



The Effects of a Comprehensive College Transition Program on Psychosocial Factors Associated with Success in College

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Abstract

We examine the effects of a comprehensive college transition program (CCTP) on four psychosocial outcomes associated with postsecondary success: sense of belonging, mattering, and academic and social self-efficacy. The CCTP operates on three four-year campuses and includes a range of supports, including shared academic courses, peer mentoring, and residential or common community spaces. We leverage the randomization of Angrist et al. (2014), but restrict our comparison to scholarship recipients with and without CCTP exposure. To account for differential attrition from the experimental sample, we rely on a “selection on observables” assumption for our primary analysis. Results suggest that the program significantly and substantially increased students’ sense of belonging and mattering, but had no effect on academic or social self-efficacy.

Keywords. College transition, psychosocial outcomes, experimental design

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For several decades, postsecondary institutions have designed and implemented learning communities to improve undergraduate teaching and learning, and to support students' transition and persistence in college (Lenning & Ebbers, 1999; Shapiro & Levine, 1999; Tinto, 1997; 2015). The argument is that learning communities provide college students a chance to form stronger relationships with each other and their instructors, to engage more deeply with the interdisciplinary integrated content of the courses, and to access extra support. These opportunities may in turn make it more likely that students will pass their courses, persist semester to semester, and graduate with a college credential (Shapiro & Levine, 1999). In addition, instructors in learning communities will often employ pedagogical strategies designed to improve students' quality of thinking and communication, to promote a better understanding of self and others, and to encourage a greater ability to bridge the gap between academic and social worlds (Lenning & Ebbers, 1999).

Generally speaking, learning communities have several of the following characteristics: (a) alignment of pedagogical practices, preferably interdisciplinary, across multiple courses to make curricular connections; (b) use of co-registration or block scheduling to enable students to take courses together; (c) classes organized as small groups of students and faculty; (d) use of active pedagogical strategies that foster deeper interactions between students and instructors; (e) faculty brought together to support collaborations focused on improving student learning outcomes; (f) in the case of living-learning communities, a high level of faculty collaboration and participation in all facets of the students' college transition experience (e.g., out-of-class faculty interactions); (g) a setting for community-based delivery of academic support programs; and (h) student academic and social support networks (Gabelnick, MacGregor, Matthews, & Smith, 1990; Lenning & Ebbers, 1999; Price, 2005).

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Until recently, there have not been systematic quantitative evaluations of learning communities with robust research designs that account for differences in student characteristics between those who are, and are not, in learning communities (Price, 2005; Taylor, Moore, MacGregor, & Lindblad, 2003). Within the past decade or so, a series of field experiments evaluating learning community programs around the country have addressed this gap (Bloom & Sommo, 2005; Scrivener, Bloom, LeBlanc, Paxson, Rouse, & Sommo, 2008; Visher, Weiss, Weissman, Rudd, & Wathington, 2012; Weiss, Mayer, Cullinan, Ratledge, Sommo, & Diamond, 2014). These studies find very small, positive impacts for learning community programs (Visher et al., 2012; Weiss et al., 2014). However, this scholarship examined interventions that only consisted of paired courses. Paired courses are only one component of a well-developed learning community program. Thus, the impacts of more comprehensive learning community interventions, such as a Comprehensive College Transition Program (CCTP), remain unclear and merit further examination.¹

This study examines the impact of a CCTP on student psychosocial outcomes.² This program, with its mission to serve low-income students, is the largest of its kind in the country, and was developed as part of a larger initiative implemented by the Susan Thompson Buffett Foundation (STBF). For five decades, the STBF has offered scholarships to Nebraska high school graduates who attend the state's public colleges and universities. This unique scholarship

¹ It is important to clarify that this CCTP is more than a well-developed learning community and, as explained in more detail below, it shares more common elements with well-developed comprehensive college support programs such as CUNY's Accelerated Study in Associate Programs (ASAP), than well-developed learning communities.

² We focus on psychosocial factors for three reasons. First, this study builds on the evaluation of Angrist et al. (2016) which focused on the impact of the CCTP on traditional outcomes such as enrollment, persistence, and degree attainment. Second, there is growing evidence of the positive association between psychosocial factors and traditional education outcomes (Oyserman, 2015; Heckman, Stixrud, & Urzua, 2006; Yeager & Walton, 2011), and as a result it is critical to learn how to properly define, measure, and evaluate the impact of different educational interventions on critical psychosocial outcomes. Finally, according to educational psychology theory, psychosocial factors are malleable, and therefore subject to change based on well-designed interventions.

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program is administered in conjunction with university leaders to make sure institutions provide the same amount of financial support from other sources to students regardless of whether they have received the STBF scholarship (Angrist, Autor, Hudson, & Pallais, 2014; Angrist, Autor, Hudson, & Pallais, 2016). The STBF awards scholarships based on a combination of factors, including financial need, academic preparation, personal statements, and reference letters. STBF scholarship recipients can apply their awards towards costs at any public university, state college, or any of the state's six community colleges. Scholarship recipients who attend one of the three University of Nebraska campuses are also required to participate in a CCTP.

A key aim of the CCTP is to provide scholarship recipients with the support they need to successfully transition to higher education. The rationale for the program comes from a large literature documenting the myriad of difficulties students from low-income backgrounds face when they start college. These challenges include a sense of alienation, difficulty forming social bonds, and academic struggles (Mayhew et al., 2016). To examine whether the CCTP may ameliorate these difficulties, we examine the impact of the program on a number of psychosocial factors including sense of belonging, mattering, and academic and social self-efficacy. All of these factors are associated with college persistence, attainment, and early labor market outcomes (Astin, 1984, 1993; Chickering & Gamson, 1987; Deming, 2017; Gore, 2006; Heckman, Stixrud, & Urzua, 2006; Kuh, Cruce, Shoup, Kinzie & Gonyea, 2008; Mayhew et al., 2016; Melguizo, 2010; Oyserman, 2015; Pascarella & Terenzini, 1991, 2005; Sedlacek, 2004; Tinto, 1975; Wolf-Wendel, Ward, & Kinzie, 2009; Yeager & Walton, 2011).

The research design for our study³ leverages the fact that between 2012 and 2016 the STBF randomly selected some of the scholarship recipients (Angrist, Autor, Hudson & Pallais, 2016;

³ This study is part of a broader mixed-methods evaluation project. For a detailed description of the qualitative, quantitative, and mixed-methods research design please see: Author, 2018.

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Angrist, Autor, Hudson, & Pallais, 2014). Students included in the randomization were assigned to three experimental conditions: (1) Buffett Scholars who received the financial scholarship and CCTP access, (2) College Opportunity Scholars (COS) who received the financial scholarship alone, and (3) a control group. For this study, we focused on survey data collected from two cohorts of randomized students who enrolled in college in 2015 and 2016 at one of the three campuses that offer the CCTP. An initial survey was administered at the start of the fall semester, followed by two follow-up surveys administered at the end of students' first and second years in college. This longitudinal survey design allowed us to measure the development of our psychosocial factors of interest.

Since we are primarily interested in isolating the effect of the CCTP intervention, we focused on comparing the group of students who received the financial scholarship and program exposure (i.e., CCTP) relative to the group of students who only received the scholarship (i.e., COS). We do not examine effects of either of the two treatment conditions relative to control (no scholarship and no CCTP). This is because, among the students who are in the survey sampling frame (i.e. those who enrolled in one of the three main campuses that offered the CCTP), we find large differences in observable baseline characteristics between the control group and either of the two treatment conditions. These differences are driven by the strong effects of the scholarship on college enrollment (Angrist et al., 2016), and make it very difficult to isolate the causal effect of the treatments relative to control.

