5% level. See notes to Table 4 for more details.

Table 5b
The Effect of STC on Outcomes after Six Semesters by Subsamples

Outcomes	<i>Initial Credit Hours</i>				<i>Degree Propensity</i>					
	> Median Hours		≤ Median Hours		Lower Third		Middle Third		Upper Third	
	ITT	TOT	ITT	TOT	ITT	TOT	ITT	TOT	ITT	TOT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Enrolled in Classes at TCC	0.012 (0.043) [0.274]	0.053 (0.194) {0.245}	0.043 (0.042) [0.235]	0.194 (0.194) {0.125}	0.053 (0.051) [0.219]	0.232 (0.225) {0.000}	0.011 (0.053) [0.272]	0.054 (0.254) {0.325}	-0.000 (0.053) [0.277]	-0.001 (0.232) {0.365}
Enrolled in Classes Anywhere	0.067 (0.048) [0.478]	0.307 (0.218) {0.225}	0.051 (0.047) [0.399]	0.228 (0.211) {0.219}	-0.008 (0.057) [0.391]	-0.035 (0.245) {0.348}	0.021 (0.059) [0.490]	0.104 (0.281) {0.551}	0.121** (0.058) [0.440]	0.540** (0.270) {0.000}
Cumulative GPA	-0.057 (0.087) [2.704]	-0.252 (0.382) {2.990}	0.129 (0.104) [2.258]	0.569 (0.455) {1.962}	-0.136 (0.128) [2.166]	-0.590 (0.552) {2.900}	-0.020 (0.110) [2.636]	-0.099 (0.522) {2.725}	0.139 (0.112) [2.690]	0.606 (0.482) {2.344}
Earned a Degree Anywhere	0.009 (0.041) [0.239]	0.039 (0.182) {0.238}	0.056* (0.034) [0.122]	0.251 (0.153) {0.000}	0.019 (0.035) [0.079]	0.085 (0.148) {0.040}	-0.008 (0.044) [0.170]	-0.038 (0.211) {0.141}	0.081 (0.056) [0.305]	0.362 (0.249) {0.062}
Earned Associate's Degree	0.016 (0.039) [0.208]	0.073 (0.177) {0.161}	0.047 (0.032) [0.108]	0.214 (0.144) {0.000}	0.015 (0.033) [0.073]	0.065 (0.140) {0.029}	-0.001 (0.042) [0.150]	-0.004 (0.203) {0.107}	0.079 (0.054) [0.262]	0.353 (0.241) {0.011}
N	444	444	425	425	290	290	289	289	290	290

Notes: Results are for subgroups of the Main Sample that includes students assigned to the full STC treatment and those assigned to the control group. Degree propensity is the predicted probability of earning a degree after six semesters, which is estimated on the control group using a probit model that includes as controls observable characteristics at baseline. See Section V of the text for more details. Statistics reported under point estimate: (Standard error) [Mean outcome in control group] {CCM}. *Significant at the 10% level, **significant at the 5% level. See notes to Table 4 for more details.

Table 6
The Effect of EFA on Outcomes after Six Semesters for the Full EFA Sample and by Gender

Outcomes	Full Sample		Female Sample		Male Sample	
	ITT (1)	TOT (2)	ITT (3)	TOT (4)	ITT (5)	TOT (6)
Enrolled in Classes at TCC	-0.007 (0.033) [0.255]	-0.016 (0.078) {0.262}	-0.038 (0.040) [0.258]	-0.088 (0.091) {0.335}	0.052 (0.058) [0.250]	0.139 (0.153) {0.169}
Enrolled in Classes Anywhere	0.015 (0.037) [0.440]	0.036 (0.088) {0.456}	0.010 (0.046) [0.425]	0.024 (0.104) {0.505}	0.027 (0.065) [0.471]	0.073 (0.168) {0.342}
Cumulative GPA	-0.108 (0.079) [2.495]	-0.259 (0.190) {2.784}	-0.089 (0.097) [2.490]	-0.206 (0.223) {2.825}	-0.131 (0.139) [2.504]	-0.348 (0.363) {2.678}
Earned a Degree Anywhere	-0.014 (0.029) 0.182	-0.034 (0.068) {0.248}	-0.032 (0.035) [0.187]	-0.073 (0.080) {0.285}	0.017 (0.050) [0.171]	0.045 (0.130) {0.175}
Earned Associate's Degree	-0.012 (0.027) [0.159]	-0.028 (0.065) {0.218}	-0.014 (0.033) [0.157]	-0.032 (0.076) {0.208}	-0.007 (0.048) [0.164]	-0.018 (0.126) {0.238}
N	772	772	480	480	242	242

Notes: Results are for the EFA Sample (N = 772) that includes students assigned to the EFA only treatment and those assigned to the control group. Statistics reported under point estimate: (Standard error) [Mean outcome in control group] {CCM}. *Significant at the 10% level, **significant at the 5% level. See notes to Table 4 for more details.

