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Evaluation of YCC
Youth CareerConnect

Building College and Career Pathways for High School Students: Youth CareerConnect

Impact Findings Report

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ABSTRACT

In 2014, the U.S. Department of Labor (DOL) awarded $107 million in four-year grants to 24 applicants for the Youth CareerConnect (YCC) program, a high school–based program that blended academic and career-focused learning to better prepare students for both college and careers in high-growth industries that often rely on foreign workers. The program included employer partnerships and engagement, integrated academic and career curricula, work-based learning and exposure to the world of work, individualized career and academic counseling, small learning communities, and professional development. After four school years of enrolling students, 31,019 students in 130 high schools in 18 states and Puerto Rico had participated in the YCC program.

DOL contracted with Mathematica and its subcontractor Social Policy Research Associates to conduct an evaluation of the YCC program that included both an implementation and impact study. This report focuses on the impact study and answers the research question, *What is the impact of the YCC program on critical milestones and momentum points that can be achieved in high school and are associated with education and employment success?* It does so using two rigorous components: a quasi-experimental design (QED) in 16 school districts (6,207 YCC students and 109,541 comparable non-YCC students), and a randomized controlled trial (RCT) in four school districts that were also part of the QED. It drew information from three data sources: (1) the Participant Tracking System, which tracked services and activities for all YCC students; (2) school records in the 16 QED school districts; and (3) a survey completed by 279 treatment and 157 control group students in three of the four RCT school districts. Students in the RCT were randomly assigned into a treatment group who was offered the opportunity to enroll in the YCC program or into a control group excluded from the YCC program.

Our estimations show that the YCC program had small beneficial impacts. Our primary analysis found that it increased school attendance by 0.7 percentage points (from about 90.7 to 91.5 percent) and moved a student who is at the 50th percentile in accumulating credits for high school graduation to approximately the 54th percentile. The primary analysis also showed that the YCC program might increase proficiency in English language arts. No evidence existed that the YCC program had an effect on students completing algebra coursework. Our secondary analysis showed few differences in impacts across student subgroups based on prior academic achievement and low-income status. Impacts did tend to be larger for students who received an internship, had a mentor, or completed an individual development plan, although these effects might be partly driven by factors that influence both service participation and program outcomes. It also appeared that impacts grew stronger as the program matured.

Our results have several implications for future research. First, research might explore whether the small but significant impacts on milestones and momentum points that students could achieve while in high school translate into education and employment success after high school. Second, research might explore the mechanisms that produced the stronger impacts found when students received an internship, had a mentor, or completed an individual development plan.

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LIST OF ACRONYMS

CTE	career and technical education
DOL	U.S. Department of Labor
FAFSA	Free Application for Federal Student Aid
IDP	individual development plan
PTS	Participant Tracking System
SLC	small learning community
WBL	work-based learning
WIOA	Workforce Innovation and Opportunity Act
YCC	Youth CareerConnect

EXECUTIVE SUMMARY

In April 2014, the U.S. Department of Labor (DOL) awarded $107 million in four-year grants to 24 applicants to implement the Youth CareerConnect (YCC) program, a high school–based program that blends academic and career-focused learning and aims to prepare students for both college and careers. Eligible participants were students enrolled in high school, including students who had dropped out and re-enrolled prior to or in conjunction with enrollment in the funded program. Grants ranged from $2.25 to $7 million. They were designed to integrate public school systems with employers, institutions of higher education, the workforce development system, and community partners to help prepare students for job openings in industries such as health care, advanced manufacturing, and financial services that rely often on the H-1B visa program to hire foreign workers when middle- to high-skilled domestic workers are not available. After four school years of enrolling students, 31,019 students in 130 high schools located in 18 states and Puerto Rico had participated in the YCC program. This enrollment exceeded DOL's performance goal of enrolling 25,000 students.

DOL contracted with Mathematica and its subcontractor Social Policy Research Associates to conduct an evaluation of the YCC program that included both an implementation and impact study. In this report, we provide the findings from the impact study. A separate, companion report, *Building College and Career Pathways for High School Students: Youth CareerConnect, Technical Report for the Impact Study*, provides a technical discussion of the data, samples, and analysis that underlie the estimated impacts (Burkander et al. 2019).

A. Overview of the YCC program and the impact study

The YCC program aimed to strengthen America's talent pipeline by enhancing students' high school experience to put them on a pathway to complete postsecondary education and occupational skills training, obtain industry-recognized credentials, and secure an unsubsidized job in middle- to high-skilled H-1B occupations and industries.[1] The implementation study identified three program components that were offered at a higher rate to YCC students than other students: (1) preparing students for both college and career, (2) connecting students to career-track employment, and (3) offering academic and nonacademic supports (see Figure ES.1).