The proposed research contributes to the literature in a number of different ways. First, we shed light on the potential of a CCTP to support the development of psychosocial factors that are associated with college persistence and attainment among low-income students. Most of the previous rigorous studies and evaluations have focused on traditional academic outcomes such as

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enrollment, grade point average (GPA), credit accumulation, and degree attainment (Angrist et al., 2016; Bloom & Sommo, 2005; Clotfelter, Hemelt, & Ladd, 2016; Page, Castelman, Sahadewo, & Kehoe, 2017; Scrivener et al., 2015; Scrivener et al., 2008; Visher, Weiss, Weissman, Rudd, & Wathington, 2012; Weiss et al., 2014; Weiss, Ratledge, Sommo, & Gupta, 2019). The potential mechanisms through which college transition programs could support student success in college, however, remain unclear (Andrade, 2007). For example, while the conceptual literature stresses a number of psychosocial factors—such as sense of community, motivation, or self-confidence—as important indicators of college success, these constructs are typically not studied empirically (Andrade, 2007; Taylor, Moore, MacGregor, & Lindblad, 2003). This study is one of the first to assess whether CCTPs are successful in developing psychosocial factors associated with college persistence and attainment for low-income students.

Second, this project was conducted as part of a comprehensive, mixed-methods evaluation (Cole, Kitchen, & Kezar, 2019). We intentionally worked with a large team of qualitative researchers with the goal of gaining a rich and nuanced understanding of the program before embarking on the quantitative evaluation and survey development. As a result of the two-year longitudinal and multi-institution case study, the team identified multiple components of the program, as well as the way different institutional stakeholders (e.g., students, staff, faculty, university leaders, and administrators) interacted with the program over time. The collaboration with a professional survey firm was also key for data quality and yielded high response rates. The longitudinal survey team used focus groups, cognitive interviews, and psychometric and operational survey pilots to strengthen the quality of the survey items and scales designed to measure the psychosocial factors (Cole, Kitchen, & Kezar, 2019). The team also rigorously tested the psychometric properties of the survey items and scales to build evidence for the

validity and reliability of scores from survey participants.

In terms of practical and policy implications, the results of this study will help advance the STBF's and the University of Nebraska System's understanding of the role of CCTPs in shaping scholarship recipients' college experience and success. This study will also inform higher education leaders and practitioners regarding how to create programs that will both validate low-income students' experiences and create more welcoming environments on campus (Rendon, 1994).

The paper is structured as follows. First, we present a brief review of the literature on learning communities and comprehensive college support programs. Second, we provide a description of the Buffett Scholarship and the CCTP, as well as the psychosocial outcomes we examine, including the theory of change undergirding this particular CCTP. Third, the methods section includes a description of the data, sample, selection problems, and the model estimated. Fourth, we present results for two cohort of students who had the opportunity to engage in the full two years of the program. The paper concludes with several policy implications.

Literature Review

Learning communities are arguably the most common programmatic interventions in higher education, implemented to promote students' college transition, learning, persistence, and degree attainment. Despite their ubiquity and the many evaluations of different types of learning communities, there is no agreement on their effectiveness (Bloom & Sommo, 2005; Price, 2005; Scrivener et al., 2008; Taylor et al., 2003; Visher et al., 2012; Weiss et al., 2014).

Most studies on learning communities (e.g., Price, 2005; Taylor et al., 2003) consist of single-institution assessment case studies, and a few correlational and descriptive evaluations. The results of the descriptive impact studies were generally positive and reported better grades

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and re-enrollment rates for students participating in learning communities compared to those who did not participate. A major limitation of these studies is that they compared students who *chose* to participate in a learning community with other observationally similar students on campus. Students who self-selected into the learning community programs might be very different from the students who chose not to participate, suggesting that the positive results found by these descriptive studies might be biased if researchers did not fully control for confounding differences in student characteristics (Price, 2005).

A series of field experiments conducted by the Manpower Demonstration Research Corporation (MDRC) sought to address the self-selection issue by randomizing students into programs resembling learning communities or a control condition (Bloom & Sommo, 2005; Scrivener et al., 2008; Visher et al., 2012; Weiss et al., 2014). These experiments referred to the interventions they examined as “learning communities,” but it is important to keep in mind that the interventions only included some features of learning communities (Price, 2005).

Additionally, there was variation in implementation across institutions and across cohorts (Visher et al., 2012). Specifically, MDRC conducted evaluations of programs that consisted of common first year courses (e.g., English, math, general education, freshman orientation) for small cohorts of students with additional features (e.g., tutoring, informational resources, counseling) that differed by campus and program year. The results of these field experiments of relatively “low touch” interventions suggested very small positive impacts for the participants. Visher et al. (2012) found a modest (half-credit) positive impact on total credits earned, but no impact on student persistence after three semesters. Weiss et al. (2014) conducted a longer-term evaluation of the learning community program at Kingsborough Community College and found small gains in credit accumulation for participants, but no statistically significant differences in

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degree attainment. Taken together, the results suggested very limited gains on a relatively high-cost educational intervention.

More recently, a handful of studies randomly assigned students to different types of “high touch” interventions, similar to the CCTP evaluated here, to isolate the impact of the program on students’ educational outcomes. Angrist et al. (2016) conducted a randomized evaluation of the Buffett Scholarship program and tested the impact of receiving the financial aid with or without participating in the CCTP on traditional academic outcomes such as enrollment and degree attainment. The most recent results of that evaluation, which includes six-years of follow-up starting with the first cohort enrolled in 2012, suggested that the *financial component* of the scholarship dramatically improved enrollment and baccalaureate attainment, particularly for the least academically prepared students.⁴

Three recent evaluations of the Carolina Covenant, Dell Scholars Programs, and a STEM learning community at large public four-year institutions used quasi-experimental designs (e.g., regression discontinuity and difference-in-differences) and found positive associations between program participation and early postsecondary outcomes (Clotfelter, Hemelt, & Ladd, 2016; Page, Castelman, Sahadewo, & Kehoe, 2017), as well as sense of belonging (Xu, Solanki, McPartlan, & Sato, 2018). Clotfelter et al. (2016) evaluated the Carolina Covenant, a grant-heavy financial aid program with academic and social supports (e.g. mentoring by faculty and peers, career advice, professional development opportunities, and social events) for low-income students attending the University of North Carolina at Chapel Hill. Using a regression discontinuity framework, the authors found that three cohorts of program-eligible students were more likely to meet credit accumulation benchmarks towards timely graduation and earned

⁴ Private communication with MIT team.

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higher GPAs than a sample of similar students who did not qualify for the grant. Page et al. (2017) evaluated the Dell Scholars Program, which consists of financial aid paired with a technology-driven student monitoring and support system. Using a difference-in-differences design, they found that the Dell Scholars were between 6 to 13 percentage points more likely to enroll in college in the 3rd through 6th years than a comparable sample of students from a national longitudinal study. The authors advocated for pairing all advising and financial aid programs with robust student monitoring and support systems. Xu et al. (2018) evaluated a STEM learning community program at a large public four-year institution, examining its effect on both cognitive and psychosocial outcomes. They used a regression discontinuity approach and concluded that program participation increased (a) academic performance as measured by course grades in required first-year biology courses, (b) cumulative GPA at the end of the first year, and (c) the likelihood that the student remained in the biology science major at the end of the first year. They also found an increase in student's sense of belonging in the biology science major.

Two recent randomized control trials (RCT) of comprehensive college support programs in community colleges found large, positive effects.⁵ An evaluation of the City University of New York's (CUNY) Accelerated Study in Associate Programs (ASAP), a comprehensive college support program at a community college found substantial and significant effects on enrollment, credit accumulation, three-year graduation rates, and six-year graduation rates (Scrivener et al., 2015; Weiss et al., 2019). Similarly, an RCT of a case management intervention geared toward low-income community college students in Texas conducted by Evans et al.

⁵ It is important to mention that ASAP and the case management intervention in Texas were designed and implemented in community colleges. Even though there are some common programmatic elements like mentoring and financial support, community colleges are open access institutions and require students to take remedial math and English courses, which is not the case for the students in this study.

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(2017) found that participation in the program resulted in higher rates of persistence and degree completion, as well as early earnings, but only for women.