Table 7a
The Effect of STC on Outcomes after Two Semesters for Main Sample and by Gender

Outcomes	Full Sample		Female Sample		Male Sample	
	IIT (1)	TOT (2)	IIT (3)	TOT (4)	IIT (5)	TOT (6)
Enrolled in Classes at TCC	0.064** (0.027) [0.759]	0.289** (0.121) {0.544}	0.075** (0.034) [0.749]	0.319** (0.143) {0.586}	0.040 (0.045) [0.779]	0.206 (0.225) {0.625}
Enrolled in Classes Anywhere	0.016 (0.026) [0.797]	0.072 (0.117) {0.811}	0.036 (0.033) [0.783]	0.153 (0.140) {0.720}	-0.027 (0.042) [0.829]	-0.140 (0.218) {1.043}
Total Credits Earned	1.050* (0.553) [13.934]	4.739* (2.484) {11.793}	1.299* (0.691) [13.715]	5.519* (2.920) {11.148}	0.568 (0.938) [14.402]	2.948 (4.768) {13.310}
Cumulative GPA	0.055 (0.070) [2.468]	0.243 (0.309) {2.442}	0.063 (0.088) [2.469]	0.266 (0.369) {2.365}	0.054 (0.118) [2.465]	0.271 (0.577) {2.522}
Earned a Degree Anywhere	0.012 (0.008) [0.007]	0.054 (0.035) {0.000}	0.011 (0.010) [0.007]	0.011 (0.010) {0.005}	0.012 (0.013) [0.007]	0.064 (0.069) {0.000}
Earned Associate's Degree	0.008 (0.006) [0.005]	0.035 (0.029) {0.000}	0.009 (0.008) [0.003]	0.038 (0.033) {0.000}	0.006 (0.012) [0.007]	0.029 (0.059) {0.000}
N	869	869	569	569	300	300

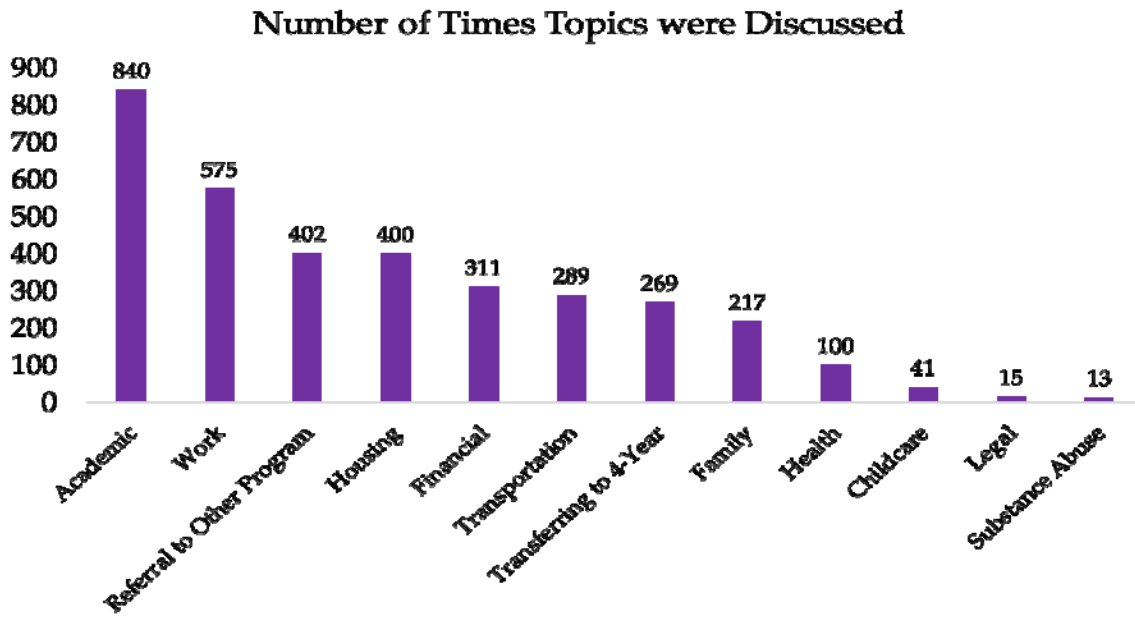
Notes: Results are for the Main Sample that includes students assigned to the full STC treatment and those assigned to the control group. Statistics reported under point estimate: (Standard error) [Mean outcome in control group] {CCM}. *Significant at the 10% level, **significant at the 5% level. See notes to Table 4 for more details.

