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Implementation and Impacts of Career-Focused Advising

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Implementation and Impacts of Career-Focused Advising

Abstract

Recent policies have expanded the availability of career-focused advising in high schools, including for students pursuing career and technical education (CTE) courses of study who might not have been adequately served by traditional college-focused advising. However, there is limited research on the effects of these policies. This study examines the implementation and impacts of career-focused advising in the context of North Carolina's career coaching program, which places community college staff on select high school campuses to provide guidance around career pathways and high school coursetaking that can prepare students for those pathways. Using descriptive analysis and interviews, we found that the program connected students with information about career opportunities as well as about the state's dual enrollment program, which can help students to get a jumpstart on earning a credential while still in high school. We used two quasi-experimental methods to analyze the impacts of the program. Our school-level event study analysis found that a school receiving a career coach increased the rate of participation in the dual enrollment program, on average, and may result in an increase in students intending to directly enter the workforce after high school and a decrease in four-year college enrollment. Our student-level propensity score-weighting analysis found that students who met with the career coaches took slightly more CTE dual enrollment courses in high school and were more likely to enroll at two-year colleges after high school than similar students who did not meet with a coach.

Introduction

High school students must navigate many complicated and consequential education and career decisions. These include how intensively to pursue college preparation courses and activities, whether to participate in career and technical education (CTE) opportunities, and which pathway to pursue after leaving high school: postsecondary education, directly entering the workforce, or an alternative route. Successfully navigating high school options and post-high school pathways depends in part on the formal and informal advising that students receive (Sattin-Bajaj et al., 2018; Mulhern, 2023). Understanding the extent to which students receive postsecondary and career advice, the mechanisms through which advice is offered, and the variation within and across contexts, is especially relevant for vulnerable student populations. There are marked, income-based differences in how students experience and navigate options after high school. Lower-income families have more limited access to information about post-high school options (Lareau, 2011), and they are more likely to rely on their high schools for information and to have their needs unmet (Sattin-Bajaj et al., 2018; Mulhern, 2023).

Much of the research on advising in high school has focused on college advising. Less is known about career-focused advising despite students from lower income and underrepresented racial/ethnic minority backgrounds being more likely than their peers to pursue career pathways rather than postsecondary education after high school (Reber & Smith, 2023). Survey results suggest that educators and policymakers are generally not confident that CTE students, for whom career-focused advising might be more directly relevant, are well served by their counseling and advising system (Advance CTE, 2018). Furthermore, little is known about advising specifically for CTE students and the research that does exist is outdated (Dougherty & Lombardi, 2016).

This study examines career- and CTE-related advising in the context of North Carolina's career coaching program. The career coaching program places community college staff on select high school campuses in North Carolina to work alongside existing advising staff to provide students guidance around career pathways and high school coursetaking that can prepare them for those pathways. We examine the implementation of this program and then evaluate how school-level patterns in CTE participation, postsecondary plans, and college enrollment change when schools receive a career coach. We also evaluate how meeting with a career coach is linked to student outcomes.

Our implementation study results indicate that career coaches supported students through a variety of activities including one-on-one advising, group presentations/workshops, and by facilitating opportunities for students to engage with college and community partners. Coaches aimed to reach as many students as possible, typically focusing on targeted postsecondary planning with juniors and seniors, and career awareness and exploration activities with younger students. Coaches' integration into school advising structures varied, impacting their access to resources to support students and their effectiveness. They collaborated extensively with teachers, especially CTE instructors, counselors, and others involved in college and career advising. Coaches also played a key role in advising students about courses and pathways offered through North Carolina's dual enrollment program, Career and College Promise (CCP), with their level of involvement ranging from raising awareness to providing logistical support.

Our impact analyses indicate that a school receiving a career coach increased participation rates in North Carolina's CTE dual enrollment pathway but did not substantially change the number of CTE courses taken via dual enrollment or traditional high school courses. We found suggestive evidence that receiving a coach increased the share of students who intended to enter employment after high school while decreasing the share of students who attended a four-year college. The impact of a school receiving a coach did not significantly impact two-year college enrollments. When looking specifically at students who met with the career coaches (typically during one-on-one meetings), we found that students who were already participating in dual enrollment prior to meeting with a coach went on to take and pass slightly more CTE courses, driven by an increase in dual enrollment CTE coursetaking, and that these students were more likely to enroll at two-year postsecondary institutions after high school. In the analysis of impacts on students who met with coaches, there was a negative impact on intentions to enroll at four-year colleges, but the impact on actual enrollments was not statistically significant.

Literature Review

This study builds on research that examines the role of high school college and career advising around students' postsecondary transition experiences. Counselors play an important role in helping students explore their interests and aspirations, develop a better understanding of their postsecondary options, and navigate the complex process of transitioning to college and the workforce. McDonough (2005) argued that increasing both the number of counselors as well as

the proportion of their time spent on postsecondary education advising would improve students' transition experiences. Numerous studies bear this out, indicating the importance of schools having a sufficient number of well-trained counselors with enough time devoted to delivering targeted college readiness and transition advising, which is positively associated with students' college preparedness and attendance rates (Bryan et al., 2011; Bryan et al., 2022; Hurwitz & Howell, 2014; Poynton & Lapan, 2017; Shi & Brown, 2020; Woods & Domina, 2014).

However, the advising literature highlights several challenges to providing such support to students, particularly in terms of counselor caseloads and time availability for postsecondary advising. In terms of caseloads, counselors often have caseloads that exceed the American School Counselor Association's (ASCA) recommended student-to-counselor ratio of 250:1. According to the National Association for College Admission Counseling (NACAC), the average student-to-counselor ratio for public high schools nationwide was 263:1, or 309:1 when limited to counselors with responsibilities for college advising (Clinedinst, 2019). Although high school student-to-counselor ratios are improving, 22 states still have student-to-counselor ratios that exceed 250:1 (Solberg et al., 2022). Further, schools with more low-income students and students from underrepresented racial/ethnic minority backgrounds tend to have less access to counselors (Gagnon & Mattingly, 2016).

In addition to caseload issues, counselors spend much less of their time on college and career advising relative to academic advising and support. For example, Clinedinst (2019), using an annual counseling trends survey, found that counselors spent most of their time on course scheduling and students' personal needs, but only 19% and 7% of their time on college admissions counseling or career counseling/job placements, respectively. Similarly, Radford et al. (2016), using data from the High School Longitudinal Study of 2009 (HSLS:2009), found that only about one-third of counselors reported that their school had a counselor whose primary responsibility was college selection and application support, and smaller shares reported having a counselor primarily responsible for helping students prepare for the workforce (18%) or workforce placements (9%). Further, two-thirds of counselors reported that career advising took up 10% or less of their department's time and 91% reported that job placement or job skills development took up 10% or less of their department's time. Finally, principal surveys from the same study indicated that helping students plan and prepare for work after high school was a low priority for their advising programs.

If counselors are spending less time, or placing less emphasis, on career counseling, this could lead to less focus on raising students' awareness about CTE or work-based learning opportunities. For example, in a survey of high school counselors who serve all (not just CTE) students, only 60% reported connecting students with CTE coursework and career pathways as a career advising and development strategy. Additionally, only 51% reported providing or facilitating work-based learning experiences for students. However, among those counselors who did report doing so, these strategies were rated as the most effective among all strategies that counselors use for career advising (Advance CTE, 2018). Improving counseling around CTE to promote equitable access to CTE programming may be important given the growing evidence of the positive impacts of CTE on high school and postsecondary outcomes (Bonilla, 2020; Brunner et al., 2023; Dougherty, 2016; Dougherty, 2018; Hemelt et al., 2019; Rosen et al., 2023).

Given the importance of advising and the challenges with existing counselor caseloads, one strategy to expand career advising and to promote CTE opportunities is funding additional positions with a primary focus on career advising or coaching. This approach is gaining ground in North Carolina through the Career Coaching program (Nachman et al., 2023). In the realm of higher education, the career coach role has grown out of a recognition that students need formal and proactive career advising, with industry support, to complement academic advising that is often more passive and focused on degree completion (see Tudor, 2018). The role of a career coach is not always clear, given that the term can cover a range of individuals with diverse backgrounds and training and there is not a widely accepted accreditation process for career coaches (Hatala & Hisey, 2011).

There is little research on career coaches, particularly on their impact. There is a recent study examining program implementation of North Carolina's Career Coaching program. Nachman et al. (2023) used coach interviews, focus groups, document reviews, and surveys to examine how the career coaches support students' college and career goals and development of career capital. Their findings highlight the important and unique role that career coaches play in building connections between students, colleges, and employers and their efforts to build trusting relationships with students and their families. Three themes emerged from their work. First, coaches were intentional in their efforts to form authentic connections with students and families to build trust and a foundation for their efforts to provide coaching around career and postsecondary opportunities. Second, coaches recognized the importance of understanding local

contexts as well as the unique needs of the students and families that they served. Third, coaches cultivated relationships with local employers to create opportunities for students to connect with career engagement activities. Career coaches used these activities to orient students to postsecondary options that aligned with local industry opportunities. One key takeaway from this work was that career coaches were distinct from other advisors in that they were well positioned to form relationships with community partners and support pathway opportunities for students without the same time constraints that other advisors experienced.

Our study furthers previous work in several ways. First, our implementation study builds on the work of Nachman et al. (2023) in a few dimensions: we consider which types of students coaches tend to work with and what factors drive student contact; we explore how career coaches navigate their roles as community college staff stationed at partner high schools particularly when roles and responsibilities overlap; and we shine a light on how high schools and colleges collaborate to support programs such as dual enrollment. Second, we provide the first rigorous impact study of North Carolina's coaching program on student outcomes, using both an event study design to consider the impacts of a school receiving a career coach as well as a propensity score weighting approach to analyze the impacts on students who met with the coaches.

Intervention: North Carolina's Career Coaching Program

Program Background

The North Carolina General Assembly established the Career Coaching program in 2015 (§ 115D-21.5). This program is implemented as a partnership between community colleges and school districts. The career coaches are community college staff who are placed in nearby high schools to assist students with determining their career goals and identifying educational pathways to achieve those goals. Career coaches frequently engage with students through one-on-one sessions to discuss career interests, raise awareness of exploration or immersion opportunities, and identify courses and pathways to support student interests. They also hold group advising sessions including presentations and information sessions with students, parents, and other stakeholders. Furthermore, coaches may promote engagement with local business or industry leaders and organizations to establish, modify, or support pathway opportunities to meet state and local workforce needs. Career coaches may also provide advising around Career and College Promise (CCP), North Carolina's dual enrollment program. Under CCP, students in

comprehensive high schools can enroll in one of two pathways: 1) the College Transfer pathway, which provides students with courses that lead to an associate degree or meet the general educational requirements of a four-year institution; or 2) the Career and Technical Education (CTE) dual enrollment pathway, under which students take community college courses that lead to technical credentials or workforce-based majors.

Local education agencies (LEAs) can apply for a career coach by partnering with a local community college to submit an application to a state advisory committee that includes representatives of the K-12 Department of Public Instruction, the North Carolina Community College System (NCCCS), the NC Department of Commerce, and the business community. Since there are limited funds for career coaches, the state advisory committee reviews applications and decides where to allocate the coaches.[2] Applications are evaluated based on the following criteria: 1) evidence of signed MOU between the community college and local school board; 2) evidence of matching funds (except for in the most distressed counties where there is no local matching funds requirement); 3) local workforce needs/targeting resources to enhance local economic activities; 4) professional development and deployment plan for career coaches; and 5) geographic diversity of awards. State funding for career coaches was $500,000 in the 2015-16 school year and had increased to $5.6 million by the 2021-22 school year.

Participation in the Career Coaching Program

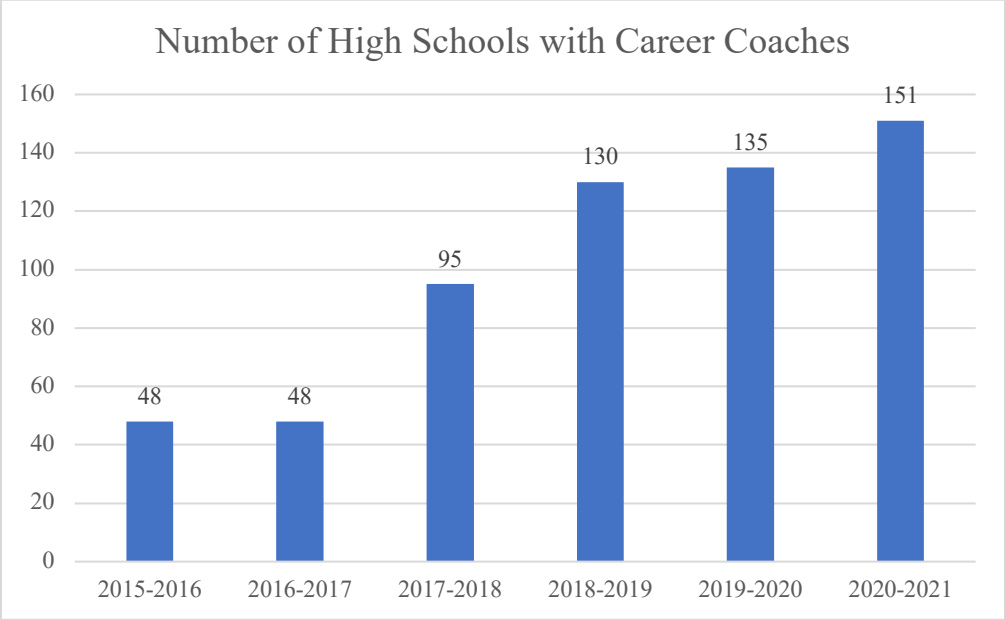
As of 2021-22, the state had awarded five cohorts of coaches. The first three cohorts each served in their schools for two school years. The two most recent cohorts we include in our analyses were slated to serve for three school years with the last cohort we include starting in 2020-2021 and scheduled to wrap up in the 2022-2023 school year. As of the 2020-21 school year, 160 comprehensive public high schools in North Carolina had received a career coach at some point, relative to 231 schools that had not.[3] Often, schools that received coaches in an earlier cohort were approved to continue to receive coaches for an additional two or three years

[2] Given the competitive selection process for receiving a career coach, we considered restricting the set of comparison schools in our school-level analyses to schools that applied to receive a career coach but did not. However, we opted not to pursue this approach because of inconsistent or incomplete data over the years on schools that applied but did not receive career coaches and because the pool of rejected applicant schools is not large and most that were rejected in one round of funding subsequently received funding in future rounds.

[3] We exclude 18 alternative schools, public charter schools, and Cooperative Innovative High Schools (CIHS) that received coaches from these counts and our analyses. We also exclude 11 schools that appeared to have treated students based on the individual-level coaching data but that were not included among the set of treated schools according to program records. Schools that were not open in 2020-2021 not included in these counts or tabulations.

in subsequent rounds of funding. Figure 1 plots the number of high schools served by career coaches over time from 2015-2016 through 2020-2021.