In summary, the positive impacts of comprehensive college support programs at four-year and two-year institutions contrasts with previous findings from RCTs of merit-based financial aid programs and low-touch paired-course interventions that found either no impact, or at best modest impact, on enrollment and other short-term traditional academic outcomes (Goldrick-Rab et al., 2016; Visher et al., 2012; Weiss et al., 2014). In the sections that follow, we describe the scholarship program, the CCTP, and the theory of change behind the programmatic components of the CCTP.

Description of the Susan Thompson Buffett Foundation Scholarship and the Learning Community Program

Susan Thompson Buffett Foundation Scholarship Program

For the past five decades, the STBF has offered scholarships to Nebraska students. Scholarships are awarded on a competitive basis to first-time entering freshmen who are residents of Nebraska and graduated from a Nebraska high school (STBF, n.d.). The largest STBF awards are worth more than \$60,000, covering tuition and fees for up to five years of study at any Nebraska public college. STBF supports more than 3,800 students each year, with annual spending of more than \$40 million.

The STBF has built strong relationships with high schools in Nebraska, and any first-time freshmen who qualify for the program are invited to apply for the scholarship. Currently, the STBF uses an Expected Family Contribution (EFC) of \$10,000 as the need-based eligibility threshold for the program. Eligible applicants also need to submit transcripts, personal essays, Student Aid Reports from the Free Application for Federal Student Aid (FAFSA), and reference

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letters. The STBF uses a very thorough review process to select scholarship recipients. Students submit their applications online between November 1 and February 1. The STBF notifies winners by May 1.

The Buffett Scholarship must be used at a public postsecondary institution in Nebraska, which includes any of the three University of Nebraska (NU) campuses, three state colleges, or six community colleges. The awards vary by type of institution and campus, but they typically cover the cost of tuition and fees, plus \$500 for books. Students are also eligible to receive other institution, state, or federal grants, so they could use the value of the scholarship to cover any of the federally defined components of their Cost of Attendance (COA), including room and board. Students can receive other forms of financial aid, such as Pell grants or institutional aid, in addition to the scholarship.

Comprehensive College Transition Program

The CCTP examined in this study is a college success and transition program initiated in 2008 and funded by the STBF in partnership with the NU system. The CCTP exists on three campuses and ranges in size from approximately 200-600 first- and second-year students with over 2,300 total Buffett Scholars each year. The Buffett Scholars who elect to attend one of the three NU campuses receive a financial scholarship and are required to participate in the two-year comprehensive support program.

The overall purpose of the CCTP is to facilitate a smooth transition into college and to promote a pathway to college completion. The program aims to foster students' academic, social, and civic development through a network of supports designed to nourish student success. The main programmatic components vary across campuses, but generally include: first-year experience (FYE) courses taught by staff, shared academic courses (SAC) taught by faculty

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selected by the program,⁶ peer mentoring and subject-specific tutoring from upper level program participants, advising (e.g. mid-semester grade checks⁷), and academic and social activities offered by CCTP staff. Over the course of the program, CCTP students participate in a range of academic, social, career development, and community service activities, including financial literacy sessions, resume writing workshops, service-learning trips, student organizations, and more. In the first two years, CCTP students enroll in 6-7 SACs intended to create a small classroom environment that facilitates the building of relationships with faculty members and other students in the classroom.⁸

One key feature of the CCTP is that it provides Buffett Scholars the opportunity to work for pay in the program as either peer academic leaders (PAL) or peer mentors. Students can apply to these positions anytime between their sophomore and last year on campus. The program directors and staff at each of the three NU campuses define the roles of peer mentors and PALs. Peer mentors meet with students regularly and provide additional academic and social support for program participants. PAL responsibilities vary, but at most campuses they include supporting the staff by co-teaching an FYE course, proctoring required program study hours, or serving as a teaching assistant in one of the small SAC courses. Both peer mentors and PALs serve as a consistent point of contact for students during their first year (Perez, Acuna & Reason,

⁶ CCTP Directors work with campus specific faculty liaisons to identify professors to teach the SAC courses. These professors are expected to work closely with scholars and sometimes share the background of the scholars. In some cases, they receive additional funds to supplement learning outside of the classroom. Evidence from an embedded case study of an autobiographical reading and writing course at one of the campuses illustrated that the instructors used a pedagogy of validation that enhanced both students' writing skills and their self-efficacy in writing and their sense of belonging (Perez, Acuna & Reason, 2017).

⁷ This is a 'proactive advising' program activity that was designed by program staff using a non-deficit approach to promote academic success. Results from a case study that included 462 interviews of 72 first- and second-year students suggest that mid-semester grade checks provided an opportunity for students to reflect on and assess their academic progress while receiving proactive guidance and emotional and interpersonal support (Kitchen, Cole, Rivera, & Hallett, 2017).

⁸ Participation in all activities are compulsory for all CCTP students.

2017). Peers in leadership roles play a key role in student success because their close contact with students enables them to identify and report back to the staff and program directors when there are any potential academic or personal issues that need to be addressed.

Although the CCTP at each campus includes the common programmatic elements described above, our longitudinal comparative case study identified differences in program implementation tailored to the needs of each of the three NU campuses. Despite some programmatic differences, all participants are required to remain active participants of the CCTP by engaging in a set of core program components across campuses (i.e., SACs, peer mentor meetings, grade checks) in order to keep the scholarship.

Comprehensive College Transition Program Theory of Change

Tinto's (1997) institutional departure model argues that institutions have a responsibility to support student development and success. He argues that in order to do so, faculty, student affairs, and academic affairs professionals need to design programs that help students integrate into the institution both academically and socially. Learning communities are a promising intervention that may promote low-income students' academic and social engagement. The theory of change behind learning communities is that students, in particular low-income and first-generation students, can get lost on large campuses, where they need to take large general education courses, and generally do not receive additional pedagogical and mentoring support. Learning communities are an opportunity to create a small, liberal arts-style learning experience by selecting a small group of students, typically in their first year, to take common courses with faculty trained in providing meaningful learning opportunities that foster collaboration and student-faculty interactions (Goodsell-Love & Tokuno, 1999; Hurtado et al., 2007; Inkelas & Associates, 2008; Shapiro & Levine, 1999). Learning community faculty also use active,

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interdisciplinary, and in some cases culturally relevant and collaborative pedagogical strategies to increase learning and promote peer and faculty interactions.

Figure 1 presents a visual representation of the theory of change of the CCTP as it relates to the development of critical psychosocial outcomes associated with college persistence and attainment. We illustrate how the different programmatic elements of the CCTP are hypothesized to support students in their academic and social engagement, while helping them feel that they matter to different institutional agents, and that they belong at the institution. The CCTP provides substantially more supplemental services (e.g., light-touch contact during the summer, orientation, mandatory activities and events to foster student-faculty interactions, first year experience, SACs, peer mentoring, and residential living-learning communities or other common spaces), compared to the support offered by the campuses to the broader population of students (e.g., academic office, health office, and campus student services). We hypothesize that exposure to these additional activities and tailored support services will result in the development of intermediate psychosocial outcomes that the literature suggests are related to college persistence and attainment: (a) sense of belonging; (b) mattering; (c) academic and social self-efficacy.

Sense of Belonging to Campus

Sense of belonging has conceptual roots in psychology and mental health studies. It is defined as a “sense of personal involvement in a social system so that persons feel themselves [an] indispensable and integral part of the system” (Anant, 1996, p.21). In postsecondary settings, sense of belonging is defined and operationalized as students’ active participation in school and classroom activities and a concomitant feeling of identification with their institution (Finn, 1989). This construct was popularized by Hurtado and Carter (1997) in contrast to the concepts of separation and integration proposed by Tinto (1993) and a number of empirical

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studies in higher education have tested the association between sense of belonging and traditional academic outcomes for first-generation and students of color (Hausman, Schofield, & Woods, 2007; Spanierman et al., 2013; Hoffman, Richmond, Morrow, & Salomone, 2002; Strayhorn, 2012).