Table 7b
The Effect of STC on Outcomes after Four Semesters for Main Sample and by Gender

Outcomes	Full Sample		Female Sample		Male Sample	
	ITT (1)	TOT (2)	ITT (3)	TOT (4)	ITT (5)	TOT (6)
Enrolled in Classes at TCC	-0.008 (0.034) [0.456]	-0.037 (0.152) {0.473}	-0.008 (0.042) [0.468]	-0.035 (0.177) {0.464}	0.009 (0.057) [0.429]	0.047 (0.290) {0.405}
Enrolled in Classes Anywhere	-0.017 (0.032) [0.604]	-0.077 (0.145) {0.609}	-0.005 (0.041) [0.582]	-0.021 (0.172) {0.529}	-0.030 (0.054) [0.650]	-0.155 (0.276) {0.736}
Total Credits Earned	1.659* (0.920) [20.064]	7.489* (4.150) {15.681}	2.289** (1.144) [19.645]	9.723** (4.874) {13.658}	0.576 (1.579) [20.959]	2.987 (8.034) {19.755}
Cumulative GPA	0.022 (0.068) [2.476]	0.097 (0.299) {2.544}	0.038 (0.087) [2.466]	0.159 (0.360) {2.442}	0.012 (0.114) [2.463]	0.061 (0.558) {2.661}
Earned a Degree Anywhere	-0.013 (0.020) [0.100]	-0.061 (0.087) {0.114}	-0.012 (0.026) [0.110]	-0.050 (0.108) {0.129}	-0.010 (0.029) [0.079]	-0.053 (0.146) {0.053}
Earned Associate's Degree	-0.004 (0.019) [0.087]	-0.020 (0.084) {0.063}	0.002 (0.025) [0.094]	0.008 (0.104) {0.055}	-0.007 (0.027) [0.071]	-0.037 (0.139) {0.037}
N	869	869	569	569	300	300

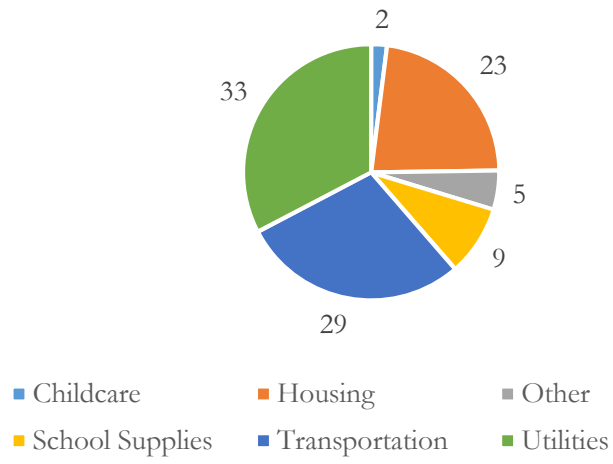
Notes: Results are for the Main Sample that includes students assigned to the full STC treatment and those assigned to the control group. Statistics reported under point estimate: (Standard error) [Mean outcome in control group] {CCM}. *Significant at the 10% level, **significant at the 5% level. See notes to Table 4 for more details.

Figure 1



Notes: Topics such as academic, work, and health are an aggregate of several, more specific categories. Mass emails and administrative records have been excluded (meaningful interactions only). All data are for the Main Sample.

Figure 2
Breakdown of EFA for STC Participants by Payment Type



Notes: Data are from CCFW case notes. Sample includes all EFA payments to STC participants (N = 94).

Figure 3
Consort Diagram for RCT Research Design