Figure 1. Number of High School with Career Coaches, by School Year



NOTE: There were five cohorts of coaches funded through 2020-2021. The first three cohorts were funded for two school years and the latest two for three school years. Schools were eligible to receive coaches in multiple cohorts.

Table 1 shows that schools with coaches were more likely to be in rural areas and small towns, less likely to be in cities, and about as likely to be in suburban areas, relative to schools never receiving coaches. Schools receiving coaches were about twice as likely to be in the most economically distressed counties (known as "tier 1" counties).[4]

[4] The North Carolina Department of Commerce classifies counties into three tiers based on their average unemployment rate, median household income, percentage growth in population, and adjusted property tax base per capita. Of North Carolina's 100 counties, 40 are designated as tier 1 (most distressed), 40 as tier 2, and 20 as tier 4 (least distressed). The tier designations are updated each year. The tabulations presented in Table 1 are based on the tier designations in effect for 2020 (the fall of the 2020-2021 school year).

Table 1. Locations of Schools Receiving and Not Receiving Career Coaches

	With Coaches	Without Coaches
Number of schools	160	231
Locale		
Large City	0.0%***	17.3%
Small or Medium City	10.6%	16.0%
Suburb	17.5%	16.9%
Town	15.6%	10.0%
Rural	56.3%**	39.8%
County Economic Tier		
Tier 1 (most disadvantaged)	40.6%***	20.8%
Tier 2	35.6%	41.1%
Tier 3 (most advantaged)	23.8%**	38.1%

NOTE: asterisks indicate whether schools with coaches are statistically different from schools without coaches; *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; reflects characteristics of schools as of the 2020-21 school year; excludes alternative schools, public charter schools, and Cooperative Innovative High Schools (CIHS); also excludes one school that received a career coach but closed prior to 2020-2021

In looking at the characteristics of the students in schools that did and did not receive career coaches,[5] we see that career coaches were more likely to be in schools with higher shares of economically disadvantaged students and Black and Hispanic students (Table 2). Participating schools also had students with slightly lower average exam scores than schools without coaches.

Table 2. Characteristics of Schools with and Without Career Coaches

	With Coaches	Without Coaches
Number of schools	160	191
Average School Characteristics		
Asian	1.2%**	2.5%
Black or African American	24.1%	22.3%
Hispanic	19.0%*	16.5%
White	49.9%	52.0%
Other race/ethnicity	5.9%	6.8%
Economically Disadvantaged	39.3%**	34.7%
Gifted/Talented Students	13.8%*	15.5%
English Language Learners	5.0%*	4.1%
8th grade Math Test Z-Scores	-0.06	0.02
8th grade Reading Test Z-Scores	-0.15***	-0.01
Enrollment	892*	1,015

NOTE: asterisks indicate whether schools with coaches are statistically different from schools without coaches; *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; reflects characteristics of schools as of the 2020-21 school year; excludes alternative schools, public charter schools, Cooperative Innovative High Schools (CIHS), and one school that received a career coach but closed prior to 2020-2021; this table also excludes 40 schools in large city locales.

[5] We exclude large city locale schools from this comparison because no high schools in large city locales had received career coaches as of 2020-2021.

In this paper, we look at both implementation and impacts. Because our implementation findings informed analytic decisions about how we examined impacts, we discuss them separately. We begin by describing the methods and findings from the implementation study. We then move to describing the methods and findings for the impact study.

Implementation Study

Methods

To explore coaching activities and student participation, we analyzed reports from individual coaches on the students with whom they met, starting with the 2019-20 school year, when coaches were first expected to provide details on the students with whom they interacted. This information included the number and types of contacts with the coach as well as each student's unique identifier, which we used to link students meeting with coaches to our statewide administrative dataset (described in more depth below).

To understand the implementation of the program and the types of supports provided by the coaches, we conducted interviews with 12 current career coaches as well as two former coaches who recently transitioned to leadership roles at their institutions. Coaches who participated in this study took part in either individual one-hour interviews or small focus groups (with 2-3 coaches). In these interviews and focus groups, coaches were asked about their background, how they prepared for their work, what activities they complete as part of their work, their approach to advising students, how they collaborate with other staff and community partners, and lessons learned from their work. Coaches were recruited for interviews with the support of program leaders who forwarded emails to the coach listserv. In terms of the coaches who participated, five were new (1-2 years), four were coaches for 3-4 years, and five had been coaching 4 or more years. Nine of the coaches primarily served a single school and five served multiple schools.

To analyze the interview data, we employed a combination of inductive and deductive coding. Initially, we developed codes based on our research questions and existing literature. Subsequently, we modified the codes based on the emerging themes identified from the data to develop a more comprehensive understanding of the coaches' experiences and insights.

Implementation Study Findings

Descriptive Evidence on Who Met with Coaches

Analyses conducted by NCCCS found that coaches provided more than 20,000 coaching sessions in 2019-20 and 2020-21 and hundreds of employer engagement activities (Table 3). The number of student coaching sessions ticked down in 2021-22 to just under 20,000.

Table 3. Number of Coaches, Coaching Visits, and Employer Engagement Activities

School Year	# Coaches	# Community Colleges	# LEAs	# Student Coaching Sessions	# Employer Engagement Activities
2019-20	72	34	49	24,422	399
2020-21	84.5	39	57	27,103	292
2021-22	84.5	40	57	19,899	460

SOURCE: North Carolina Community College System

Our own analysis of the student-level coaching records for 2019-2020 and 2020-2021 allowed us to descriptively analyze the characteristics of students who met with coaches and those who did not but could have (note: we did not receive student-level coaching data for the 2021-22 school year). Table 4 presents characteristics for two cohorts of 11th grade students at schools with coaches based on whether or not the students met with a coach or not in their junior or senior year of high school. Note that, based on the data available to us, the first cohort (2018-2019 11th graders) only could have had a documented meeting with a coach during their expected senior year in 2019-2020 while the second cohort of 11th graders (in 2019-2020) could have had a documented meeting with a coach in either their junior or senior year or both. According to the data, approximately one-quarter (27.7%) of students in these cohorts with access to a coach met on at least one occasion with the coach. Students who met with a coach were disproportionately white, higher achieving, and less likely to be economically disadvantaged than their counterparts not meeting with coaches. They took slightly more high school CTE courses in 10th grade, on average, than students who did not meet with a career coach.

Table 4. Characteristics of Students Meeting and Not Meeting with Coaches

	Met With Coach	No Coach Meeting
Number of students	13,127	34,270
Average Student Characteristics		
Asian	1.5%	1.3%
Black or African American	18.1%***	21.0%
Hispanic	14.6%***	16.8%
White	61.4%***	55.5%
Other race/ethnicity	4.4%***	5.5%
Economically Disadvantaged	40.7%***	47.5%
Gifted/Talented	20.0%***	14.8%
English Language Learner	3.1%***	4.8%
8th grade Math Test Z-Score	0.08***	-0.11
8th grade Reading Test Z-Score	0.09***	-0.12
# of HS CTE courses taken, grade 10	1.57***	1.53

NOTE: asterisks indicate whether students who met with coaches are statistically different from students who did not; *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; Reflects characteristics of cohorts of students entering 11th grade in 2018-2019 and 2019-2020 who attended schools with coaches in 2019-2020 or 2020-2021 and who could have met with those coaches in those two years for which student-level data on coaching sessions were available. Excludes students who attended alternative schools, public charter schools, and Cooperative Innovative High Schools (CIHS).

In interviews, all coaches reported working with students across grades 9-12. Coaches reported trying to work with as many students as possible. Coaches reported both actively seeking out students for career coaching and meeting with students based on staff referrals and school needs. Although coaches reported working with students across the academic spectrum, several coaches reported working specifically with students with lower GPAs, students who did not know what they wanted to do, or students whom staff felt were less engaged in school and may benefit from learning more about CTE opportunities. As one coach put it, "I will work with any student that I need to, or I'm asked to. Typically, students are referred to me by the counselors, especially if they lack direction."

In schools where coaches felt more integrated into the school setting, coaches reported collaborating with teachers, counselors, college liaisons, and career development coordinators (who also provide career development supports to students) to identify students for support. As one coach described,

> I collaborate a great deal with the guidance counselors and also with the career development coordinators. The career development coordinator is one of my main contacts. I collaborate quite a bit with the career and technical education staff at the high school because we try to work with programs that they have at the high school that may have a counterpart at the college so the students could see the connection and starting on that. I would collaborate with the general faculty, English, math, and science.

In schools where coaches felt less integrated into the advising culture, student interactions were typically driven by individual relationships, such as receptive teachers inviting coaches into their classrooms or referring students to the coach.

Given NCCCS' role in operating the career coaching program, we also explored whether students meeting with coaches were more likely to participate in North Carolina's dual enrollment program, Career and College Promise (CCP), typically entailing enrollment in NCCCS coursework in high school through participation in one or more dual enrollment pathways. Of students in the two cohorts of 11th graders for which we present information in Table 4, we found that 62% of students who met with an NCCCS career coach participated in dual enrollment in high school versus just 24% of students who did not meet with a career coach.

Importantly, our analyses found that students who met with a career coach often were already enrolled in one or more dual enrollment courses prior to meeting with a career coach. Specifically, 54% of the 2018-19 cohort of 11th graders who met with a coach were in a CCP course prior to their first documented coaching session. Among 2019-2020 11th graders, 51% of students receiving coaching were in CCP prior to their first documented coaching session.[6]

The fact that dual enrollment students were more likely to receive coaching likely accounts for the disconnect between our qualitative data—where coaches discussed meeting with students who might need it the most—and our quantitative data, which indicates that students meeting with coaches had higher academic performance and were less likely to be economically disadvantaged. Other research has found that students taking dual enrollment courses are more likely to be female and white and less likely to be economically disadvantaged (Xu, Solanki, and Fink, 2021; Miller et al., 2017).

Coaching Activities

The interviews provided an overview of the activities that coaches completed with their students.[7] Career coaches wore many hats and were involved in a variety of activities, including but not limited to: one-on-one student advising, group discussions and presentations,

[6] Among students who ever participated in the CCP dual enrollment program in high school, the shares with a first documented meeting with a coach after they were already participating in dual enrollment were even higher: 88 percent of the 2018-19 cohort of 11th graders who ever participated in CCP and ever met with a coach and 77 percent of the 2019-20 cohort of 11th graders.

[7] Information from the coaching reports also provided data on activities, although the completeness of the information varied by coach. Future research will mine these reports in more depth.

administering career assessments and interest inventories, organizing college and job tours or fairs, facilitating workshops, supporting work-based learning opportunities, organizing or participating in family engagement events, and collaborating with local business and industry partners to create career-related opportunities for students.

Coaches spent much of their time in one-on-one or small group coaching sessions with students to discuss their career interests, goals, and plans. In these meetings, the coaches prioritized getting to know the students, building relationships, and most importantly, making students' career interests, goals, and plans central to the discussion. Several coaches discussed the importance of meeting students where they were and providing coaching that was tailored to each student's needs. For example, for students who were unsure about their futures, coaching sessions focused on exploring interests, discussing goals, and raising awareness about career possibilities. For students who were more certain of their career interests or plans, coaching sessions focused on making sure students received information and supports about specific opportunities and pathways related to their chosen field. This included helping students find information about colleges or vocational programs, and assisting with applications, financial aid, resumes, interviews, and job searches.

Coaches also reported spending much of their time conducting group sessions and workshops on various topics related to career planning and postsecondary education such as completing college applications, writing resumes, exploring scholarships and financial aid, and exploring career opportunities. These sessions often occurred in the form of classroom presentations on career-related topics or to promote CTE or College Transfer pathway dual enrollment opportunities, but coaches also reported conducting larger sessions such as grade- or school-wide assemblies or sessions at family nights or community events.

Many coaches reported working closely with CTE teachers to do classroom visits either at the request of the teacher or by the coach reaching out and offering presentations or workshops relevant to the CTE curriculum. English classrooms were also a common setting for career coaches, where they often reported conducting workshops on career and college planning or helping with specific activities such as resume writing. As one coach shared, "It actually turns out that a lot of the English teachers are more apt to let me in the doors to present and do workshops than a lot of other classes…The English teachers let me come in, talk about resumes, talk about college. Of course, the CTE teachers do too." Coaches also discussed visiting

specialized classes where topics were tailored to the subject area and the teacher's needs or students' interests, such as a presentation in a career management class on career planning or a presentation in a financial management class on college financial aid applications and student loans. A few coaches mentioned avoiding presentations in core classes, unless requested.

A core aspect of the career coaching work included advising about dual enrollment. Consistent with our quantitative descriptive findings highlighted earlier, all coaches reported some level of involvement in advising students about the CCP dual enrollment program. This happened both through one-on-one advising sessions and through presentations about CCP given the coaches' role in advising students about postsecondary program options in general and their status as community college employees. However, the nature of their involvement in advising students about CCP varied. For example, some career coaches were more heavily involved in logistically supporting CCP by helping students to complete applications and enroll in CCP classes as well as monitoring students currently taking dual enrollment courses. This was more typically the case in schools with less administrative support for CCP, such as having fewer CCP liaisons from the community college or limited availability of these liaisons. These coaches were often seen, and in some cases saw themselves as, the primary contact or liaison for CCP at their community college. However, other coaches were less involved in the logistics of the CCP program, focusing more on raising awareness and encouraging students to consider CCP as an option and referring students to the appropriate advisors for enrollment and next steps.

Most coaches reported being more directly involved with CCP during enrollment periods when students were making coursework decisions. Most coaches preferred to advise students about CCP more holistically and as part of a broader conversation rather than in an administrative capacity. For example one coach said:

> I think my number one job duty is to help each student develop a career and academic plan by the time they graduate. And so that's my main focus. I do help students with selecting courses that achieve that goal. So, I am a part of some of CCP as far as advising and registration. But my main goal is to help the students figure out exactly what are their career goals and what are their academic goals, and how can I help them achieve those goals, either taking high school classes or CTE classes or even those college courses to help achieve that.

A second coach in a different school stressed that it was critical that students saw the connection between dual enrollment and their career goals:

> I actually career coach all of my CCP students. So when they come to me talking about classes, I'm like, "Okay, why do you want to take this class? How is it going to contribute to your career? What are you thinking about? I don't want you just taking random classes, wasting your time."

Integration of Coaches into the School Setting

Career coaches were in a unique position relative to other advising staff in that they were employees of the community college but spent most of their time in their assigned high schools. Coaches reported that their level of integration into the school's staff and culture varied significantly. In some schools, coaches were treated as integral members of the advising staff, while in others, they were seen as external or somewhat of a guest in the school. For example, one coach described being an integral part of the school, sharing,

> My relationship with [school staff] is very close. I'm treated like a staff member. I'm treated like I am employed by them, even though I'm not. I mean, I got a staff T-shirt this year. I'm on the phone directory. I got a staff handbook… I have an office, which I'm lucky, because I learned [from other coaches] that not everybody does. Some people are just stationed in a corner…I have PowerSchool [student information system] access, which apparently is something that not a lot of people have.