Many of the main programmatic elements of the CCTP were designed to support students' sense of belonging to campus. Specifically, the multiple required elements include social activities (e.g., field trips, bowling), shared living and working spaces, FYE course, mandatory SACs, regular meetings with the CCTP staff, and peer mentors. Belonging is a relational construct, thus encouraging the development of social ties to those within the program through these elements is essential for promoting a sense of belonging. The program staff and faculty also often communicate to students that they belong in the community of Buffett scholars. Students may also be encouraged to connect with other offices and students on campuses through program activities designed to help them integrate into the larger campus community.

Mattering

Mattering is characterized by the relationships that exist between an individual and the people to whom he or she matters (Rosenberg & McCullough, 1981; Schlossberg, 1989). This construct refers to an individual feeling of importance to others, that other people care about their well-being, which in turn creates a feeling of reliance as others depend on the individual. Rosenberg and McCullough (1981) contend that mattering consists of three distinct elements: (a) awareness that the individual commands the interest or notice of others; (b) the belief that others take what he or she has to do or say as important; and (c) the notion that others depend on the individual. Students feel like they matter when institutional agents and peers take notice of them

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and validate their actions and presence. Mattering is positively associated with academic achievement and positive school climate, and negatively associated with academic stress (Rayle & Chung, 2007). Specifically, in the context of this CCTP, case study data (i.e., digital diaries, document analyses, focus groups, interviews with CCTP students and stakeholders, and observations) suggest students consistently receive messages from the program staff, in particular during the first year in the program, that make them feel that they matter (First Year Campus Summaries, 2017-2019). The students often use the term “family” to describe their relationships with members of the CCTP, and in multiple instances state that community members have one another’s backs, and that their success matters to others in the program. While it varies somewhat across campuses, case study evidence suggests that the caring environment students experience results from regular opportunities to interact with CCTP staff, peer-mentors, and CCTP faculty who taught SAC courses.

Academic and Social Self-Efficacy

Bandura’s social cognitive theory asserts that self-efficacy relates to “[a] learner’s judgment about his or her ability to successfully attain educational goals” (Bandura, 1977, p. 12). He argues that self-efficacy is specific to a behavior or an outcome, and as such can be applied to, and measured in relation to, different activities. We chose to measure *academic and social self-efficacy*, two constructs that have been linked theoretically and empirically to college persistence and attainment (Chemers, Hu, & Garcia, 2001; Gore, 2006; Inkelas & Associates, 2008).

There are specific CCTP programmatic activities that support the development of academic self-efficacy such as FYE courses, mid-semester grade checks (Kitchen, Cole, Rivera, & Hallett, 2017), and some of the SACs that were designed with the goal of enhancing the

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learning experiences (Perez, Acuna, & Reason, 2017). For instance, one goal of the FYE course is to build college knowledge and to help students feel like they can successfully navigate the college experience by building study skills, college planning, and other academic skills. The degree to which these various programmatic components support academic self-efficacy varies by campus, but the mid semester grade-checks (Kitchen et al., 2017) and the autobiography course stand out as important opportunities in which CCTP staff and faculty provide learning opportunities to foster this psychosocial outcome (Perez, Acuna, & Reason, 2017).

In terms of social self-efficacy, Tinto's theory asserts that learning and problem solving also take place outside the classroom as individuals engage with each other, inquire of those with skills and expertise, and use resources and tools that are available in the surrounding environment. The CCTP develops students' social self-efficacy mostly through promoting opportunities for peer engagement in the required CCTP activities (e.g., required social outings), shared living or program space, as well as in the FYE and SAC courses that enable students to build strong friendships during the first academic year. Some students indicate that having a "built-in" friend group through the program led to a sense of social ease and comfort engaging with others. These different components of the program are expected to support students in their belief that they can execute the actions necessary to be socially successful.

Methodology

Our research design leverages the random assignment of applicants to the Buffett Scholars program (Angrist et al., 2014). The original randomization occurred within target college strata based on students' intended college of enrollment at the time of the application. Based on their application score, students were divided into three groups. Students in the highest-scoring group, referred to as "Must Funds" received guaranteed awards; the middle-scoring

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group was subject to random assignment, and the lowest scoring group was disqualified.⁹

Students in the middle group, the experimental group, were randomly assigned to one of three treatment arms (CCTP, COS, and control) and had application scores that were statistically indistinguishable from each other. For the purposes of this study, we focus only on the students in the middle group who were subject to random assignment, who targeted one of the three campuses in the NU system, and who eventually enrolled in one of the three NU campuses (Angrist et al., 2014, 2016).

Although successful random assignment renders the treatment groups equivalent on observable and unobservable characteristics, our analysis must confront differential attrition from the experimental sample. Differential attrition in this study occurs because of two reasons. The first cause stems from the strong treatment effects of the scholarship offer on college choice (Angrist et al., 2014; 2016), but our survey was only administered to students attending a campus in the NU system. Put another way, students who randomly received a Buffett or COS scholarship were more likely than control students to enroll at one of the three NU campuses and to participate in the CCTP. Thus, Buffett scholars and COS students are more likely to be included in the survey sample frame than control students. The second cause of differential attrition in our sample arises from survey nonresponse, which we find is correlated with the experimental conditions. Specifically, the survey response rate of the students in the CCTP and COS conditions was higher than the survey response rate of those in the control group. Both causes of attrition can result in biased estimates of the program impacts. We address any biases resulting from differential selection into the sampling frame or from survey nonresponse by

⁹ For a more detailed explanation of the randomization see Angrist et al. (2016).

controlling for a rich set of demographic, academic, and financial background variables.¹⁰ We describe the strategies that we used to both quantify and ameliorate the impact of this selection bias in the following section.

Data and Sample

Longitudinal Survey of Thompson Scholars (STS). The research team, along with the American Institutes for Research (AIR), designed the longitudinal Survey of Thompson Scholars (STS), which was administered to Buffett Scholars, COS students, and control students who enrolled at one of the three main NU campuses starting in 2015 or 2016 (Cole, Kitchen, & Kezar, 2019). The STS data used for this study come from both cohorts and consists of an initial survey that was administered shortly after students enrolled in college, and two follow-up surveys administered just before the end of students' first and second years. The initial survey primarily asked students about their experiences in high school (e.g., high school interaction with peers and faculty), and their expectations for college (e.g., expectations about academic and social self-efficacy, sense of belonging, mattering and others). The first follow-up (1FU) and second follow-up surveys (2FU) asked about the "actual" experiences with the CCTP as they related to the outcomes of interest (e.g., reported academic and social self-efficacy, experience of mattering and belonging, engagement with peers and faculty, engagement with program features, financial stress, and revised graduation expectations).¹¹

We combine data collected through the longitudinal STS, administrative data from students' applications for the Buffett Scholarship (e.g., high school GPA, family income, race

¹⁰ We also explored the possibility of estimating effects bounds, but found the assumptions required to calculate Lee bounds were untenable in this case, as COS students exhibited higher response rates than CCTP students at some campuses at certain time points, while the Lee bounds assume monotonic differential attrition (Lee, 2009).

¹¹ Full survey instruments are available upon request.

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and ethnicity, gender and other relevant background characteristics), and financial information from the FAFSA, for the analyses described below.

Sample. Table A.1 shows how the analytic sample was formed. We began with the full sample of students ($N = 1,051$) who were part of the RCT, targeted a campus from the main university system, and were assigned to either COS or CCTP. Ultimately, our sample was reduced to students ($n = 578$) who responded to both follow up surveys.¹²

There are three main sources of selection bias that might affect the final composition of the sample: (a) *differential enrollment*, (b) *differential persistence*, and (c) *survey non-response and differential response rates* across groups. There is evidence that receiving the Buffett Scholarship substantially changed the characteristics of the enrolled students relative to students from the original randomization (Angrist et al., 2016). In order to address the magnitude of the *differential enrollment* issue, we first calculated the number of students who either *switched into* or *out of* the institutions after being notified of the grant. The baseline findings suggested that whereas a small number of students ($n = 44$), *switched into* one of the three main university campuses after receiving the Buffett Scholarship, a much larger number of non-recipients ($n = 437$), *switched out* of the three campuses by simply not enrolling. We removed the students who *switched into* or *out of* the institution to minimize the selection issue.