Figure ES.1. Services and activities that define the YCC program

Preparing for college and career

- Instruction in work-readiness or occupational skills
- Coursework structured in ways that lead to articulation to a two- or four-year college program or an industry-recognized credential
- Emphasis on active learning pedagogies

Connecting to career-track employment

- Work-based learning

Offering academic and nonacademic supports

- Small learning communities
- Individual Development Plans

The YCC impact study assessed short-term student outcomes with two rigorous components—a quasi-experimental design

[1] More information on the H-1B program can be found at http://www.dol.gov/whd/immigration/h1b.htm.

(QED) study in 16 school districts and a randomized controlled trial (RCT) in four school districts that were also in the QED. It answered the overarching research question, *What is the impact of the YCC program on critical milestones and momentum points that can be achieved in high school and are associated with education and employment success?* The study focused on milestones and momentum points that students could achieve during high school—which represent outcomes in this study (see sidebar)—because data collection ended in 2018, when most students in the sample were 16 or 17 years old.

Outcomes during high school

Milestones

High school diploma

Still in school at a point in time

Momentum points

Education success

High school behaviors

- Attendance
- Credit accumulation
- School activities
- Engagement and satisfaction
- Reduced substance abuse

Postsecondary preparation

- Math and English proficiency
  - English language proficiency
  - Algebra progression
- Positive education expectations and knowledge
- Postsecondary credits earned while still in high school

Employment success

- Work-readiness skills
- Paid work experience

The impact study relied primarily on the QED design with a much larger number of school districts and students than the RCT design but also exploited strengths of the RCT design. The QED drew information from school records and balanced the characteristics of students who participated in the YCC program (the treatment group) to students in the same school district who did not (the comparison group). In each school district, the study followed up to six cohorts of students (who started a 9th or 10th grade program in school years starting in fall 2014, 2015, or 2016) for two to four years. The four school districts in the RCT included two cohorts of students who applied to the YCC program in 9th- or 10th-grade for fall 2016; the RCT followed them for two years. Students in the RCT were randomly assigned into a treatment group who could enroll in the YCC program and a control group who could not.

The impact study drew information from three data sources:

1. The Participant Tracking System captured the characteristics of all YCC participants as well as the services and activities they received. It allowed for identification of YCC participants for the QED and ensured that students in the RCT control group did not receive services funded by the YCC program.
2. School records obtained in spring 2018 used for both the QED and RCT included data two to three years before and two to four years after students could have entered the YCC program.
3. Surveys completed by 279 treatment and 157 control group students in three of the four RCT school districts included baseline information from 98 percent of the students and 100 percent of their parents and follow-up surveys from 81 percent of students. These surveys provided a richer set of outcomes than were available in school records.

We pre-specified *primary* and *secondary* analyses and based study conclusions on the smaller number of primary analysis outcomes, with the secondary analysis providing support for and

depth to those findings. The primary analysis, based on the 16 QED school districts, used school records data for 6,207 treatment group students who enrolled in the YCC program and 109,541 comparison group non-YCC students and examined four key outcomes. The secondary analysis included three complementary components, described in the sidebar. Despite the rigor with which the impact study was designed and implemented, caution must be used in interpreting its results, for at least three reasons. (1) Impacts were estimated on milestones and momentum points and not the longer-term outcomes targeted by the YCC program. (2) Our QED analysis cannot account for unobservable characteristics that might exist between treatment and comparison group students, despite strong similarity in the demographic and educational background characteristics of the two groups. (3) The small sample size in the RCT means the analysis could not detect effects that we might expect to find.

Primary and secondary analysis

Primary analysis outcomes

- School attendance
- Credit accumulation
- English language proficiency
- Algebra progression

Secondary analysis

- Subgroup analysis
  - Prior academic achievement
  - Low-income status
  - Cohort
  - Receipt of key YCC program services (internship, mentorship, and individual development plan)
- High school graduation analysis
- Self-reported actions
  - Staying in school
  - School engagement and satisfaction
  - Positive behavior at school
  - Postsecondary credits earned during high school
  - Educational expectations and knowledge
  - Work-readiness skills
  - Paid work experiences
  - Substance abuse

B. Findings

Our estimations showed that the YCC program had a small impact on improving outcomes that have been associated with education and employment success. Specifically, we found evidence that the YCC program increased both school attendance and credit accumulation, both of which have been shown to reduce the rate at which students drop out of high school (Ginsburg et al. 2014). In some analysis, program participation had a statistically significant impact for increasing proficiency in English language arts, which is shown to be associated with postsecondary success (Hein et al. 2013). We present details of these findings by answering three targeted research questions. Together, answers to the questions provide insights that answer to the impact study's overarching research question.

1. *What is the impact of the YCC program on school attendance, credit accumulation, proficiency in English language arts, and algebra progression?*

The primary analysis conducted by the QED found that, two to four years after starting a program:

- The YCC program produced a small increase in school attendance. On average, students in the treatment group attended 91.5 percent of enrolled days, compared to 90.7 percent for the comparison group. This impact of 0.7 percentage points is equivalent to an effect size of 0.05 standard deviations. The estimate is robust to alternative estimation methods and significant at the 5 percent level.