When coaches were more integrated into the advising culture, they reported being more effective implementing joint initiatives or addressing advising gaps. In schools where they were less integrated, coaches reported facing difficulties in establishing productive working relationships. This level of integration not only impacted their ability to work effectively with and be accepted by both students and staff, but it also impacted their access to things like office space, technology, and student information systems.

Two related features seemed to drive this level of integration and access: support from the administration and familiarity with the program. In schools where the coaches reported that administrators understood and valued the role of the career coaches, coaches were more likely to report having access to resources, supports, and collaborative opportunities. Conversely, coaches noted that a lack of support or understanding from administration resulted in coaches initially spending more time self-advocating and building relationships and less time supporting students. More veteran coaches reported that, as familiarity with the program and the role of the career coaches grew, staff became more accepting and relied more heavily on the coaches to support the advising program. Several new career coaches reported benefiting from stepping into roles

previously occupied by their predecessors, as previous coaches had effectively blazed the trail, establishing familiarity and acceptance among school staff that significantly eased the transition for their successors.

Implications for the Impact Study

The findings from the implementation study have several key implications for the impact study. First, our analyses showed that the students who interacted directly with career coaches had different characteristics, on average, than students who did not interact with the coaches. This means that we needed to design our analyses to take that into account.

Second, the analyses showed that coaches do both group and one-on-one coaching. This suggests that coaches could have an impact at the school level and at the individual level. As a result, we conducted two different sets of impact analyses—one focusing on the impact of having a coach at the school level and the second on the impact of having a coach on the students who were recorded as meeting directly with a coach.

Third, the analyses showed that students who enrolled in dual enrollment then sought out or were directed to career coaches. An important implication of these findings for our student-level analyses of coaching is that we were unable to consider dual enrollment participation through CCP as an outcome of the coaching since it often preceded the receipt of coaching. Additionally, it was critical to account for CCP participation in identifying the student-level treatment-comparison contrast because of the apparent close link between CCP participation and receipt of the coaching treatment.

Impact Study

Data and Methods

As noted above, we used two different approaches to examine the impact of the program: a school-level event study analysis and a student-level propensity score weighting analysis.

Data

Our state-level administrative data came from the North Carolina Department of Public Instruction (including demographics, transcript data, CTE coursetaking, achievement data, high school graduation data), the University of North Carolina System (enrollment, transcript, and degree attainment data), and NCCCS (enrollment, transcript, and degree/credential attainment data). We also linked the dataset to National Student Clearinghouse data to provide line-of-sight to postsecondary enrollments nationwide.

NCCCS provided us with records of which high schools received career coaches in which years, which we used to develop school-by-year treatment flags. Student-level data from NCCCS for 2019-20 and 2020-21 indicated which students met with career coaches (typically via one-on-one meetings) in those two school years. We verified that the students in the student-level coaching data were enrolled in treated schools based on their school recorded in the high school data and removed from the analysis anyone who was not recorded as enrolled at a treated school.

Our sample for the school-level analysis included nine cohorts of 11th graders, with the first cohort entering 11th grade in 2011-12 and the last cohort entering 11th grade in 2019-20. We followed these students through their first year after high school, including postsecondary enrollments through 2021-22.[8] We excluded students who attended Cooperative Innovative High Schools (CIHS), charter schools, or alternative schools in their 11th grade year from the analysis because career coaches only rarely served these schools. We also excluded students who attended schools in large city locales in 11th grade because no such schools had received career coaches by 2020-2021. In total, this sample included approximately 691,500 students.

These students were distributed across 371 schools that served 11th grade students over the analysis period. Of these schools, 161 received a career coach at some point from 2015-16 through 2020-21 (when 2019-20 11th graders would be in 12th grade), one of which closed prior to 2020-21. The year these schools first received coaches varied: 45 received a coach for the first time in 2015-16, 44 in 2017-18, 34 in 2018-19, 11 in 2019-20, and 27 in 2020-21. This left 210 schools contributing cohorts of 11th grade students to the analysis that never received a coach over this period, 23 of which closed prior to the 2020-21 school year.[9]

Our student-level model was restricted to just two cohorts of 11th graders, those entering 11th grade in 2018-19 and 2019-20, for whom we could observe student-level coaching records. Again, we excluded students at CIHS, charters, alternative schools, and large city schools. We note upfront that the late high school experiences of the two cohorts in our student-level analysis

[8] Although we identify students in 11th grade cohorts, they could have received a coach at any point in 11th or 12th grade and some may also have had access to a coach in 10th grade or earlier.

[9] We note that this count of 210 schools that never received coaches with students in the school-level analyses differs from the count of 191 schools never receiving coaches in Table 2 for several reasons. First, schools might have closed prior to 2020-2021 (the year presented in Table 2), or they might have opened in 2020-2021, meaning that they did not have any cohorts of 11th grade students (in 11th grade in 2019-2020 or prior) able to be included in the school-level analyses. Second, schools could shift from "regular" to "alternative" schools or their locale designation could shift to "large city" by 2020-2021, which results in students in earlier cohorts (when their schools met inclusion criteria) being included in the analyses but their schools being excluded from the descriptive analyses of school-level characteristics shown in Table 2 because they did not meet inclusion criteria in 2020-2021.

were affected by the COVID-19 pandemic. As such, their experiences with career coaches as well as the impacts of coaching may differ from students in earlier or more recent cohorts.

Analytic Methods

We first describe our school-level event study modeling approach and then our student-level propensity score weighting approach.

School-level Model. We used a difference-in-differences model to identify the effects of receiving a career coach at the high school level. For this model, we defined the initial treatment year as the first year in which a school received a career coach. We defined fully treated students as 11th graders at a school in a year when there was a career coach who also were at a school with a career coach in 10th and/or 12th grade (most typically, at the same school). Thus, fully treated students must have been exposed to a career coach for at least two school years. We considered students who were in 12th grade when the coach arrived to be partially treated.

The comparison group consisted of students i) in the treated schools in the years before the career coach arrived and ii) in schools that had never received a career coach by the end of our study period in 2020-2021. Table 5 presents the characteristics and outcomes of the sample of students in the school-level analysis overall as well as separately by whether the student was in a school that ever or never had a coach. We describe how we constructed these outcomes in the "Outcomes" section below.

Table 5. Sample Characteristics for Event Study Models

	Students at All Schools (1)	Students at Schools That Ever Had a Career Coach (2)	Students at Schools That Never Had a Career Coach (3)	Pooled Standard Deviation (4)
Student Baseline Characteristics				
8th Grade Math Test Score	0.07	-0.01***	0.13	0.945
8th Grade Reading Test Score	0.06	-0.01***	0.11	0.950
Female	49.3%	49.2%	49.3%	0.500
Asian	2.4%	1.3%***	3.1%	0.152
Black	22.9%	23.1%**	22.8%	0.420
Hispanic	12.1%	13.0%***	11.4%	0.326
White	55.9%	56.7%***	55.3%	0.497
Economically Disadvantaged	43.3%	48.4%***	39.4%	0.495
English Language Learner	2.9%	3.0%***	2.8%	0.167
Gifted	18.2%	16.1%***	19.7%	0.385
Student Outcomes				
Dual Enrollment Participant	22.2%	26.5%***	19.0%	0.416
College Transfer Dual Enrollment Participant	13.1%	14.8%***	11.8%	0.338
CTE Dual Enrollment Participant	12.2%	15.2%***	10.0%	0.328
Grades 11-12 All CTE Courses	2.66	2.93***	2.45	2.114
Grades 11-12 CTE Courses Passed	2.50	2.76***	2.31	2.045
Grades 11-12 Dual Enrollment CTE Courses	0.29	0.40***	0.21	1.070
Grades 11-12 High School CTE Courses	2.36	2.54***	2.24	1.870
Weighted Final GPA	3.14	3.08***	3.19	0.961
High School Dropout	1.6%	1.7%***	1.5%	0.125
High School Graduate	94.3%	93.8%***	94.7%	0.232
Enroll in College Within 1 Year	59.2%	56.0%***	61.6%	0.491
Enroll in 2-Year College Within 1 Year	27.3%	29.2%***	25.9%	0.446
Enroll in 4-Year College Within 1 Year	34.0%	28.8%***	37.9%	0.474
Earned Postsecondary Certificate in High School	1.1%	1.7%***	0.7%	0.106
Earned Associate Degree in High School	0.2%	0.3%***	0.1%	0.043
Intend to Enroll at 2-Year College	38.5%	43.5%***	34.7%	0.487
Intend to Enroll at 4-Year College	43.3%	36.9%***	48.1%	0.495
Intend to Go Directly into Employment	11.6%	12.9%***	10.6%	0.320
Intend to Enlist in Military	4.5%	4.7%***	4.3%	0.207
Number of Students	684,883	293,751	391,132	
Number of Schools	371	161	210	

NOTE: This table shows the average characteristics of students in our sample and their outcomes. Column (1) is based on the full sample. Column (2) is based on students in a school that ever had a career coach

during our study period. Column (3) is based on students in a school that never had a career coach in our study period. Math and reading test scores are z-scores from the state's 8th grade tests. The stars in column two are from a t-test for whether the difference between the values in columns two and three are statistically significant. *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$. The standard deviations for the full sample are in column 4.

We used school fixed effects to compare treatment students to students in the same school in earlier years to account for differences in the types of schools which were more likely to receive a coach. We also used time fixed effects and the students in the schools that never received a coach to account for changes over time that would be expected in the treatment schools even if they had not received a career coach. Pre- and post-treatment years varied across schools because the program funds were distributed in cycles. This variation in treatment timing allowed us to control for calendar time effects and account for statewide changes over time in our outcomes.

This type of model can identify the causal effects of being in a school that received a career coach as long as there were no other changes that happened at schools at the same time they received a coach and as long as changes over time would have been the same in the treatment schools as in the comparison schools in the absence of the career coaches. Thus, these models measure how the outcomes changed in the years after a school got a career coach relative to the expected outcomes based on pre-treatment trends and time-invariant school characteristics.

Traditional two-way fixed effects (or difference-in-differences) methods can yield biased estimates if treatment effects vary across cohorts. Since our sample includes two cohorts of students who were treated during the COVID-19 pandemic, and the career coaching model may have been implemented differently in the pandemic years than in other years, we anticipate some variation in treatment effects over time. Thus, we employ the new empirical model by Borusyak et al. (2021).[10] This model involves a two-step estimation procedure.

First, we estimated school and calendar time fixed effects (α_s and α_t) using the untreated observations (i.e., individuals in schools without a career coach). This includes students in schools that never received a coach as well as students in a treated school before the coach arrived. Students in never treated schools are used to identify the calendar time fixed effects, since they provide information about how patterns were likely to have evolved due to other changes over time. Students in the treated schools in the years before the coach arrived are used to construct the school fixed effects, so that we can account for differences in the types of

[10] In the appendix, we also show robustness to the model from Callaway and Sant'Anna (2021). This is another common approach for dealing with limitations to traditional two way fixed effects estimators.

schools that received coaches. In equation (1), $Y_{it}(0)$ is the outcome of interest for students in the untreated group, β_0 is the intercept, capturing the average level of the outcome among the untreated group, and ϵ_{it} is the error term.

$$Y_{it}(0) = \beta_0 + \alpha_s + \alpha_t + \epsilon_{it} \quad (1)$$

School fixed effects, $\widehat{\alpha_s}$, control for time-invariant differences across schools in their outcomes and account for differences in which types of schools may be more or less likely to receive a career coach. Calendar time fixed effects, $\widehat{\alpha_t}$, control for trends over time in the outcomes (e.g., declines in college attendance).

Second, we used these fixed effects estimates to obtain an estimated treatment effect for the treated students. We did not include control variables in our main model because recent work cautions against including time-varying covariates since they can bias estimates in two-way fixed effects or difference-in-differences models (Sant'Anna & Zhao, 2020). In our full sample, we subtracted the estimated fixed effects from the observed outcome of interest, Y_{it}, to obtain treatment effect estimates $\widehat{\tau_{it}}$ as shown in equation (2):

$$\widehat{\tau_{it}} = Y_{it} - \widehat{\alpha_s} - \widehat{\alpha_t} - \widehat{\beta_0} \quad (2)$$

We estimated average treatment effects (ATEs) across the overall sample by taking weighted averages of these treatment effect estimates $\widehat{\tau_{it}}$, as in equation (3):

$$\widehat{\tau_w} * = \sum_{it} w_{it} \widehat{\tau_{it}} \quad (3)$$

Then $\widehat{\tau_w}*$ is our estimate of the average treatment effect of being in a school with a career coach where $w_{it} = 1/N_1$. We fit models based on three pre-treatment years and four post-treatment years. Treatment is defined as an absorbing state, so once a school is characterized as treated, it is always considered treated. Our figures show effects separately for each time period (e.g., the first year with a coach versus the third year with a coach) and our tables present estimates based on the average treatment effect in the four years after the coach arrives. There are a few schools that do not have coaches four years after the initial coaches arrived, but we include these schools in the treatment estimates because there could be residual impacts of coaching even at schools that did not continue to receive coaches beyond the initial two- to three-year funded period.[11]

[11] In total, of the students in our school-level analysis, fewer than 200 students across nine schools attended schools that had previously received coaches but did not themselves attend the school in a year when it had a coach.

These models rely on the important parallel trends assumption. This assumption requires that treated and comparison schools have parallel trends in the relevant outcome prior to the arrival of the coach so that any divergence in outcomes after a coaches' arrival is attributable to the causal effect of the coach. To check the validity of this assumption in our analysis, we present graphical evidence examining pre-treatment trends in outcomes of interest along with p-values from the Wald test of whether the trend in the pre-period is significantly different from zero. For some outcomes, the assumption of no pre-trends does not appear to have been satisfied. Readers should use caution when interpreting those results. For some outcomes, the assumption of no pre-trends does not appear to have been satisfied. Readers should use caution when interpreting those results.

Student-level Model. We use a propensity score weighting approach to analyze the impacts on students of meeting with a career coach on at least one occasion. Establishing an appropriate treatment-comparison contrast is essential to implementing this quasi-experimental approach. As described above, we know that students who met with career coaches were more likely to participate in the CCP dual enrollment program in high school. Furthermore, we know that they typically met with a coach after they were already enrolled in dual enrollment coursework. Given this finding and the close connection between the career coaching program and CCP, we determined we needed to account for CCP participation in setting up the student-level impact analysis.

We explored various approaches and achieved the best balance on baseline observable student and school characteristics between the treatment and comparison groups when focusing on a subset of students who had already participated in dual enrollment as of fall of 12th grade—with treatment students first having a documented meeting with a coach in the 12th grade fall semester and comparison students never meeting with coaches. Notably, the fall semester of 12th grade was the most common semester to have a first documented meeting with a coach, which means that this approach to bounding the sample preserves a larger portion of the treatment group of coached students than had we used an alternative point in high school to differentiate between the pre-treatment and post-treatment periods.