We are aware that the decrease in longitudinal survey response rates might be the result of: a) students dropping out of the program, b) problems related to survey non-response, or c)

¹² We use a generous definition of survey response, counting all students who answer at least one item as respondents. Attrition analyses indicate there are minimal differences between students who respond to both follow-up surveys and students who do not (specifically, students with higher ACT scores, higher high school GPAs, female students, continuing-generation students, students with higher academic self-efficacy, and students who feel a greater sense of mattering to campus during their first three weeks on campus are more likely to respond to both surveys (full results available upon request). By controlling for student characteristics, we address selection into the analytic sample. Additionally, we estimate effects without restricting our sample to students who respond to both follow-up surveys; results are similar.

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differential survey response rates. The *differential persistence* is related to students dropping out of college, and the *survey non-response and/or differential survey response rate* refers to enrolled students not answering the survey and/or having higher response rates for the students in the CCTP compared to those in the COS group. In order to disentangle this issue, we first estimated the drop out rates for each wave for CCTP and COS students (see Tables A.2 and A.3). The results show a relatively low first-year drop out rate, four percent for the CCTP students and seven percent for the COS students in cohort 2015, and two and three percent for CCTP and COS students, respectively, in cohort 2016.¹³ The second year drop out rate is larger, about 11 percent for the CCTP students and 26 percent for the COS students in the 2015 cohort and 15 and 20 percent for CCTP and COS students, respectively, in the 2016 cohort. While overall attrition rates are higher among COS students than among CCTP students in both cohorts, there is variation by campus. In particular, COS students in the 2016 cohort responded at a higher rate to the second follow-up survey than CCTP students at one of the three campuses examined.

Tables A.2 and A.3 shows that over 80 percent of the CCTP and COS students responded to the baseline survey. However, the differential response rate issue gets more pronounced in subsequent survey waves. Focusing on the second follow up longitudinal response rate (e.g., those who responded to baseline, 1FU, and 2FU) within the 2015 cohort, the 32 percent response rate for students in the control group is much lower than the 59 and 48 percent respectively for the CCTP and COS students. The substantial differential response rates we observe between

¹³ We wanted to get a sense of the magnitude of the drop out rates of the students in our sample compared with a nationally representative sample of students enrolled in public four-year institutions in 2015 (NSC, 2018). According to a recent report by the National Student Clearinghouse (NSC), the overall retention for students who first enrolled at public four-year colleges was 90 percent (10 percent drop out), which is larger than the 4 and 7 percent drop out rates reported above. The drop out rates of students of color were much higher about 30 percent for Hispanic and 35 percent for African Americans. These numbers suggest as confirmed by the work of Angrist et al. (2016) that the program was effective in terms of reducing drop out rates and helping institutions retain their students.

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CCTP and COS students on one hand and control students on the other for both cohorts and at both follow-up points motivated our decision to limit our comparison to CCTP and COS students, rather than analyzing differences across the three arms of the original RCT.

Psychosocial Factors

As we have noted, there is consensus in the social science literature related to the association between psychosocial factors and traditional educational outcomes such as persistence and attainment (Astin, 1984, 1993; Chickering & Gamson, 1987; Deming, 2017; Gore, 2006; Heckman, Stixrud, & Urzua, 2006; Kuh, Cruce, Shoup, Kinzie & Gonyea, 2008; Mayhew et al., 2016; Melguizo, 2010; Oyserman, 2015; Pascarella & Terenzini, 1991, 2005; Sedlacek, 2004; Tinto, 1975; Wolf-Wendel, Ward, & Kinzie, 2009; Yeager & Walton, 2011). In this section, we first provide a brief description of the scales used to measure each of the psychosocial outcomes, and included an Appendix, with the list of items included in each of the survey waves for the four psychosocial outcomes of interest in our study. The following section describes the methods we used to evaluate the quality of the scales, as well as the procedures used to create the Rasch scores included in our regression analyses.

Sense of Belonging to Campus. Sense of belonging was operationalized based on items adapted from the six-item scales that were developed in the Organization for Economic Cooperation and Development's (OECD) 2015 administration of the Programme for International Student Assessment (PISA) (OECD, 2015). In the baseline survey we asked about students' *expectations* of belonging at their respective institutions, and in the first and second follow-up surveys, we asked about their actual experiences related to a sense of belonging at the institution.

Mattering. In the initial survey, examples of items measuring the expectation of mattering included: “There will be people who are sad for me when I fail in something I set out to do”; “There will be people that are generally supportive of my individual needs.” We included analogous items in the first and second follow-up survey, but asked students to reflect specifically on their experiences at their respective institutions and how these experiences contributed to feelings of mattering. There have been a number of empirical studies in higher education that have explored the connection between mattering and building community and/or an inclusive college environment, in particular for African American students (Cooper, 1997; Rayle & Chung, 2007). Many scales measuring mattering have not been widely evaluated in the literature and require further examination, particularly when considering their use in diverse student populations. Thus, we evaluated the psychometric properties of the mattering construct within our sample.

Academic and Social Self-Efficacy. We included a number of items that have been used in the psychology and education literature to measure students’ academic and social self-efficacy (Pajares & Schunk, 2001; Pintrich, 2004; Voung, Brown-Welty, & Tracz, 2010; Zimmerman, 2008). Academic self-efficacy at the beginning of students’ first semester was measured based on student’s self-reported expectations about their ability to complete academic tasks and at the follow-up surveys based on students’ actual academic experiences in college. We operationalized the social self-efficacy construct in the baseline survey by asking questions about their social experiences in college, and in the follow-up surveys based on their actual social experiences at their institution.

Rasch Models and Evaluation of Psychosocial Scales

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Finding scales that produce valid and reliable scores across different contexts is one of the challenges associated with measuring psychosocial outcomes. For some of the constructs of interest (i.e., sense of belonging), we found a set of items that had been consistently used successfully by other researchers and organizations, such as the OECD (OECD, 2015). In the case of other constructs (e.g. mattering), the available scales had not been rigorously evaluated. Qualitative work conducted as part of the larger mixed methods study from which data for this study were drawn helped to inform decisions around scale development and selection (Cole, Kitchen, & Kezar, 2019). In order to evaluate the scales, we conducted a psychometric analysis of the following psychosocial outcomes of interest: academic and social self-efficacy, sense of belonging, and mattering.

The goal of the psychometric analysis was to find evidence of “good fit” between the data we collected and an *a priori* model that asserts the presence of a latent construct measured by our assembled items. Because we utilize longitudinal survey data in which some items within a construct change over time¹⁴, we calculate Rasch scores for each construct, and examine several psychometric properties of these scores to assess whether the scales are a good fit for our data (Andrich, 1978; Wright & Masters, 1982; Granger, 2008).¹⁵ Although the definition of “good fit” varies, there is general agreement that a variety of diagnostics should be used when judging the soundness of a Rasch score. We evaluate item difficulty, construct reliability, construct dimensionality, item fit, average person ability by response category, rating scale thresholds, and differential item functioning. In general, Rasch scores exhibit better fit when the

¹⁴ In particular, psychometric results from the initial survey were used to modify the scales in the first and second follow-up surveys. Modifications included re-wording questions to clarify meaning, dropping questions with very low factor loadings from preliminary confirmatory factor analyses, and increasing the range of response options for items asking students to rate their ability to complete a task (i.e. “Cannot do this at all” to “Absolutely can do this”).

¹⁵ Rasch score construction and testing was conducted by AIR team members Samantha Nieman and Mark Masterton using WINSTEPS (Linacre, 2018). The full psychometric report is available upon request.