We limited the pool of comparison students to students who attended schools that never received coaches. This is because there could be systematic, unobservable differences between students who met with career coaches at schools that had those coaches and students who

attended the same schools but did not meet with career coaches. As in our school-level model, we excluded students who attended charter schools, alternative schools, CIHS, and schools in large city locales from both the treatment and comparison groups because of the infrequency with which those types of schools received career coaches.

Having defined our treatment and comparison groups, we next constructed propensity score weights for the comparison group such that it resembled the treatment group on average on observable baseline characteristics. The first stage in the weighting process was the estimation of propensity scores using generalized boosted modeling (GBM; McCaffrey et al., 2013). GBM combines boosting (i.e., iterations) and regression trees (which partition the dataset into numerous regions based on the covariate values). GBM is data adaptive and nonparametric; it automatically selects which covariates should be included and the best functional form by using many piecewise functions of the covariates and testing all possible interactions to achieve the best balance between the treatment and comparison units.

We implemented GBM using a rich set of student- and school-level covariates. Student-level baseline covariates included gender, race/ethnicity, age, gifted status, disability status, economically disadvantaged status, English Language Learner status, absences in baseline years, suspensions in the baseline year, 8th grade reading and math scores, high school end-of-course exam scores taken prior to 12th grade, advanced courses taken prior to 12th grade, high school CTE courses taken prior to 12th grade, and an indicator for student mobility. We also included measures of dual enrollment credits earned (overall and CTE credits) through grade 11 as well as measures of dual enrollment credits attempted (overall and CTE credits) in the fall of grade 12 (in which the students would have enrolled prior to meeting with a career coach). School-level covariates included a binary indicator for "urbanized area" locale (small/medium city or suburb versus rural or town), county economic development tier (from the North Carolina Department of Commerce), total school enrollment, school-level averages of student-level covariates including race/ethnicity, and baseline school-level averages for on-time graduation and rates of student enrollment post high school in two-year and four-year postsecondary institutions. We used the *Twang* package in Stata (Cefalu et al., 2015) to implement GBM.

The GBM procedure yielded treatment and (weighted) comparison groups that meet federal standards for baseline equivalence (What Works Clearinghouse, 2022). All weighted

standardized effect size differences were less than 0.25 standard deviations, and most were less than 0.10 standard deviations; we present a selection of these measures in Table 6.[12]

Table 6. Baseline Characteristics of Treatment and Comparison Groups

	Unweighted Comparison Mean (N=21,253)	Weighted Comparison Mean (N=21,253)	Treatment Mean (N=3,334)	Weighted Standard-ized Effect Size
Female	61.3%	62.6%	59.4%	-0.07
White	66.9%	69.6%	70.7%	0.03
Black	13.3%	11.6%	11.7%	0.00
Hispanic	10.8%	11.4%	11.5%	0.01
Other Race (Not Hispanic)	9.1%	7.5%	6.0%	-0.06
Age	17.24	17.25	17.25	0.02
Gifted	30.3%	29.0%	29.2%	0.00
Disability status	2.5%	2.7%	3.4%	0.04
Economic disadvantage	24.9%	27.4%	30.8%	0.08
ELL	0.9%	0.9%	1.3%	0.04
Absences	8.03	8.14	7.38	-0.10
Ever out-of-school suspended	2.6%	2.6%	2.6%	0.00
Ever in-school suspended	4.5%	4.7%	5.6%	0.04
8th grade math	0.55	0.48	0.45	-0.05
8th grade reading	0.50	0.45	0.40	-0.06
Unweighted GPA	3.43	3.42	3.40	-0.03
# of Honors courses	4.36	4.37	4.23	-0.05
# of AP courses	1.05	0.85	0.71	-0.11
# of High school CTE courses	0.99	1.04	1.04	0.00
# of CTE DE credits attempted (fall 12th grade)	1.35	1.48	1.80	0.11
# of All DE credits attempted (fall 12th grade)	5.95	6.01	6.61	0.12
# of CTE DE credits earned (11th grade)	0.91	0.88	1.33	0.14
# of All DE credits earned (11th grade)	4.54	4.46	4.81	0.06

NOTE: all students in the analysis had enrolled in at least one dual enrollment course by the fall of 12th grade; treatment students had a first documented meeting with a career coach in the fall of 12th grade while comparison students attended schools that never received career coaches; excludes students who attended schools in large city locales, alternative schools, public charter schools, and Cooperative Innovative High Schools (CIHS) in 12th grade; unless otherwise notes the measures presented reflect characteristics as of students' 11th grade year, including coursetaking in 11th grade and cumulative unweighted GPA through 11th grade; baseline equivalence statistics for additional student- and school-level covariates included in the propensity score weighting and impact estimation models available upon request to the authors.

[12] For brevity, we present a selection of student-level covariates in Table 1, omitting from the table school-level covariates, student-level coursetaking and absences measures from 9th and 10th grades, student achievement on high school end-of-course exams, and a selection of additional student-level measures. Baseline equivalence for all measures is available upon request to the authors. As described in the text, weighted standardized effect size differences were less than 0.25 standard deviations for all student- and school-level covariates included in our primary analysis reported in the body of the paper.

The propensity score-based weights were then used to weight the following model to estimate the impact of participating in the coaching program:

$$Y_{ij} = \beta_0 + \beta_1 Trt_{ij} + \boldsymbol{\beta_2 X_{ij}} + \boldsymbol{\beta_3 Z_j} + \varepsilon_{ij} \qquad (4)$$

where Y_{ij} is the outcome for student *i* in school *j*; Trt_{ij} is participation status of student *i* in the career coaching program; $\boldsymbol{X_{ij}}$ is the vector of student-level covariates; $\boldsymbol{Z_j}$ is the vector of school-level covariates; and ε_{ij} is the usual student-level residual. We clustered standard errors at the high school level to account for the clustering of students within schools.[13] We also controlled for all variables that were used in the estimation of propensity scores as covariates, which is referred to as "doubly robust modeling" (Bang & Robins, 2005). We used multiple stochastic imputation to address missing covariate values, computing ten imputed values for each missing covariate.[14] We did not impute outcome values.

To assess differential treatment impacts by subgroup for selected outcomes, we used an interaction model, interacting treatment assignment with an indicator for each subgroup. We considered the following three sets of mutually exclusive demographic or socioeconomic subgroups: male versus female students, white non-Hispanic students versus students in other racial or ethnic groups, and economically disadvantaged students (typically receiving free or reduced-price lunch) and not economically disadvantaged students. We also considered whether impacts varied based on whether or not students had taken a CTE course in 11th grade.

To explore the role of dual enrollment coursetaking as a mediator of coaches' impacts on postsecondary enrollment and intentions outcomes, we used the *mediate* package in Stata. This allowed us to decompose the total effect of participating in career coaching on postsecondary outcomes into a direct effect of the coaching and an indirect effect of the program based on its impact on college credits earned through dual enrollment coursetaking in the spring of students' 12th grade year (after they met with a career coach). We explored dual enrollment credits earned (overall and CTE) as mediators of two-year postsecondary intentions and enrollments.

In the Appendix, we display results from three alternative approaches we took to defining the treatment and comparison groups for the student-level analysis. One was to include both CCP and non-CCP students (as of fall of 12th grade) in the analysis and to include baseline CCP

[13] We also ran models that clustered standard errors at the high school by cohort level as a robustness check and our statistical inferences were unchanged.

[14] We excluded students missing baseline measures of GPA or economic disadvantage from our analyses. We note that we did not need to impute race/ethnicity data for any students in our analyses.

participation as a covariate in the propensity score weighting approach. The second was to replicate the analysis focused on CCP students presented in the main text but using the fall of 11th grade as the dividing line between the pre- and post-treatment period; specifically, we restricted to CCP students by the fall of 11th grade and considered treatment students to be those first meeting with a coach in the fall of 11th grade and comparison students to be those attending schools that never received coaches. The third was to weight on CCP participation by the fall of 11th grade and to include both CCP and non-CCP students in the treatment (first meeting with a coach in the fall of 11th grade) and comparison (attended schools without coaches) groups.

These alternative approaches yielded acceptable balance on baseline student-level covariates. However, in the case of the samples that included CCP and non-CCP students, we needed to remove school-level covariates from the propensity score weighting to do so, making those versions not doubly robust with respect to school-level factors (only included as covariates in the impact estimation). However, these approaches enabled us to look at how meeting with a career coach is related to subsequent CCP participation. The Appendix includes tables with covariate balance between treatment and comparison groups and results for these samples, which broadly align with those presented in the main text in the "Student Level Results" section below.

Outcomes

We examined the following set of outcomes. Their construction varied slightly across the student- and school-level models including due to differences in the timing of identifying the treatment. Moreover, not all outcomes were examined for the student-level model. Specifically, we did not consider binary measures of dual enrollment pathway participation as outcomes in the student-level model because of the likelihood that participating in dual enrollment preceded receiving coaching. The student-level model also restricted its analysis of coursetaking to courses taken and passed in the spring of 12th grade, the only semester of enrollment that could have been influenced by meeting with a career coach for the first time in the fall of 12th grade.

Outcomes Analyzed in Both School- and Student-Level Models. The following outcomes were analyzed with both models.

- Number of *CTE courses passed* was the total number of CTE courses passed in grades 11 and 12 for the school-level model and in the spring of grade 12 for the student-level model. This included both dual enrollment CTE and high school CTE courses.

- Number of *CTE courses taken* was the total number of CTE courses taken in grades 11 and 12 for the school-level model and in the spring of grade 12 for the student-level model. This included both dual enrollment CTE and high school CTE courses.
- Number of *high school CTE courses taken* was the total number of high school CTE courses (outside the dual enrollment program) taken in grades 11 and 12 for the school-level model and in the spring of grade 12 for the student-level model.
- Number of *CTE dual enrollment courses taken* was the total number of CTE dual enrollment courses taken in grades 11 and 12 for the school-level model and in the spring of grade 12 for the student-level model.
- *Weighted GPA* was students' final cumulative weighted high school GPA.
- *High school dropout* was an indicator for whether the student dropped out of high school.
- *Graduate high school in four years* was an indicator for whether the student graduated high school within four years.
- *Attend any college* was an indicator for whether the student showed up in the data as having attended a college within one year of graduating high school.
- *Attend any two-year college* was an indicator for whether the student showed up as having attended a two-year college within one year of graduating high school.
- *Attend any four-year college* was an indicator for whether the student showed up as having attended a four-year college within one year of graduating high school.
- *Intend to attend a two-year college* was an indicator for the student reporting on their 12th grade postsecondary intentions survey that they planned to attend a two-year college.
- *Intend to attend a four-year college* was an indicator for the student reporting on their 12th grade postsecondary intentions survey that they planned to attend a four-year college.
- *Intend to enter employment* after high school was an indicator for the student reporting on their 12th grade postsecondary intentions survey that they planned to enter the workforce after high school.
- *Intend to enter the military* after high school was an indicator for the student reporting on their 12th grade postsecondary intentions survey that they planned to join the military after high school.

Outcomes Analyzed for School-Level Model Only. The following outcomes were analyzed for the school-level model only because all students we examined in the student-level model participated in dual enrollment..

- *Any dual enrollment participation* was a binary measure for participating in the CCP dual enrollment program at any point in 11th or 12th grade.
- *Participation in the dual enrollment College Transfer pathway (CTP)* was a binary measure for participating in CTP at any point in 11th or 12th grade.
- *Participation in the dual enrollment CTE pathway* was a binary measure for participating in CTE dual enrollment at any point in 11th or 12th grade.

Outcomes Analyzed for Student-Level Model Only. We added the outcomes below to our student-level model analyses. We analyzed measures of college credits earned in high school and the rate of earning a short-term postsecondary credential in high school for this model only because all students in our student-level analyses participated in dual enrollment—and earning credits and credentials to get a jumpstart on postsecondary education is a core objective of the state's dual enrollment program.

- Number of *CTE college credits earned* through dual enrollment in the spring of grade 12.
- Overall number of *college credits earned* (including CTE and general education courses) in the spring of grade 12.
- *Earned a short-term postsecondary credential in high school*. This outcome was whether students earned a certificate or diploma from NCCCS while still in high school.

School-level Results

First, we examined the impacts of schools receiving career coaches on binary measures of rates of participation in the CCP dual enrollment program— overall and separately for the two types of pathways, the College Transfer pathway and CTE dual enrollment pathway. Figure 2 shows that rates of participation in the CCP dual enrollment program increased when a school received a career coach. (The shaded portion of the graphs represent the confidence intervals.) Table 7 indicates that students were 2.7 percentage points more likely to participate in the dual enrollment program after the school received a career coach, an increase of about 10 percent over pre-coach rates of dual enrollment pathways participation. This was due to an increase in both CTE and College Transfer pathway participation. While the average change in the post-period years was similar for both pathways, the bottom panel of Figure 2 indicates that the change may

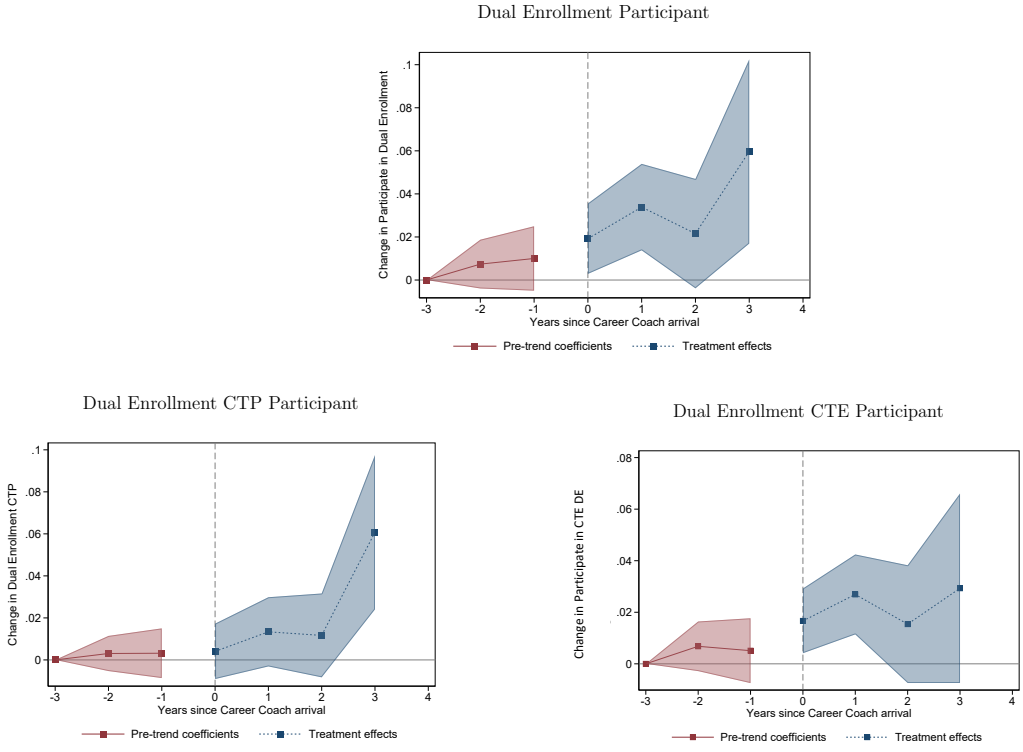
have been driven more by CTE dual enrollment pathway participation (since College Transfer pathway participation changes were only significant three years after the first coach arrived). For all of the outcomes presented in Table 7, the pre-trends test indicates there are no significant differences in the pre-trends.