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item difficulty score is closer to zero (on scale of negative to positive 5), the reliability coefficient is higher (this is similar to but generally lower than Cronbach's alpha), the percent of variance explained by the items is higher (indicating a unidimensional latent construct), the mean square is close to one (on a scale of zero to two, indicating item fit), the average person ability by response category indicates higher ability respondents (on that construct) agree with higher response categories, the rating scale thresholds (in this case, Andrich thresholds) indicate a proper and distinct ordering between response categories (category peaks are at least one logit apart), and differential item functioning (we examine differential item functioning across gender and race/ethnicity) is less than 0.5.

We find that our psychosocial measures perform well in our sample. We find no evidence of differential item functioning by gender or race/ethnicity, and that there is an increasing and positive relationship between students' ability and likelihood of responding to higher response categories (e.g. a student with a higher social self-efficacy score is more likely to respond with a seven on an item in the construct than a student with a lower social self-efficacy score). We find that there is proper ordering for all scales, and the Andrich thresholds for both belonging and mattering are at least one logit apart. However, because of the numerous response categories for the items in the academic and social self-efficacy scales, not all category response peaks are at least one logit apart; therefore, we use standardized scores for each outcome variable rather than categorical scale scores, so this is not a first-order concern. We find high Rasch reliabilities for each construct, ranging from 0.80 for our social self-efficacy scale to 0.88 for our academic self-efficacy scale. Results suggest each construct is unidimensional, with the share of variance explained by the items ranging from 53.2% for the sense of belonging scale to 58.6% for the social self-efficacy scale. Item difficulties range from -0.62 for an item included in the academic

self-efficacy scale to 0.93 for an item included in the mattering scale. Finally, we find evidence of good item fit, with mean squares ranging from 0.64 for an item in the mattering scale to 1.56 for an item in the social self-efficacy scale.

Empirical Design

We first compared the background and demographic characteristics of the students in the CCTP and COS groups of the longitudinal sample as a way of assessing whether there were systematic differences between these two groups. We started by using traditional statistical tests such as *t*-tests and Chi-square tests to test for differences in the background and demographic variables of interest.¹⁶

We estimate the effect of the CCTP on students' psychosocial outcomes using ordinary least squares (OLS). Our preferred model specification includes controls for individual characteristics such as: gender, race, level of education of the guardian, expected family contribution, ACT score, and unweighted GPA, as well as campus by cohort fixed-effects, as suggested in the econometrics and program evaluation literature (Angrist & Pischke, 2009; Bloom, 2006; Shadish, Cook, & Campbell, 2002; Murnane & Willett, 2011). Responses were not weighted for survey nonresponse, as such weights would not correct for differential selection into the sampling frame; including background characteristics accounts for both differential selection into the sampling frame and survey nonresponse. Missing survey responses were imputed using hot deck imputation (Andridge & Little, 2010).¹⁷ Imputation was used to correct for item non-response, not for students who attrited from the survey entirely. Our results are

¹⁶ All analyses were conducted in Stata.

¹⁷ Students were grouped into cells based on nine background characteristics (race, ethnicity, gender, ACT composite score, ACT English score, ACT math score, ACT reading score, treatment condition, and campus). Within each cell, observations were randomly drawn to fill in missing items for students who skipped an item. Our results are not sensitive to including observations with imputed values. Results from models excluding observations with any imputed items are available upon request.

robust to the use of imputation; estimates are similar if we exclude students with any missing items that contribute to the outcome of interest (results available upon request). Imputation was not used to fill in missing background information (such as ACT score). Instead, we include indicators for missing background characteristics (e.g. ACT score and family adjusted gross income rather than dropping observations).

Our preferred specification is parameterized as followed:

$$Y_i = \alpha_i + \beta_1 X_i + \beta_2 CCTP_i + \beta_3 CampusXCohort_i + e_i \quad (1)$$

where Y_i represents the psychosocial outcomes of interest, α_i is the constant, X_i is a vector of student background and demographic characteristics, $CCTP_i$ is an indicator for CCTP participation, $CampusXCohort_i$ is a campus by cohort fixed effect accounting for differential cohort and campus sorting, and e_i represents the error term.

Additionally, we estimated the models using the doubly robust estimator on a propensity score matching model as a robustness check for our main results (Robins, Rotnitzky, & Zhao, 1995; Rosenbaum & Rubin, 1993). Although this approach relies on a similar assumption for causal inference as the multivariate regression models—that everything related to potential outcomes and treatment assignment is accounted for by the observable factors (Bang & Robins, 2005)—it provides an alternative way of controlling for observables.

Results

Background and Demographic Characteristics by Treatment Groups

We begin our analyses by comparing the background and demographic characteristics of the CCTP and COS students in the initial survey sample frame and the respondents to the first

and second follow-up surveys (Table 1).¹⁸ The statistical tests across groups suggest similarities in these characteristics, with a few exceptions. Specifically, when looking at the analytic sample, we see a significant difference between the CCTP and COS groups at the 10% significance level in the share of Latinx students ($p=0.096$), the share of students who declined to report a race/ethnicity ($p=0.079$), and average high school GPA ($p=0.054$). This equivalence indicates our estimates are less prone to selection bias.

Effects of the CCTP on Psychosocial Factors: Ordinary Least Squares

Table 2 reports the results for four psychosocial outcomes of interest at both the first and second follow-ups, pooling data from both the 2015 and 2016 cohorts. We estimate CCTP students' reported psychosocial outcomes relative to COS students' outcomes across survey waves. Column (1) presents the first-year impact, measured at the end of the student's freshmen year, and Column (2) presents the overall impact for the two-year CCTP program.

The first panel presents the results for *sense of belonging* to campus in which we ran sets of models for three cross-sectional and two longitudinal survey waves. The results illustrate that after engaging in the program for one and two academic years respectively, students in the CCTP compared to COS reported stronger feelings of belonging to the institution. The estimates for CCTP students compared to COS are large (0.169 standard deviations at the end of students' first year and growing to 0.196 standard deviations at the end of students' second year), even after controlling for entering student characteristics, and are statistically significant at the 5% significance level.

The results also suggest that participating in the CCTP translated to students reporting stronger feelings of *mattering*. Again, the magnitude of this effect is quite large, slightly over a

¹⁸ We conducted these tests for the three cross-sections (i.e., baseline, FFU, and 2FU), and the longitudinal samples (i.e., baseline to first follow up and baseline to second follow up), and these results are available upon request.

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quarter of a standard deviation after one year in the program and about 29 percent of a standard deviation after students' second year, after accounting for student background characteristics and campus-by-cohort specific shocks. The program effects on students' sense of mattering at both the first and second follow-up are statistically significant at the 1% significance level.

We find no differences in terms of either academic or social self-efficacy between CCTP and COS students. At both the end of students' first and second years in the program, we estimate small, noisy effects for academic self-efficacy in our preferred model. Similarly, while we estimate slightly larger point estimates for the impact of the CCTP on students' social self-efficacy (0.089 standard deviations at the end of year one and 0.237 standard deviations at the end of year two), neither estimate is statistically significant at the 5% confidence level. While the direction of our results align with findings from the case study which found that students create a strong social bond with peers in their first year as a result of the intense participation in the social and programmatic activities (e.g., etiquette dinners, off-campus intense bonding experiences, and others), we cannot conclude that there is a quantitatively distinguishable effect of the program on students' social self-efficacy.

Effects of the CCTP on Psychosocial Factors: Propensity Score Matching

The results of the association between participating in the CCTP and the four main psychosocial factors of interest from the OLS and propensity score matching methods are closely aligned (see Table 3). In the case of the student's *sense of belonging to campus*, the estimates are statistically significant at the 5% significance level and practically large, at about one-fifth of a standard deviation at both the first and second follow-ups.

The results from the propensity score matching models also replicate the strong association between CCTP participation and reporting *feelings of mattering* found using OLS.