Table 7. Impact on Dual Enrollment Program Participation Rates, Overall and by Pathway

Outcome	Impact Estimate (SE)	Pre-trend P-value	N
Any Dual Enrollment Pathway Participation	2.7 pp** (1.0 pp)	0.366	516,661
College Transfer Pathway (CTP) Participation	1.8 pp** (0.8 pp)	0.770	516,661
CTE Dual Enrollment Pathway Participation	1.8 pp (0.9 pp)	0.379	516,661

NOTE: *$p \leq .10$; **$p \leq .05$; ***$p \leq .01$; These estimates show the effects of having a career coach in one's school during 11th or 12th grade. They include cohort and school fixed effects and standard errors are clustered by school. They are based on the approach from Borusyak, Jaravel & Spiess (2021). The right column reports the p-value associated with the Wald pre-trend test.

Figure 2. Dual Enrollment Program Participation Rates, Overall and by Pathway



NOTE: These figures show how participation in dual enrollment changed when a coach arrived at the school. The top figure is based on participation in any dual enrollment pathway and the bottom two figures look separately at the dual enrollment pathways—the College Transfer pathway (CTP) and the Career and Technical Education pathway (CTE). The shading represents the confidence intervals around the point estimates. Time 0 is the year in which a school first received a career coach.

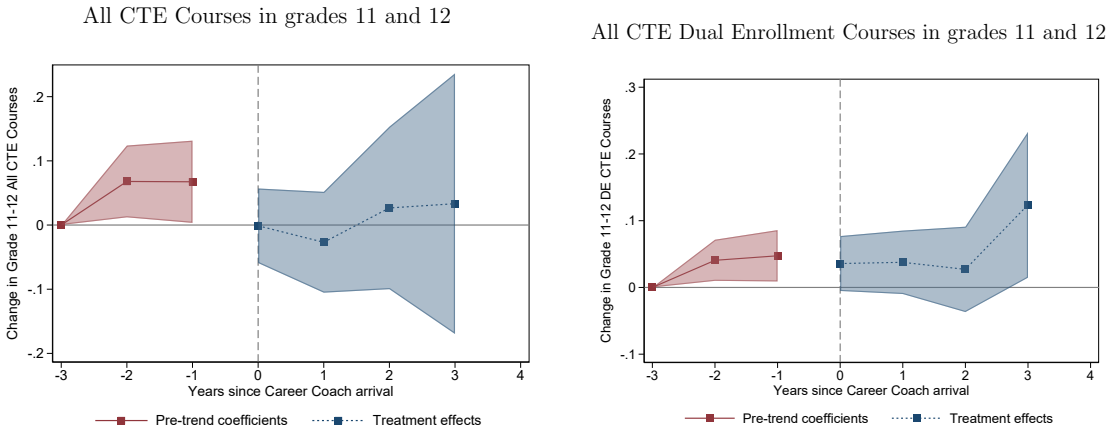
Next, we considered how intensity of participation in CTE courses changed, using continuous measures of the number of CTE courses taken—overall and split into high school and dual enrollment courses. There were no significant changes in the number of CTE courses taken, as shown in Table 8. There was a marginally significant increase in the number of CTE dual enrollment courses taken, but Figure 3 indicates that this was driven by changes three years after the arrival of a coach. Moreover, it appears likely that treated and comparison schools were on different trajectories with respect to this outcome prior to the arrival of career coaches, as the p-value on a Wald pre-trend test presented in Table 8 indicates. Thus, these estimates should be interpreted with caution. We also estimate no significant changes in high school CTE courses taken outside of the dual enrollment program or the number of CTE courses overall that students pass. Only the estimates for the total number of CTE courses passes the pre-trends test.

Table 8. Impact on CTE Coursetaking in Grades 11 and 12, Overall and by Type of Course

Outcome	Impact Estimate (SE)	Pre-trend P-value	N
# of CTE Courses Taken Overall	-0.011 (0.046)	0.042	564,221
# of High School CTE Courses Taken	-0.038 (0.044)	0.044	564,221
# of Dual Enrollment CTE Courses Taken	0.044* (0.026)	0.023	564,221
# of CTE Courses Passed Overall	-0.055 (0.036)	0.538	564,221

NOTE: *$p \leq .10$; **$p \leq .05$; ***$p \leq .01$; These estimates show the effects of having a career coach in one's school during 11th or 12th grade. They include cohort and school fixed effects and standard errors are clustered by school. They are based on the approach from Borusyak, Jaravel & Spiess (2021). The right column reports the p-value associated with the Wald pre-trend test.

Figure 3. CTE Coursetaking, Overall and Restricted to Dual Enrollment Courses



NOTE: These figures show how the number of CTE courses taken changed when a coach arrived at the school. The figure on the left is for all CTE courses and the figure on the right is restricted to the dual enrollment CTE courses. The shading represents the confidence intervals around the point estimates. Time 0 is the year in which a school first received a career coach.

The statistically significant increase in the rate of participation in the CTE dual enrollment pathway (binary measure) but limited change in the volume of CTE courses taken and passed (including dual enrollment CTE courses) indicates that the coaches likely expanded the number of students who participated in CTE dual enrollment, but some students who would have participated in the absence of the coach may have taken fewer CTE courses when the coach arrived as more of their peers took CTE courses. These patterns could reflect limited course capacities if there was not sufficient room in classes or instructors to expand CTE offerings to meet increased demand. These patterns may also reflect limited course offerings during the COVID-19 pandemic. Many coaches' first years at the treated schools were during the pandemic and CTE courses, which were typically offered in person due to their hands-on nature, may not have been offered online or may have had lower enrollment capacities than normal.

We also assessed whether students' cumulative weighted GPAs were affected by the arrival of a career coach as well as impacts on dropout and 4-year high school graduation rates. We found no discernable impacts on these outcomes, as shown in Table 9. However, the pre-trends tests fail for the dropout rate and four-year graduation rate measures so these results should be interpreted with caution.

Table 9. Impact on High School Outcomes

Outcome	Impact Estimate (SE)	Pre-trend P-value	N
Cumulative Weighted GPA	-0.011 (0.012)	0.149	559,642
Dropout Rate	0.2 pp (0.2 pp)	0.034	561,229
4-Year Graduation Rate	-0.2 pp (0.2 pp)	<0.001	564,249

NOTE: *$p \leq .10$; **$p \leq .05$; ***$p \leq .01$; These estimates show the effects of having a career coach in one's school during 11th or 12th grade. They include cohort and school fixed effects and standard errors are clustered by school. They are based on the approach from Borusyak, Jaravel & Spiess (2021). The right column reports the p-value associated with the Wald pre-trend test.

We then considered the impacts of receiving a coach on students' intentions post high school and their actual postsecondary enrollments within one year of high school. Table 10 indicates that college attendance decreased in the years after the career coach arrived and that this primarily affected four-year college attendance. Figure 4 also shows these results. Student responses to a 12th grade survey about their postsecondary intentions also indicated a decline in intentions to attend a four-year college after the coach arrived. This decline in four-year college intentions was offset by an increase in intentions to enter the workforce immediately after high school. This increase in employment intentions may reflect increases in CTE participation or the career guidance provided by coaches. However, the pre-trend p-values for the four-year institution intentions and enrollments outcomes are marginally significant, suggesting that it is possible that schools that received coaches were on different trajectories prior to treatment. Thus the estimates about changes in student intentions should be interpreted with caution and only as suggestive evidence.

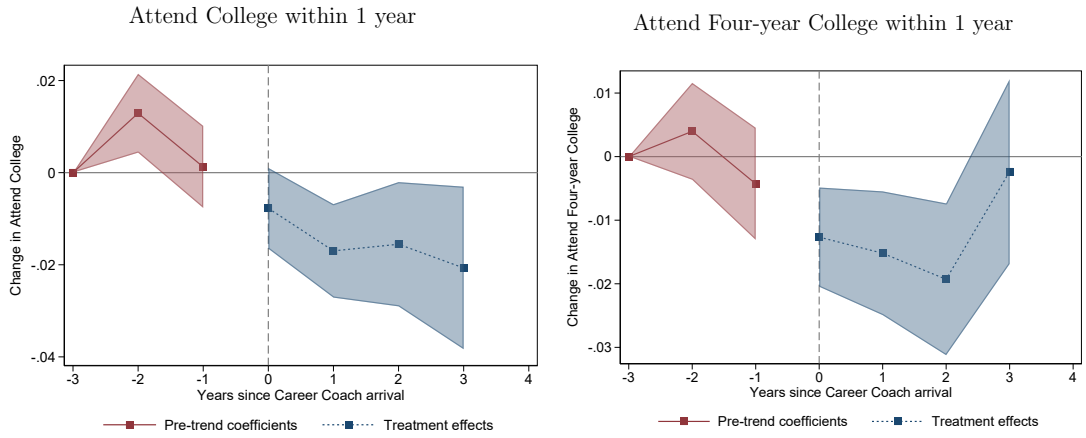
Table 10. Impacts on Postsecondary Intentions and Enrollments

Outcome	Impact Estimate (SE)	Pre-trend P-value	N
Post-Graduation Intentions			
Attend a 2-Year Institution	0.4 pp (0.7 pp)	0.043	516,674
Attend a 4-Year Institution	-2.2 pp*** (0.7 pp)	0.082	516,674
Pursue Employment	2.9 pp*** (0.6 pp)	0.347	516,674
Enter the military	-0.2 pp (0.2 pp)	0.088	516,674
Postsecondary Enrollments Within 1 Year of High School			

Outcome	Impact Estimate (SE)	Pre-trend P-value	N
2-Year Institution Enrollment	-0.3 pp (0.4 pp)	0.078	564,221
4-Year Institution Enrollment	-1.3 pp*** (0.4 pp)	0.091	564,221
Any Postsecondary Enrollment	-1.6 pp*** (0.4 pp)	0.005	564,221

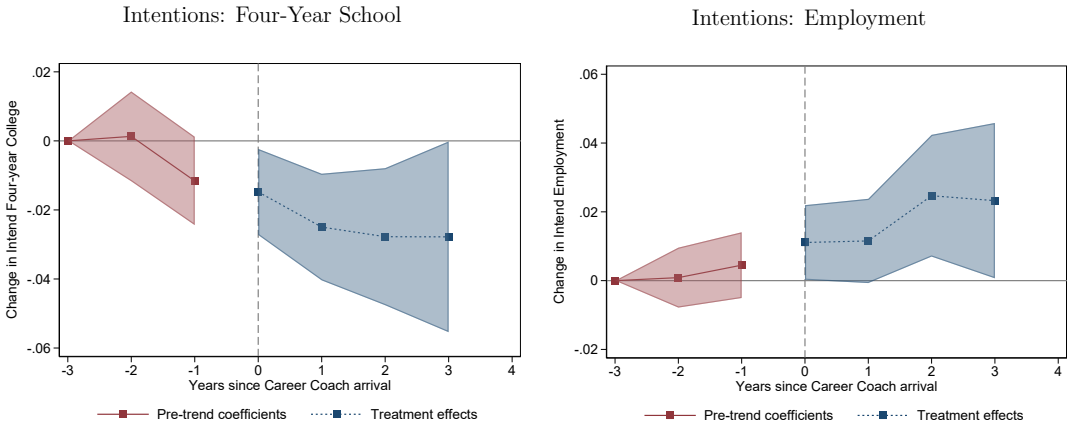
NOTE: *$p \leq .10$; **$p \leq .05$; ***$p \leq .01$; These estimates show the effects of having a career coach in one's school during 11th or 12th grade. They include cohort and school fixed effects and standard errors are clustered by school. They are based on the approach from Borusyak, Jaravel & Spiess (2021). The right column reports the p-value associated with the Wald pre-trend test.

Figure 4. Postsecondary Enrollments Within 1 Year of High School



NOTE: These figures show how any college attendance and four-year college attendance changed when a coach arrived at the school. The x-axis indicates the change in the share of students attending college. The shading represents the confidence intervals around the point estimates. Time 0 is the year in which a school first received a career coach.

Figure 5. Postsecondary Intentions as Measured by 12th Grade Survey



NOTE: These figures show how student intentions to attend a four-year college or enter employment changed when a coach arrived at the school. The x-axis indicates the change in the share of students intending to pursue each pathway. The shading represents the confidence intervals around the point estimates. Time 0 is the year in which a school first received a career coach.

Finally, we examined whether career coaches' impacts on postsecondary intentions and enrollments were driven by their shorter-term effects on dual enrollment participation. For this, we estimated three versions of our main models. First, we conditioned on whether the student participated in the CTE dual enrollment pathway; second, we conditioned on a continuous measure of CTE dual enrollment courses taken; and third, we conditioned on an indicator for participation in the College Transfer pathway (CTP). These results are in Table 11. The estimates in this table are very similar to those in Table 10 above, which indicates that career coaches' impacts on dual enrollment participation did little to mediate the coaches' effects on college attendance and intentions post high school. Rather, it appears that receiving a coach directly influenced these outcomes, perhaps through career guidance provided to students or activities to connect students with opportunities to learn about local employers.

Table 11. Impacts on Postsecondary Intentions and Enrollments, Conditional on Dual Enrollment Participation

Outcome	Controlling for CTE Dual Enrollment Pathway Participation	Controlling for Number of CTE DE Courses Taken	Controlling for College Transfer Pathway Participation
Post-Graduation Intentions			
Attend a 2-Year Institution	0.3 pp (0.7 pp)	0.3 pp (0.7 pp)	0.7 pp (0.7 pp)
Attend a 4-Year Institution	-2.2 pp*** (0.7 pp)	-2.2 pp*** (0.7 pp)	-2.8 pp*** (0.8 pp)
Pursue Employment	2.0 pp*** (0.6 pp)	2.0 pp*** (0.6 pp)	2.1 pp*** (0.6 pp)
Enter the military	-0.2 pp (0.2 pp)	-0.2 pp (0.2 pp)	-0.2 pp (0.2 pp)
Postsecondary Enrollments Within 1 Year of High School			
2-Year Institution Enrollment	-0.5 pp (0.4 pp)	-0.4 pp (0.4 pp)	-0.3 pp (0.4 pp)
4-Year Institution Enrollment	-1.3 pp*** (0.4 pp)	-1.3 pp*** (0.4 pp)	-1.9 pp*** (0.4 pp)
Any Postsecondary Enrollment	-1.7 pp*** (0.5 pp)	-1.7 pp*** (0.4 pp)	-2.0 pp*** (0.5 pp)

NOTE: *$p \leq .10$; **$p \leq .05$; ***$p \leq .01$; These estimates are impact estimates that show the effects of having a career coach in one's school during 11th or 12th grade. They include cohort and school fixed effects and standard errors are clustered by school. They are based on the approach from Borusyak, Jaravel & Spiess (2021).