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Specifically, when using the doubly robust propensity score matching estimator, we find that assignment to the CCTP is associated with a 0.293 standard deviation increase in mattering at the end of students' first year on campus and a 0.308 standard deviation increase in mattering at the end of students' second year on campus; both of these estimates are statistically significant at the 0.1% significance level.

The association between CCTP participation and academic and social self-efficacy also present a consistent picture of the overall impact of the program on these two psychosocial outcomes. The results suggest no association between CCTP participation and academic self-efficacy. Again, the point estimates for academic self-efficacy are noisy and close to zero, while the estimates for social self-efficacy are above 10% of a standard deviation but not statistically significant.

Overall, the alignment between the OLS and PSW indicates that our findings are robust to the method used to control for observable characteristics.

Discussion

Our results suggest that the CCTP effectively supported the transition of low-income students to college and fostered some psychosocial factors that are linked to college persistence and attainment. Specifically, participation in the CCTP, as compared to receiving a substantial college scholarship without additional supports, is related to large increases in both mattering and sense of belonging to campus after students' first and second years on campus.

Consistent with the CCTP's theory of change and supported by the results of the longitudinal case study, there is suggestive evidence that some of the programmatic activities contributed to the development of CCTP students' sense of belonging to the institution and feelings that they mattered. In particular, case study evidence suggests that shared living or office

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space, regular meetings with CCTP staff and peer mentors, and opportunities to reflect on and receive guidance about academic and personal development, as well as some of the small shared courses with program peers taught by carefully selected faculty contributed to the increases we observe in students' sense of belonging and feelings of mattering (Hallett et al., 2019; Kitchen et al., 2019; Perez et al., 2019). Additionally, the strong messaging to CCTP students that they belong to a community of scholars, requirements to participate in social activities, early contact from the STBF personnel about the award, and participation in orientation activities during the summer and early in the fall could have contributed to the effects we observe on students' sense of belonging to campus. The large impact on mattering is also consistent with preliminary results from the longitudinal case study that documents an ethic of care and validation embedded throughout the multiple activities that the students were exposed to throughout the duration of the program (Hallett, Reason, Toccoli, Kitchen, & Perez, in press).

There are several CCTP component exemplars that offer explanations for observed program effects on mattering and belonging. For example, during the mid-semester grade check program staff proactively engage with students to help them change academic behaviors to succeed in college. Specifically, students receive caring, supportive messages indicating that they are capable learners and that their success matters to others (Kitchen, Cole, Rivera & Hallett, 2017). In a case study of a shared academic course offered through this program, researchers found that program faculty's intentional efforts to display care and validation helped students feel as though they mattered to others (Perez, Acuna, & Reason, 2017). These two qualitative studies from the larger mixed-methods evaluation of the CCTP provide a contextual understanding of our findings, and reaffirm that the CCTP fosters a caring and validating

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environment, one potential mechanism for the large differences observed between CCTP and COS students in terms of sense of belonging to campus and mattering to other people.

The results of this paper suggest that the program was not as effective in developing students' academic self-efficacy. The lack of an impact related to this factor is surprising given that there are specific programmatic elements related to strengthening students' academic skills through the first-year seminar and shared academic courses. For instance, the shared courses are intended to build student confidence in their ability to do well academically with the support from a built-in network of program peers and faculty. Moreover, the results of a qualitative study of the mid-semester grade check intervention suggested that its proactive advising and non-deficit approach promoted a virtuous cycle of reflection and self-assessment, emotional and interpersonal support, and proactive planning and instrumental guidance that were all geared towards developing academic self-efficacy (Kitchen et al., 2017). A potential explanation for our finding is that students' responses on our survey are affected by reference group bias (West et al., 2016). We find that students in the CCTP have higher GPAs than students in the COS or control groups at the end of their first and second semesters on campus. It could be that because CCTP students are comparing themselves academically to a higher-achieving group of students on average, they feel less efficacious in their ability to succeed, while COS students feel more efficacious because they either a) know they are performing better than their peers on average or b) they have less information about how well their peers are doing, since they are not living with and taking courses with the same group of students. Our finding of no effect on academic self-efficacy could also be related to the fact that the mid-semester check intervention, as well as the academically demanding shared academic courses, could be helping CCTP students get a more realistic view of their academic performance, which leads them to report lower levels of

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confidence in their academic abilities compared to their COS peers, who receive less feedback on their performance. Future work should examine the complex relationship between students' academic performance, feedback signals, and self-reported academic self-efficacy.

We estimate a small but imprecise positive relationship between assignment to the CCTP and students' social self-efficacy. This is an interesting finding given the program's emphasis on social activities, shared courses, and shared living or office space. However, there are differences in implementation of the shared space program component across campuses. At only one campus do CCTP participants live exclusively with each other; at another campus both CCTP and COS students live in the same residence hall, and the third does not offer a dedicated living space exclusively for Buffett scholars. Additionally, while students do take multiple courses together, they also take courses with other students, and those courses may be more aligned with their declared majors. Finally, students in the COS group could substitute participation in the CCTP with participation in Greek life or other student organizations on campus to build social networks, limiting the treatment-control contrast and muddying our analysis.

This study provides rigorous empirical evidence that a well-designed and well-funded CCTP with a sharp focus on helping students feel that they belong to the institution and that they matter to others, has the potential to provide holistic support to low-income students as they transition into college, thereby improving their collegiate experience and improving persistence and attainment rates. The positive impact of the CCTP on psychosocial outcomes supports recent findings from a rigorous evaluation of a STEM-focused learning community that also focused on psychosocial outcomes (Xu et al., 2018). In addition, the strong causal impact of the program in terms of college enrollment and persistence reported by Angrist et al. (2016) provides suggestive evidence of a positive relationship between psychosocial and traditional academic outcomes that

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will be explored further in future papers. Postsecondary institutions and states working to support low-income students and to build diverse, inclusive, and supportive college environments should consider a CCTP as a promising strategy.

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Table 1

Background Characteristics and Selected Baseline Measures by Sample and Treatment Group, Cohorts 2015 and 2016

Variable	Initial Survey Sample Frame					Respondents to First and Second Follow-Up				
	RCT COS		RCT CCTP		Difference	RCT COS		RCT CCTP		Difference
	<i>M or %</i>	<i>n</i>	<i>M or %</i>	<i>n</i>	<i>p-value</i>	<i>M or %</i>	<i>n</i>	<i>M or %</i>	<i>n</i>	<i>p-value</i>
Female	62.0%	382	62.1%	622	0.869	63.5%	219	68.8%	359	0.188
Latino/Hispanic, Any Race	24.9%	382	28.3%	622	0.243	20.5%	219	27.0%	359	0.096 ⁺
Black/African American Only, Non-Latino	5.8%	382	7.9%	622	0.337	5.5%	219	6.4%	359	0.784
White Only, Non-Latino	58.4%	382	53.7%	622	0.268	61.6%	219	57.4%	359	0.445
Other/Multiple Races, Non-Latino	4.7%	382	4.7%	622	0.853	4.1%	219	3.9%	359	0.913
Unknown Race	2.1%	382	0.6%	622	0.038*	2.3%	219	0.6%	359	0.079 ⁺
At Least One Guardian Attended College	23.3%	382	21.9%	622	0.550	20.1%	219	20.1%	359	0.966
At Least One Guardian Earned a Bachelor's	68.1%	382	71.7%	622	0.198	63.5%	219	68.2%	359	0.283
Took ACT	97.1%	382	97.7%	622	0.586	98.2%	219	97.8%	359	0.704
ACT Composite	21.2	382	21.1	622	0.583	21.9	219	21.8	359	0.692
High School GPA	3.4	382	3.5	622	0.186	3.5	219	3.5	359	0.054 ⁺
Expected Family Contribution (\$)	2761.7	382	2612.9	622	0.524	3008.8	219	2778.3	359	0.430
Parent's Adjusted Gross Income	45101.3	382	43899.0	622	0.595	47405.2	219	45427.1	359	0.486