Student-level Results

We now turn from the impacts of simply having access to a coach to the impacts on students who met with the career coaches. First, we considered the effects of meeting with a coach in the fall of 12th grade on students' coursetaking in the spring of 12th grade. This was the only semester of enrollment that could plausibly have been influenced by meeting with a coach starting in the fall, though it is possible that some initial coach meetings late in the fall term could have occurred after students had already selected their courses for the spring. In addition, some students may have enrolled in year long courses or selected their spring courses in the prior school year. We considered both high school and dual enrollment CTE coursetaking. We also analyzed college credits earned through dual enrollment, for CTE alone and including both CTE and general education courses. Table 12 displays these results. We find that students who met with coaches took and passed a fraction of an additional CTE course, with an increase in CTE

dual enrollment coursetaking driving this result. There was not a statistically significant impact on high school CTE coursetaking. We see that the students who met with coaches earned slightly more college credits through dual enrollment (CTE and overall) than comparison students (who also were CCP students as of fall of grade 12 but whose schools did not have career coaches).

Table 12. Impacts of Meeting with a Career Coach on High School Outcomes

Outcome	Treatment		Comparison		Impact Estimate (SE)	Effect Size
	Sample Size	Mean (SD)	Sample Size	Mean (SD)		
Total # of CTE courses passed spring 12th grade	3,334	0.43 (0.87)	21,253	0.37 (0.74)	0.06* (0.02)	0.07
Total # of CTE courses taken spring 12th grade	3,334	0.78 (1.07)	21,253	0.65 (0.91)	0.13*** (0.03)	0.12
Total # of high school CTE courses taken spring 12th grade	3,334	0.39 (0.66)	21,253	0.37 (0.63)	0.02 (0.03)	0.03
Total # of CTE DE courses taken spring 12th grade	3,334	0.39 (0.89)	21,253	0.28 (0.71)	0.11*** (0.02)	0.13
Total # of CTE DE college credits earned spring 12th grade	3,334	0.91 (2.36)	21,253	0.69 (1.94)	0.22*** (0.06)	0.10
Total # of DE college credits earned spring 12th grade	3,334	3.71 (4.12)	21,253	3.31 (3.89)	0.40** (0.14)	0.10
Final GPA (weighted)	3,334	3.71 (0.69)	21,252	3.70 (0.63)	0.00 (0.00)	0.01
High School Dropout	3,333	0.0% (1.7%)	21,218	0.0% (2.2%)	0.0 pp (0.04 pp)	-
4-Year High School Graduation Rate	3,334	99.7% (5.5%)	21,353	99.7% (5.8%)	0.0 pp (0.14 pp)	-
Earned short-term postsecondary credential in high school	3,334	4.7% (26.6%)	21,253	4.1% (19.9%)	0.6 pp (0.78 pp)	-

NOTE: *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; Comparison group means and standard deviations are weighted; effect sizes for continuous outcomes are calculated as the ratio of the impact estimate to the pooled (weighted) standard deviation.

Table 12 also displays the results for our other high school outcomes. We did not find a statistically significant effect of the coaching on students' final GPA, on-time high school

graduation rate, dropout rate, or the rate of earning a short-term postsecondary credential in high school through dual enrollment coursetaking at NCCCS, though in the case of this last outcome, we do observe a positive point estimate with a slightly larger share of students who met with coaches (4.7%) earning such a credential than students who did not have access to them (4.1%).

We then looked at whether meeting with a coach affected students' postsecondary intentions as expressed on their 12th grade survey (administered in the spring as students approach graduation) and their actual postsecondary enrollments within one year of high school. Table 13 includes these results. We found a statistically significant positive impact of meeting with a coach on student intentions to enroll in a two-year postsecondary institution, which carried through into a statistically significant positive impact on actual enrollments. We found a negative impact on four-year postsecondary intentions and enrollments, though the negative point estimate on actual enrollments was not statistically significant at conventional levels. We did not see a statistically significant effect of meeting with a coach on intentions to go directly into the workforce or to the military. There was no net impact on enrolling in any postsecondary institution including both two- and four-year colleges.

Table 13. Impacts of Meeting with a Coach on Postsecondary Intentions and Enrollments

Outcome	Treatment Mean (SD)	Comparison Mean (SD)	Impact Estimate (SE)
Post-Graduation Intentions			
Attend a 2-Year Institution	40.2% (49.3)	35.8% (47.9%)	4.4 pp** (1.55 pp)
Attend a 4-Year Institution	52.3% (50.0%)	55.1% (49.7%)	-2.8 pp* (1.36 pp)
Pursue Employment	5.1% (24.0%)	6.2% (24.1%)	-1.1 pp (0.87 pp)
Enter the military	1.6% (13.3%)	1.9% (13.5%)	-0.3 pp (0.25 pp)
Postsecondary Enrollments Within 1 Year of High School			
2-Year Institution Enrollment	36.1% (48.2%)	32.9% (47.0%)	3.2 pp** (1.12 pp)
4-Year Institution Enrollment	45.8% (49.5%)	47.1% (49.9%)	-1.3 pp (1.16 pp)
Any Postsecondary Enrollment	77.4% (42.9%)	76.3% (42.5%)	1.1 pp (1.00 pp)

NOTE: *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; treatment sample size for intentions: 3,321; comparison sample size: 21,180; treatment sample size for enrollments: 3,334; comparison sample size: 21,253; comparison group means and standard deviations are weighted.

For a subset of outcomes, we analyzed impacts by subgroup using an interaction model. Table 14 displays our findings for impacts by subgroup and differential impacts between subgroups for three sets of mutually exclusive demographic or socioeconomic subgroups: males and females, non-white or Hispanic students and white non-Hispanic students, and economically disadvantaged versus not economically disadvantaged students. We also analyzed impacts based on whether students had taken a CTE course in 11th grade.

We saw very small positive impacts on CTE courses passed overall (including high school and dual enrollment) for all subgroups except for students who had not taken a CTE course in 11th grade; these impacts were statistically significant for male, white non-Hispanic, economically disadvantaged, and 11th-grade CTE-taker student subgroups. We observed small positive effects on CTE and overall dual enrollment credit-earning for all subgroups, though these effects were not statistically significant for either measure for non-white or Hispanic students, for the dual enrollment courses overall measure for economically disadvantaged students, or for the CTE dual enrollment measure for students not taking CTE in 11th grade .

The effects on intentions to enroll at two-year institutions were positive for all subgroups and statistically significant for all but economically disadvantaged students and students who did not take CTE in 11th grade. Impacts on actual enrollments in two-year institutions were positive for all groups except non-CTE takers but statistically significant only for females, white non-Hispanic students, economically disadvantaged students, and 11th grade CTE takers. Impacts on four-year enrollments and intentions were negative for all six demographic or socioeconomic subgroups but none were statistically significant. This pattern did not hold when analyzing based on whether students took a CTE course in 11th grade—the negative impact on intentions was statistically significant for CTE takers and the point estimate on enrollments was positive (but not significant) for non-CTE takers.

The only statistically significant differential impact for the three sets of demographic or socioeconomic subgroups was a larger impact on dual enrollment college credits earned (including CTE and general education courses) for white non-Hispanic students (0.52 credits) relative to the impact on non-white or Hispanic students (0.13 credits). In two cases, there was a significantly significant difference in impacts based on 11th grade CTE coursetaking—a larger impact on the number of CTE courses passed (including high school and dual enrollment CTE) and a larger impact on actual enrollments at two-year postsecondary institutions. This suggests

that meeting with a career coach encouraged greater engagement in CTE coursetaking for those who were previously involved in CTE but did not spur non-CTE students to start taking CTE.

Table 14. Student-Level Model Impact Estimates by Subgroup, Selected Outcomes

Outcome	Gender		Race/Ethnicity		Economically-Disadvantaged		CTE Coursetaking in Grade 11	
	Male	Female	Non-white or Hisp.	White non-Hisp.	EDS	Not EDS	Yes	No
Total # of CTE courses passed spring 12th grade	0.09*	0.04	0.04	0.06*	0.07*	0.05	0.08**	-0.0
Differential impact	0.06		-0.02		0.03		0.09**	
Total # of CTE DE college credits earned spring 12th grade	0.31**	0.16*	0.12	0.26	0.29**	0.19**	0.25***	0.13
Differential impact	0.15		-0.14		0.10		0.12	
Total # of DE college credits earned spring 12th grade	0.34*	0.44**	0.13	0.52***	0.18	0.49**	0.38*	0.46*
Differential impact	-0.10		-0.40*		-0.31		-0.08	
Intention to attend a 2-year institution	5.0 pp*	4.0 pp*	5.1 pp**	4.1 pp*	4.0 pp	4.5 pp**	5.1 pp**	2.6 pp
Differential impact	1.0 pp		1.0 pp		-0.5 pp		2.5 pp	
Intention to attend a 4-year institution	-3.0 pp	-2.7 pp	-2.9 pp	-2.8 pp	-3.1 pp	-2.7 pp	-3.6 pp*	-0.9 pp
Differential Impact	-0.3 pp		.01 pp		-0.4 pp		-2.8 pp	
Enrolled at a 2-year institution	3.2 pp	3.2 pp*	2.4 pp	3.5 pp**	3.0 pp	3.3 pp*	4.8 pp***	-0.5 pp
Differential Impact	0.0 pp		-1.2 pp		0.3 pp		5.3 pp**	
Enrolled at a 4-year institution	-2.0 pp	-0.9 pp	-1.1 pp	-1.4 pp	-0.1 pp	-1.8 pp	-2.3 pp	0.9 pp
Differential Impact	-1.1 pp		0.3 pp		1.6 pp		-3.2 pp	

How to read this table: The impact on CTE DE college credits passed in the spring of 12th grade for males was 0.31 credits, and for females, it was 0.16 credits. Impacts on both subgroups were statistically significant. The impact was larger for males than females by 0.15 credits but this difference in impacts is not statistically significant.
*p≤.05; **p≤.01; ***p≤.001

Last, we considered whether the impact on the number of dual enrollment credits earned in the spring of 12th grade mediated the impacts we observed on intentions to enroll in two-year postsecondary institutions and actual enrollments in those colleges. Specifically, we decomposed the total effect on two-year postsecondary intentions and enrollments into the direct effect of the coaching and the indirect effect of taking and passing dual enrollment courses (at two-year institutions) while in high school as a mediator of subsequent intentions and enrollments. Table 15 displays the results. We found that the direct effect accounted for most of the total effect but that there was also typically a statistically significant indirect effect of earning college credits through dual enrollment (except for the indirect effect via dual enrollment coursetaking overall on intentions). In general, the effect of the coaching on the intensity of dual enrollment participation in the spring of senior year did appear to have a modest mediating effect on students' intentions and decisions to enroll post-high school at two-year institutions.

Table 15. Results of Mediation Analysis

Outcome	Indirect Effect (SE)	Direct Effect (SE)	Total Effect (SE)
Mediator: Total # of CTE DE college credits passed spring 12th grade			
Intend to attend 2-Year Institution post high school	0.2 pp* (0.1 pp)	4.2 pp** (1.6 pp)	4.4 pp** (1.5 pp)
Enrolled at 2-year institution within 1 year post high school	0.3 pp* (0.1 pp)	2.9 pp** (1.1 pp)	3.2 pp** (1.1 pp)
Mediator: Total # of DE college credits passed spring 12th grade			
Intend to attend 2-Year Institution post high school	0.1 pp (0.1 pp)	4.3 pp** (1.6 pp)	4.4 pp** (1.5 pp)
Enrolled at 2-year institution within 1 year post high school	0.4 pp* (0.2 pp)	2.8 pp* (1.1 pp)	3.2 pp** (1.1 pp)

NOTE: *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; treatment sample size for intentions: 3,321; comparison sample size: 21,180; treatment sample size for enrollments: 3,334; comparison sample size: 21,253.

Discussion

This paper provides a wide-ranging examination of the career coaching model as it exists in North Carolina. The career coaching model, developed to address concerns that students had inadequate access to career-focused advising, entails collaboration between local community colleges and high schools to apply for state funding to support placing a community college staff member in the area high schools to serve students as a career coach. We explored the

implementation of this model through an analysis of descriptive data on which types of schools receive coaches and which students at those schools meet with the coaches as well as through qualitative analysis of interviews we conducted with 14 current or former career coaches. We also provided a first-of-its-kind impact analysis of North Carolina's career coaching program, leveraging a set of quasi-experimental methods to assess the program's impacts on students at schools who receive coaches (overall) and on the students who themselves met with the coaches.

We found that, through 2020-21, career coaches were placed disproportionately in smaller, rural schools, often in counties considered among the most economically disadvantaged in the state. By contrast, none had been placed in high schools located in large cities, and as such, we did not include students at large city schools in the comparison group in our impact analyses. The students who met with coaches, however, were less likely to be economically disadvantaged than their peers who did not meet with the coaches. Students meeting with coaches also were disproportionately white, female, and higher achieving. We identified substantial overlap between the set of students who participated in career coaching and who enrolled in the state's CCP dual enrollment program, which is also affiliated with the community colleges. Importantly, students often first met with a career coach after they were already participating in the dual enrollment program; this likely contributed to coaches serving disproportionately white, female, and higher-achieving students, since those populations are more likely to take dual enrollment courses (particularly in the College Transfer pathway).

Our interview findings reinforced the connection between CCP and career coaching, with all coaches reporting some degree of involvement with CCP either by raising awareness about the program, including it among the array of options presented to students, and in some cases, supporting students with logistical aspects of participating in the CCP program. However, the interviews demonstrated that coaches' roles extended well beyond connecting students to the CCP program. They engaged with students one-on-one and in small and large group settings on everything from building knowledge about postsecondary and career options to helping students connect the dots between their interests and aspirations and the pathways that would help them achieve those aspirations. Several coaches reported close connections with local employers and creating opportunities for students to learn about opportunities.

Our school-level impact analyses suggested that a school receiving a career coach tended to increase participation in the CTE dual enrollment pathway and student intentions to enter

employment directly after high school. Receiving a coach also appeared to reduce four-year college enrollment, perhaps by redirecting more students to employment. It is important to keep in mind that these school-level model results represented the average effect of a school receiving a career coach, and that many students in schools with a coach did not meet with the coach.

Our student-level impact analyses focused on students who were already participating in the CCP dual enrollment program as of the fall of 12th grade, comparing students who first met with a coach that fall to CCP students at schools that did not receive coaches. As such, our findings reflect the additional effect of receiving coaching on top of the effects of participating in CCP, which we have found in our prior analyses was associated with large and statistically significant impacts on college credit-earning in high school and on enrolling at two-year schools post high school (Edmunds et al., 2023). In the analyses in this paper, we found that coached students took slightly more CTE dual enrollment courses and earned slightly more college credits though dual enrollment (CTE and overall) than their CCP counterparts who did not have access to a coach at their high school. We acknowledge that, because we identified our sample at the start of 12th grade, our analyses provided a very limited opportunity for the coaches to impact course taking. However our alternative specifications that identified students in 11th grade (Tables A.9 and A.10) found similar results.