Note. COS = College Opportunity Scholars; CCTP = Comprehensive College Transition Program Scholars, M = mean, % = percent. Means reported for continuous-scale variables. Proportions (in percent) reported for categorical variables. P-values for funding group significance are from composite Wald tests that assignment to the CCTP has no association with the variable in a regression model with targeted campus (randomization strata) by cohort fixed effects estimated using ordinary least squares. Ninety-seven percent in baseline survey sample frame were members of the randomization strata within the three main university campuses. Participants who were not part of the randomization strata are not included in the regression analyses. Categorical variables converted to binary variables as listed. Significance indicators: + $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

The Effects of a Comprehensive College Transition Program on Psychosocial Factors

Table 2

Participation in a Comprehensive College Transition Program and Psychosocial Outcomes, Combined Cohorts, First and Second Follow-Ups

	First Follow-Up (1)	Second Follow-up (2)
Sense of Belonging, Campus		
CCTP vs. COS	0.169* (0.082)	0.196* (0.088)
<i>Adj. R</i> ²	0.030	0.031
Mattering		
CCTP vs. COS	0.274*** (0.078)	0.294** (0.088)
<i>Adj. R</i> ²	0.055	0.038
Academic Self-Efficacy		
CCTP vs. COS	-0.090 (0.082)	0.003 (0.085)
<i>Adj. R</i> ²	0.030	0.043
Social Self-Efficacy		
CCTP vs. COS	0.089 (0.083)	0.237 (0.146)
<i>Adj. R</i> ²	0.000	0.026
<i>N</i>	578	578
Student Background Characteristics	Included	Included
Campus-by-Cohort Fixed Effects	Included	Included

Note. CCTP = Comprehensive College Transition Program Scholars; COS = College Opportunity Scholarship Scholars. Standard errors are in parenthesis. Each column within each panel represents separate analyses. The following covariates are included in both the treatment and the outcome equations: Female, student of color, at least one guardian earned a bachelor's, took ACT, ACT composite, high school GPA, expected family contribution, and an indicator for zero EFC. Randomization strata fixed effects included in all models. Missing background variable values were replaced with zeros and a dummy variable indicator were added for each background variable with missing values (ACT score for less than 1% of the sample). The sample excludes must-fund students, control students, and students who did not target a University of Nebraska campus in the scholarship application. Constructs calculated using Rasch rating scale models.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The Effects of a Comprehensive College Transition Program on Psychosocial Factors

Table 3

Participation in a Comprehensive College Transition Program and Psychosocial Outcomes
Augmented Inverse Probability Weighting, Combined Cohorts, First and Second Follow-Up

	First Follow-Up (1)	Second Follow-Up (2)
Sense of Belonging to Campus		
CCTP vs. COS	0.183* (0.076)	0.206* (0.081)
Mattering to Campus		
CCTP vs. COS	0.293*** (0.076)	0.308*** (0.090)
Academic Self-Efficacy		
CCTP vs. COS	-0.091 (0.080)	0.001 (0.084)
Social Self-Efficacy		
CCTP vs. COS	0.094 (0.080)	0.246 (0.138)
<i>N</i>	578	578

Note. Standard errors in parenthesis. CCTP = Comprehensive College Transition Program Scholars; COS = College Opportunity Scholarship Scholars. Standard errors are in parenthesis.

Each column within each panel represents separate analyses. The following covariates are included in both the treatment and the outcome equations: Female, student of color, at least one guardian earned a bachelor's, took ACT, ACT composite, high school GPA, expected family contribution, and an indicator for zero EFC. Randomization strata fixed effects included in all models. Missing background variable values were replaced with zeros and a dummy variable indicator were added for each background variable with missing values (ACT score for less than 1% of the sample). The sample excludes must-fund students, control students, students who did not target a University of Nebraska in the scholarship application, and students who did not respond to both follow-up surveys. Constructs are predicted using Rasch rating scale models.

* $p < .05$, ** $p < .01$, *** $p < .001$

The Effects of a Comprehensive College Transition Program on Psychosocial Factors

Table A.1

Study Samples from Original Funding Group Assignment to Initial through Second Follow-Up Surveys, Combined

Funding Group	Initial Frame ^a	Initial Frame/Original Assignment ^b	Initial Respondents/Initial Frame ^c	1FU Respondents/Initial Frame ^d	2FU Respondents/Initial Frame ^e	Initial, 1FU, 2FU Respondents/Initial Frame ^f
CCTP	666	99.70%	86.19%	77.03%	63.81%	53.90%
COS	382	100%	85.34%	76.70%	64.14%	53.40%
Total	1,048	99.81%	85.88%	76.91%	63.93%	53.72%

Note. CCTP = Comprehensive College Transition Program Scholars; COS = College Opportunity Scholarship Scholars. 1FU = First Follow-Up. 2FU = Second Follow-Up. Participants who targeted a state college or a community college are not included. Must-fund and control students are also not included.

^a The survey was sent to this initial number of students.

^b Percentage of students who were sent the survey out of the original randomization assignment.

^c Percentage of students who responded to the initial survey out of those who were sent the survey.

^d Percentage of students who responded to the 1FU survey out of those who were sent the survey.

^e Percentage of students who responded to the 2FU survey out of those who were sent the survey.

^f Percentage of students who responded to all waves of the survey over the initial survey sample frame.

The Effects of a Comprehensive College Transition Program on Psychosocial Factors

Table A.2

Decomposition of Survey Non-Response by Rates of Attrition Versus Dropout, 2015 Cohort

Funding Group	Baseline Survey Sample Frame	1FU Response Rate/Baseline Survey frame	8 month (Aug through April) Total Dropout Rate (1FU Survey Sample Frame)/(Baseline Survey Sample Frame)		1FU Attrition Dropout	1FU Attrition Survey Non-Response	2FU Response Rate	18 month Total Dropout Rate (2FU Survey Sample Frame)/(Baseline Survey Sample Frame)		2FU Attrition Survey Non-Response	
			8 month (Aug through April) Total Non-Response Rate (1FU Survey Sample Frame)/(Baseline Survey Sample Frame)	18 month Total Non-Response Rate (2FU Survey Sample Frame)/(Baseline Survey Sample Frame)							
CCTP	315	80%	4%	16%	22%	78%	69%	12%	19%	38%	62%
COS	190	74%	7%	19%	28%	72%	61%	26%	13%	67%	33%

Note. CCTP = Comprehensive College Transition Program Scholars; COS = College Opportunity Scholarship Scholars. FFU = First Follow-Up. 2FU = Second Follow-Up. Participants who targeted a state college or a community college are not included. Must-fund and control students are also not included.

Table A.3

Decomposition of Survey Non-Response by Rates of Attrition Versus Dropout, 2016 Cohort

Funding Group	Baseline Survey Sample Frame	1FU Response Rate/Baseline Survey frame	8 month (Aug through April) Total Dropout Rate (1FU Survey Sample Frame)/(Baseline Survey Sample Frame)		1FU Attrition Dropout	1FU Attrition Survey Non-Response	2FU Response Rate	18 month Total Dropout Rate (2FU Survey Sample Frame)/(Baseline Survey Sample Frame)		2FU Attrition Survey Non-Response	
			8 month (Aug through April) Total Non-Response Rate (1FU Survey Sample Frame)/(Baseline Survey Sample Frame)	18 month Total Non-Response Rate (2FU Survey Sample Frame)/(Baseline Survey Sample Frame)							
CCTP	307	74%	2%	24%	8%	92%	59%	16%	26%	38%	62%
COS	192	79%	3%	18%	12%	88%	67%	20%	13%	60%	40%

Note. CCTP = Comprehensive College Transition Program Scholars; COS = College Opportunity Scholarship Scholars. FFU = First Follow-Up. 2FU = Second Follow-Up. Participants who targeted a state college or a community college are not included. Must-fund and control students are also not included.

Figure 1

Theoretical Framework (Theory of Change)