We also found that coached students were more likely to go on to two-year postsecondary schools—both as reflected on their pre-graduation intentions survey and documented through actual enrollments within one year of high school. The bulk of the coaches' impact on two-year intentions and enrollments appeared to be a direct effect of the coaching, though we also found some evidence that the impact on dual enrollment credit-earning in high school mediated a portion of the impact on enrollments.

Furthermore, we found that coaches had the largest effects on students already in the CTE pathway in 11th grade, with minimal or null effects on students who were not in CTE in 11th grade. In the future, students outside the CCP program may benefit from more interactions with the career coaches, especially if one goal of the career coaches is to expand participation in CCP or CTE.

There are several limitations of our analyses. Though reflecting a diversity of coaching experiences, our qualitative implementation findings derived from a modest number of interviews with a non-random sample of coaches who were willing to participate. Other coaches

may have had different perspectives than those presented here, while the perspectives we did capture might have been more reflective of those coaches' recent experiences than program implementation over the duration of its existence.

We were limited in terms of the quantitative data on career coaching available to us as well, with individual students receiving coaching only linked to unique identifiers that matched to our longitudinal administrative dataset in the 2019-20 and 2020-21 school years. We used a school-level event study model to understand impacts on students over a larger set of years but at the cost of being able to differentiate between students who received coaching and students who did not. Our event study model provided suggestive evidence of the impacts on students at schools receiving coaches, on average, when a coach arrived to the school; however, for some outcomes we considered, including enrollments at four-year schools post high school, pre-trends tests suggest that the schools receiving coaches might have been on different trajectories from schools that did not receive coaches prior to the coaches' arrival.

Our student-level propensity score model did identify treated students who met with coaches, and compared them to students at schools without coaches, but we were limited to just two cohorts we could follow for a year post high school to assess outcomes, and only if we defined treatment as receiving coaching starting in 12th grade. The limited time window over which students could have met with coaches coupled with our decision to define treatment in a binary fashion rather than attempting to determine intensity of individual students' engagement with the coaches (owing to data limitations) meant that our findings may have been conservative relative to what one could expect to find from a longer-term, intensive coaching experience. By contrast, like all propensity score weighting analyses, this quasi-experimental method can only weight the comparison group using observable factors, and unobservable, or unmeasurable, factors that influenced student decisions to meet with coaches and their outcomes in terms of coursetaking or two-year college enrollments could introduce bias to our findings in the opposite direction.

Furthermore, we examine several different outcomes and models. We do not adjust our estimates for potential Type 1 error or multiple hypothesis testing, so it is possible that some of the statistically significant estimates are driven by type I error.

Last, it is also important to consider that our results from all components of our study span the COVID-19 pandemic, and the student-level analysis focused on students who were in high school during the pandemic period. Coaches may have interacted with students in different ways

during the pandemic due to long periods of virtual schooling so their impacts during this period may differ from those going forward.

In summary, our implementation and impact analyses shed light on the operation and effects of North Carolina's career coaching program. They add to what is a modest literature on how career-focused advising functions and how it affects students. As these programs continue to expand and mature in North Carolina and elsewhere, additional opportunities to study their effects, and to do so over longer periods, will arise, and additional quantitative and qualitative research will be needed to validate (or possibly contradict) the findings we have presented here.

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Appendix

School-level Model Results Based on Callaway and Sant'Anna Approach

Here we show results for the school-level model based on the Callaway and Sant'Anna (2021) approach for estimating event study results. These estimates are very similar to those presented in the body of the paper based on the approach from Borusyak et al. (2021).

Table A.1. Callaway & Sant'Anna Estimates of Impact on Dual Enrollment Program Participation Rates, Overall and by Pathway

Outcome	Impact Estimate (SE)
Any Dual Enrollment Pathway Participation	2.3 pp*** (0.4 pp)
College Transfer Pathway (CTP) Participation	1.8 pp*** (0.3 pp)
CTE Dual Enrollment Pathway Participation	1.8 pp*** (0.3 pp)

NOTE: *$p \leq .10$; **$p \leq .05$; ***$p \leq .01$; These estimates show the effects of having a career coach in one's school during 11th or 12th grade. They include cohort and school fixed effects and standard errors are clustered by school. They are based on the approach from Callaway & Sant'Anna (2021).

Table A.2. Callaway & Sant'Anna Estimates of Impact on CTE Coursetaking in Grades 11 and 12, Overall and by Type of Course

Outcome	Impact Estimate (SE)
CTE Courses Taken Overall	-0.005 (0.018)
High School CTE Courses Taken	-0.029 (0.018)
Dual Enrollment CTE Courses Taken	0.034*** (0.011)
CTE Courses Passes Overall	-0.039** (0.016)

NOTE: *$p \leq .10$; **$p \leq .05$; ***$p \leq .01$; These estimates show the effects of having a career coach in one's school during 11th or 12th grade. They include cohort and school fixed effects and standard errors are clustered by school. They are based on the approach from Callaway & Sant'Anna (2021).

Table A.3. Callaway & Sant'Anna Estimates of Impact on High School Outcomes

Outcome	Impact Estimate (SE)
Cumulative Weighted GPA	-0.034*** (0.012)

Outcome	Impact Estimate (SE)
Dropout Rate	0.3 pp*** (0.1 pp)
4-Year Graduation Rate	0.1 pp (0.2 pp)

NOTE: *$p \leq .10$; **$p \leq .05$; ***$p \leq .01$; These estimates show the effects of having a career coach in one's school during 11th or 12th grade. They include cohort and school fixed effects and standard errors are clustered by school. They are based on the approach from Callaway & Sant'Anna (2021).

Table A.4. Callaway & Sant'Anna Estimates of Impacts on Postsecondary Intentions and Enrollments

Outcome	Impact Estimate (SE)
Post-Graduation Intentions	
Attend a 2-Year Institution	0.5 pp (0.4 pp)
Attend a 4-Year Institution	-2.6 pp*** (0.4 pp)
Pursue Employment	2.1 pp*** (0.3 pp)
Enter the military	-0.4 pp** (0.2 pp)
Postsecondary Enrollments Within 1 Year of High School	
2-Year Institution Enrollment	-0.1 pp (0.4 pp)
4-Year Institution Enrollment	-1.5 pp*** (0.4 pp)
Any Postsecondary Enrollment	-1.7 pp*** (0.4 pp)

NOTE: *$p \leq .10$; **$p \leq .05$; ***$p \leq .01$; These estimates show the effects of having a career coach in one's school during 11th or 12th grade. They include cohort and school fixed effects and standard errors are clustered by school. They are based on the approach from Callaway & Sant'Anna (2021).

Figure A.1. Dual Enrollment Program Participation Rates, Overall and by Pathway

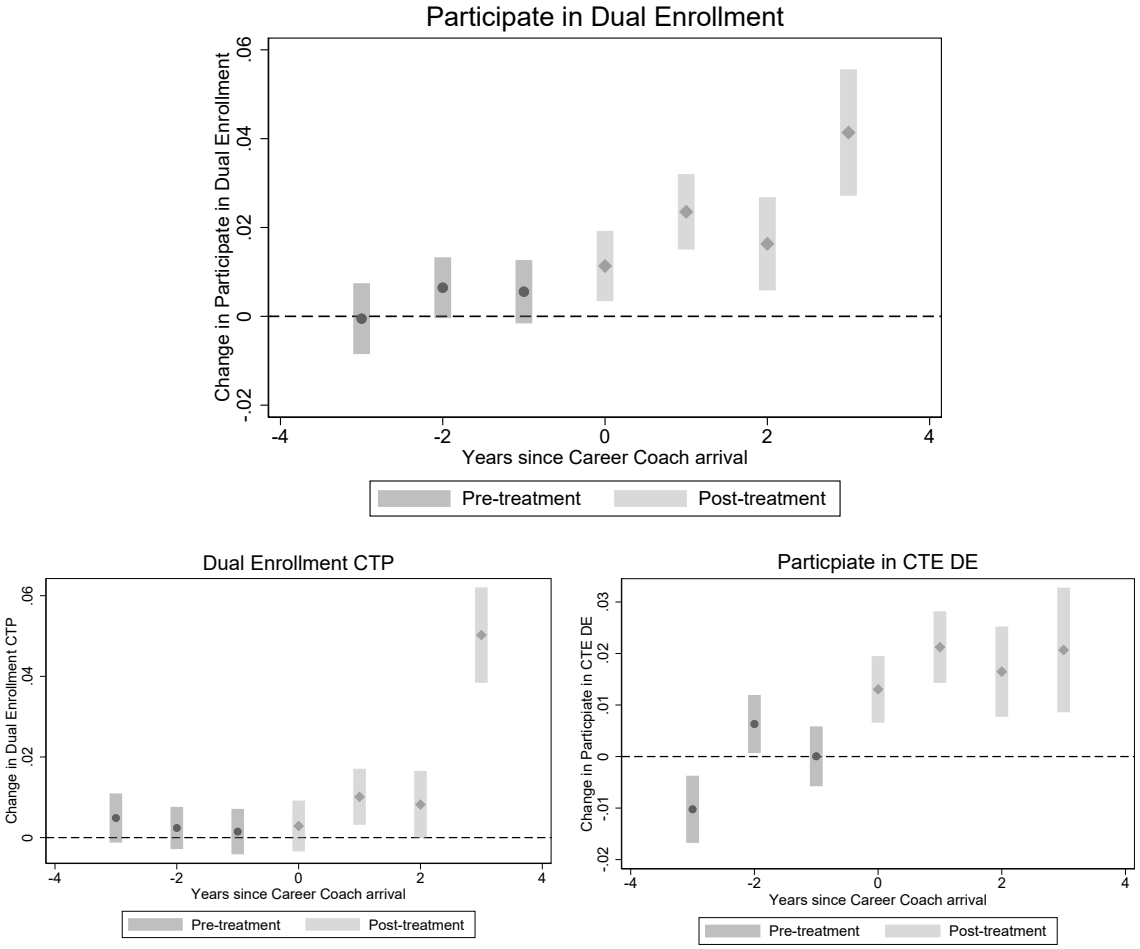


Figure A.2. CTE Coursetaking, Overall and Restricted to Dual Enrollment Courses

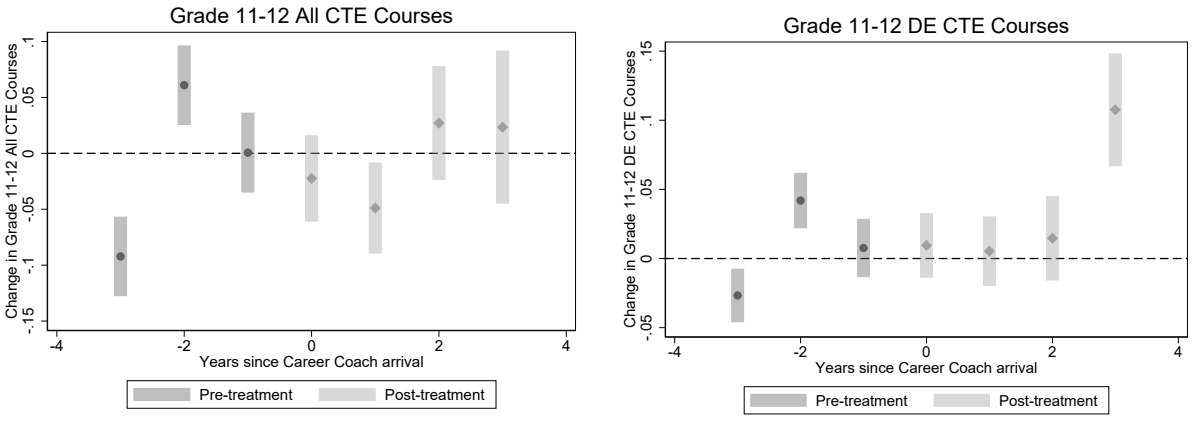


Figure A.3. Postsecondary Enrollments Within 1 Year of High School

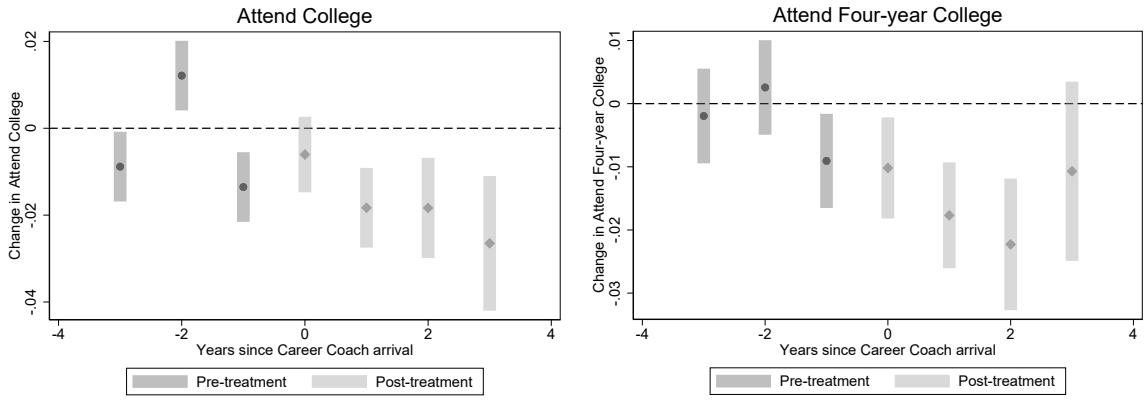
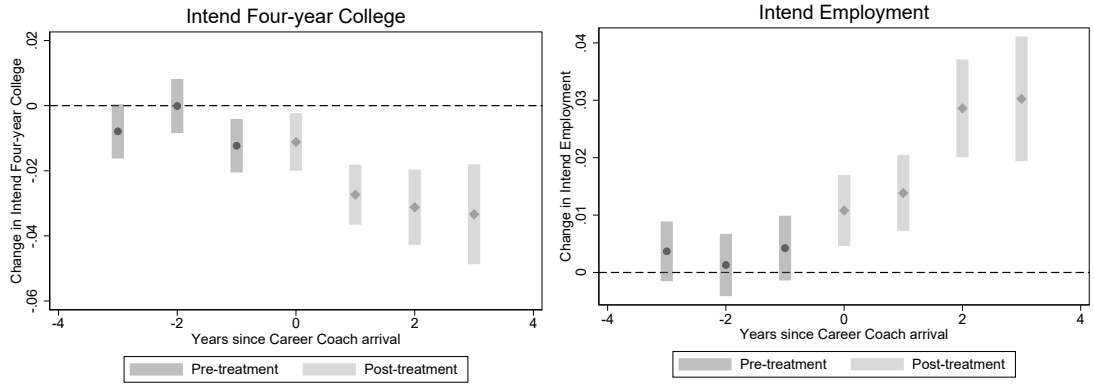


Figure A.4. Postsecondary Intentions as Measured by 12th Grade Survey



Additional Student-Level Analyses

The main student-level results presented in the body of the paper compare CCP students (as of the fall of 12th grade) who met with a career coach for the first time in that fall semester to CCP students at schools that did not have career coaches. Here we present results from three alternative approaches we took to defining the treatment and comparison groups:

1. Included both CCP and non-CCP students (as of fall of 12th grade) in the analysis and included baseline CCP participation as a covariate in the propensity score weighting approach.
2. Replicated the analysis focused on CCP students presented in the main text but using the fall of 11th grade as the dividing line between the pre- and post-treatment period; specifically, we restricted to CCP students by the fall of 11th grade and considered

treatment students to be those who first met with a coach in the fall of 11th grade and comparison students to be those who attended schools that never received coaches.

3. Weighted on CCP participation by the fall of 11th grade and included both CCP and non-CCP students in the treatment (first met with a coach in the fall of 11th grade) and comparison (attended schools without coaches) groups.

The first set of tables below presents covariate balance for these three alternative approaches. Student-level covariate balance for these alternative approaches meets WWC standards of standardized effect sizes of no more than 0.25 standard deviations. However, in the case of approaches (1) and (3), which included both CCP and non-CCP students and weighted on baseline CCP participation, we were unable to achieve adequate balance on student-level factors when including school-level factors in the weighting process (our preferred, doubly robust approach). As such, we included student-level factors only in these weighting models, though we do include school-level covariates in the impact estimation models.

The second set of tables present impact estimates for the same selected outcomes for which we analyzed results by subgroup in the paper: total number of CTE courses passed, total number of CTE dual enrollment college credits earned, total number of dual enrollment college credits earned (overall), intentions to enroll at two- and four-year postsecondary schools, and actual enrollments within one year of leaving high school at two- and four-year schools. Note that in approaches (2) and (3), we considered coursetaking and credit-earning starting in the spring of grade 11 since we identified the treatment in the fall of 11th rather than 12th grade. Our results were broadly consistent across these alternative approaches, though results from approaches (2) and (3) tend not to be statistically significant, likely owing to smaller sample sizes.

Table A.5. Baseline Characteristics of Treatment and Comparison Groups, Alternative Approach 1, Include CCP and Non-CCP Students in Analysis, Identify Treatment Group Based on First Meeting with a Coach 12th Grade Fall

	Treatment Mean (N=6,122)	Unweighted Comparison Mean (N=86,145)	Weighted Comparison Mean (N=86,145)	Weighted Standardized Effect Size
Female	55.1%	49.3%	54.6%	0.01
White	62.4%	52.6%	61.9%	0.01
Black	16.4%	22.0%	16.8%	-0.01
Hispanic	14.8%	15.1%	14.6%	0.01
Other Race (Not Hispanic)	6.3%	10.3%	6.7%	-0.02
Age	17.30	17.31	17.30	0.00

	Treatment Mean (N=6,122)	Unweighted Comparison Mean (N=86,145)	Weighted Comparison Mean (N=86,145)	Weighted Standardized Effect Size
Gifted	19.6%	19.0%	18.8%	0.02
Disability status	8.1%	10.3%	8.4%	-0.01
Economic disadvantage	39.3%	35.7%	39.0%	0.01
ELL	3.4%	3.9%	3.4%	0.00
Absences	10.18	10.32	10.22	0.00
Ever out-of-school suspended	5.0%	6.1%	5.2%	-0.01
Ever in-school suspended	8.4%	7.9%	8.1%	0.01
8th grade math	0.11	0.12	0.11	0.00
8th grade reading	0.12	0.09	0.11	0.01
Unweighted GPA	3.10	2.97	3.09	0.01
Honors courses	3.05	2.75	3.04	0.00
AP courses	0.48	0.83	0.49	-0.01
High school CTE courses	1.23	1.18	1.23	0.00
CTE DE credits attempted (summer/fall 12th grade)	0.98	0.33	0.95	0.02
All DE credits attempted (summer/fall 12th grade)	3.60	1.47	3.52	0.02
CTE DE credits earned (11th grade)	0.73	0.23	0.68	0.02
All DE credits earned (11th grade)	2.62	1.13	2.52	0.02
Participated in CCP by fall of 12th grade	54.5%	24.7%	53.8%	0.01

NOTE: Treatment students had a first documented meeting with a career coach in the fall of 12th grade while comparison students attended schools that never received career coaches; excludes students who attended schools in large city locales, alternative schools, public charter schools, and Cooperative Innovative High Schools (CIHS) in 12th grade; unless otherwise notes the measures presented reflect characteristics as of students' 11th grade year, including coursetaking in 11th grade and cumulative unweighted GPA through 11th grade; baseline equivalence statistics for additional student-level covariates included in the propensity score weighting and impact estimation models available upon request to the authors. School-level covariates were not included in the weighting models but were included in the impact estimation models.

Table A.6. Baseline Characteristics of Treatment and Comparison Groups, Alternative Approach 2, Include CCP Students Only in Analysis, Identify Treatment Group Based on First Meeting with a Coach 11th Grade Fall

	Treatment Mean (N=1,131)	Unweighted Comparison Mean (N=5,136)	Weighted Comparison Mean (N=5,136)	Weighted Standardized Effect Size
Female	61.5%	61.6%	64.1%	-0.06
White	74.5%	70.7%	71.1%	0.08
Black	10.0%	11.8%	11.0%	-0.03
Hispanic	9.2%	10.2%	11.0%	-0.06
Other Race (Not Hispanic)	6.3%	7.3%	6.9%	-0.02
Age	16.25	16.24	16.26	-0.03
Gifted	30.1%	32.1%	34.5%	-0.10

	Treatment Mean (N=1,131)	Unweighted Comparison Mean (N=5,136)	Weighted Comparison Mean (N=5,136)	Weighted Standardized Effect Size
Disability status	2.7%	2.2%	2.6%	0.01
Economic disadvantage	30.0%	26.3%	28.9%	0.02
ELL	0.4%	0.6%	0.6%	-0.04
Absences	6.53	7.43	7.50	-0.18
Ever out-of-school suspended	3.2%	2.5%	2.2%	0.06
Ever in-school suspended	5.0%	4.1%	3.6%	0.07
8th grade math	0.48	0.59	0.57	-0.10
8th grade reading	0.47	0.55	0.52	-0.07
Unweighted GPA	3.46	3.51	3.48	-0.04
Honors courses	3.63	3.77	3.70	-0.03
AP courses	0.30	0.39	0.31	-0.03
High school CTE courses	1.49	1.39	1.47	0.02
CTE DE credits attempted (summer/fall 11th grade)	1.87	1.21	1.32	0.19
All DE credits attempted (summer/fall 11th grade)	6.01	5.58	5.54	0.15

NOTE: all students in the analysis had enrolled in at least one dual enrollment course by the fall of 11th grade; treatment students had a first documented meeting with a career coach in the fall of 11th grade while comparison students attended schools that never received career coaches; excludes students who attended schools in large city locales, alternative schools, public charter schools, and Cooperative Innovative High Schools (CIHS) in 11th grade; unless otherwise notes the measures presented reflect characteristics as of students' 10th grade year, including coursetaking in 10th grade and cumulative unweighted GPA through 10th grade; baseline equivalence statistics for additional student- and school-level covariates included in the propensity score weighting and impact estimation models available upon request to the authors.

Table A.7. Baseline Characteristics of Treatment and Comparison Groups, Alternative Approach 3, Include CCP and Non-CCP Students in Analysis, Identify Treatment Group Based on First Meeting with a Coach 11th Grade Fall

	Treatment Mean (N=2,390)	Unweighted Comparison Mean (N=39,696)	Weighted Comparison Mean (N=39,696)	Weighted Standardized Effect Size
Female	55.9%	48.8%	54.9%	0.02
White	62.7%	54.3%	61.7%	0.02
Black	18.1%	21.1%	18.2%	0.00
Hispanic	12.6%	15.2%	13.1%	-0.02
Other Race (Not Hispanic)	6.7%	9.4%	7.0%	-0.02
Age	16.30	16.31	16.30	-0.01
Gifted	21.7%	19.5%	20.4%	0.03
Disability status	7.4%	10.7%	8.0%	-0.02
Economic disadvantage	40.0%	37.2%	39.8%	0.00
ELL	1.6%	3.9%	2.0%	-0.03
Absences	8.32	8.81	8.41	-0.01

	Treatment Mean (N=2,390)	Unweighted Comparison Mean (N=39,696)	Weighted Comparison Mean (N=39,696)	Weighted Standardized Effect Size
Ever out-of-school suspended	5.3%	6.1%	5.4%	-0.01
Ever in-school suspended	9.1%	8.1%	8.7%	0.01
8th grade math	0.16	0.14	0.15	0.01
8th grade reading	0.18	0.12	0.17	0.02
Unweighted GPA	3.15	2.97	3.12	0.03
Honors courses	2.69	2.54	2.65	0.02
AP courses	0.19	0.26	0.19	0.00
High school CTE courses	1.57	1.29	1.56	0.01
CTE DE credits attempted (summer/fall 11th grade)	0.89	0.16	0.81	0.04
All DE credits attempted (summer/fall 11th grade)	2.84	0.72	2.67	0.05
Participated in CCP by fall of 11th grade	47.3%	12.9%	45.5%	0.04

NOTE: Treatment students had a first documented meeting with a career coach in the fall of 11th grade while comparison students attended schools that never received career coaches; excludes students who attended schools in large city locales, alternative schools, public charter schools, and Cooperative Innovative High Schools (CIHS) in 11th grade; unless otherwise notes the measures presented reflect characteristics as of students' 10th grade year, including coursetaking in 10th grade and cumulative unweighted GPA through 10th grade; baseline equivalence statistics for additional student-level covariates included in the propensity score weighting and impact estimation models available upon request to the authors. School-level covariates were not included in the weighting models but were included in the impact estimation models.

Table A.8. Impacts of Meeting with a Career Coach on Selected Outcomes, Alternative Approach 1, Include CCP and Non-CCP Students in Analysis, Identify Treatment Group Based on First Meeting with a Coach 12th Grade Fall

Outcome	Treatment		Comparison		Impact Estimate (SE)	Effect Size
	Sample Size	Mean (SD)	Sample Size	Mean (SD)		
Total # of CTE courses passed spring 12th grade	6,122	0.36 (0.77)	86,145	0.31 (0.68)	0.05** (0.02)	0.07
Total # of CTE DE college credits earned spring 12th grade	6,122	0.67 (1.95)	86,145	0.49 (1.67)	0.18*** (0.05)	0.10
Total # of DE college credits earned spring 12th grade	6,122	2.43 (3.71)	86,145	2.02 (3.43)	0.41*** (0.09)	0.11
Intention to attend a 2-Year Institution	6,078	45.3% (49.9%)	84,590	37.7% (48.5%)	7.6 pp*** (1.2 pp)	-
Intention to attend a 4-Year Institution	6,078	39.8% (48.2%)	84,590	43.3% (49.6%)	-3.5 pp** (0.8 pp)	-

Outcome	Treatment		Comparison		Impact Estimate (SE)	Effect Size
	Sample Size	Mean (SD)	Sample Size	Mean (SD)		
Enrolled at a 2-Year Institution	6,122	33.1% (47.2%)	86,145	28.9% 45.3%)	4.2 pp*** (0.8 pp)	-
Enrolled at a 4-Year Institution	6,122	34.0% (46.3%)	86,145	35.0% (47.7%)	-1.0 pp (0.8 pp)	-

NOTE: *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; Comparison group means and standard deviations are weighted; effect sizes for continuous outcomes are calculated as the ratio of the impact estimate to the pooled (weighted) standard deviation

Table A.9. Impacts of Meeting with a Career Coach on Selected Outcomes, Alternative Approach 2, Include CCP Students Only in Analysis, Identify Treatment Group Based on First Meeting with a Coach 11th Grade Fall

Outcome	Treatment		Comparison		Impact Estimate (SE)	Effect Size
	Sample Size	Mean (SD)	Sample Size	Mean (SD)		
Total # of CTE courses passed spring 11th grade and 12th grade	1,131	1.97 (2.07)	5,136	1.58 (1.75)	0.39** (0.15)	0.19
Total # of CTE DE college credits earned spring 11th grade and 12th grade	1,131	2.69 (5.81)	5,136	1.99 (4.29)	0.70 (0.42)	0.12
Total # of DE college credits earned spring 11th grade and 12th grade	1,131	13.17 (12.40)	5,136	12.15 (11.42)	1.01 (0.86)	0.08
Intention to attend a 2-Year Institution	1,117	32.1% (47.2%)	5,064	33.2% (47.1%)	-1.0 pp (3.3 pp)	-
Intention to attend a 4-Year Institution	1,117	55.7% (50.0%)	5,064	55.7% (49.7%)	0.1 pp (3.1 pp)	-
Enrolled at a 2-Year Institution	1,131	28.9% (45.4%)	5,136	30.3% (45.9%)	-1.4 pp (3.0 pp)	-
Enrolled at a 4-Year Institution	1,131	49.7% (49.8%)	5,136	48.4% (50.0%)	1.4 (3.0 pp)	-

NOTE: *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; Comparison group means and standard deviations are weighted; effect sizes for continuous outcomes are calculated as the ratio of the impact estimate to the pooled (weighted) standard deviation

Table A.10. Impacts of Meeting with a Career Coach on Selected Outcomes, Alternative Approach 3, Include CCP and Non-CCP Students in Analysis, Identify Treatment Group Based on First Meeting with a Coach 11th Grade Fall

Outcome	Treatment		Comparison		Impact Estimate (SE)	Effect Size
	Sample Size	Mean (SD)	Sample Size	Mean (SD)		
Total # of CTE courses passed spring 11th grade and 12th grade	2,390	1.91 (1.85)	39,696	1.72 (1.73)	0.18* (0.08)	0.10
Total # of CTE DE college credits earned spring 11th grade and 12th grade	2,390	1.89 (4.73)	39,696	1.44 (3.84)	0.44 (0.26)	0.10
Total # of DE college credits earned spring 11th grade and 12th grade	2,390	7.48 (10.97)	39,696	6.73 (10.41)	0.75 (0.43)	0.07
Intention to attend a 2-Year Institution	2,301	35.5% (48.3%)	37,915	34.5% (47.5%)	1.0 pp (1.9 pp)	-
Intention to attend a 4-Year Institution	2,301	44.6% (49.3%)	37,915	44.9% (49.7%)	-0.3 pp (1.6 pp)	-
Enrolled at a 2-Year Institution	2,390	28.4% (45.2%)	39,696	26.9% (44.4%)	1.5 pp (1.5 pp)	-
Enrolled at a 4-Year Institution	2,390	37.1% (47.4%)	39,696	36.3% (48.1%)	0.8 pp (1.2 pp)	-

NOTE: *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; Comparison group means and standard deviations are weighted; effect sizes for continuous outcomes are calculated as the ratio of the impact estimate to the pooled (weighted) standard deviation