- The YCC program produced a small increase in credit accumulation. Students in the treatment group were on average about 0.19 standard deviations above the school district average number of credits earned, compared to those in the comparison group, who were 0.09 standard deviations above the average number of credits earned. The impact is equivalent to the average student who is at the 50th percentile of the credits distribution moving up to approximately the 54th percentile in the distribution. The estimate is robust to alternative estimation methods and significant at the 5 percent level.
- The YCC program may have benefited a student's postsecondary preparation by improving proficiency in English language arts. Estimated impacts suggest that a YCC student who is at the 50th percentile in the distribution of proficiency in English language arts might have moved to the 52nd percentile. The impact is significant at the 5 percent level when students are weighted equally and is positive in 10 of 15 school districts.
- No evidence exists that the YCC program had an effect on students completing algebra coursework.

2. *Does the impact of the YCC program vary by (1) key student characteristics (prior academic achievement and low-income status); (2) program experiences (receiving an internship, having a mentor, and completing an IDP [individual development plan]); or (3) cohort?*

The QED showed that, two to four years after starting a program:

- No consistent pattern emerged across student subgroups based on their prior academic achievement and low-income status.
- Impacts tended to be larger for those who received an internship, had mentor, or completed IDPs compared to those who did not. However, we cannot rule out that these effects are partly driven by unobserved factors that influence both service participation and outcomes. Our analysis does not allow us to identify which of these services generated the largest impact.
- The pattern of results suggest that the YCC program might have had a larger impact for the students starting the YCC program in the later years than those starting in the early years on accumulated credits, proficiency in English language arts, and algebra progression, though not on school attendance. This finding is consistent with finding in the implementation study that later cohorts of students might have received a higher dosage of services compared to earlier cohorts.

3. *What appears to be the impact of the YCC program on high school graduation, staying in school, school engagement and satisfaction, positive behavior at school, postsecondary credits earned during high school, educational expectations and knowledge, work-readiness skills, paid work experiences, and reduced substance abuse?*

The QED showed that the YCC program did not lead to impacts on high school graduation for the students with an on-time high school graduation when we collected school records data in fall 2018. About 88 percent of both treatment and comparison group students had actually graduated. This analysis was done using early cohorts of YCC students. Because program effects appear larger in later cohorts, it is possible that the YCC program could

affect the graduation rate for the later cohorts, but we cannot measure the effect on those groups because the study ended when these students were too young to have graduated.

The RCT suggested that the YCC program did not affect any of the 20 outcomes captured by the follow-up survey (implemented about two years after starting a program) in the following areas: (1) high school behaviors, (2) postsecondary preparation, and (3) employment readiness. Our point estimates are small and statistically insignificant at the 5 percent level. We note that difficulties that districts faced in generating sufficient demand to conduct random assignment left the RCT analysis not sufficiently powered to detect program effects.

The RCT produced results in these three areas:

- **High school behaviors.** Similar percentages of treatment and control group students (87 and 90 percent, respectively) reported participating in a school-sponsored activity, believing grades are very important (76 and 75 percent), and liking school a lot (36 percent of both groups). Students in both groups also reported similar experiences with substance abuse, although the difference between the percentages of the two groups who reported never using marijuana (81 and 88 percent) is statistically significant at the 10 percent level.
- **Postsecondary preparation.** Similar percentages of treatment and control group students reported expecting to receive a two-year college degree or above (88 and 92 percent) and a vocational certificate (19 and 15 percent), taking dual-enrollment courses while in high school (72 and 69 percent), and understanding what courses they needed to take to attend a four-year college (78 and 80 percent).
- **Employment readiness.** Similar percentages of treatment and control group students reported earning a degree, certificate, or license at school that would help them get a job (29 percent in both groups) or earning a badge for a specific skill, talent, or other achievement or taking courses at school that led to an industry-recognized credential (51 and 52 percent). Both groups also reported similar levels of ever having worked for pay (69 and 70 percent) or having a job arranged through school (26 and 20 percent).

C. Future research

Taken together, our results indicate that the YCC program had relatively small but significant impacts on outcomes that students could achieve while in high school and that are associated with longer-term education and employment success. Whether these improvements translate into the longer-term gains the program intended to promote needs to be explored through future studies. The need for such studies might be especially important because an evaluation of career academies shows that the impact of these types of high school interventions on employment can sometimes take years to surface (Kemple 2008, 2004). It will be feasible to continue research on the students in this evaluation using a restricted use data file (Vigil, Burkander, and Maxwell 2019) and to follow up with students from 11 of the 16 school districts in the QED to collect National Student Clearinghouse data.

Future research might also focus on determining the mechanisms that produce these impacts. Our findings suggest that internships, mentoring, and IDPs might be a place to focus. Although we show larger impacts for students engaging in these program components, we cannot rule out that these effects are partly driven by unobserved factors that influence both service participation and program outcomes. Future research should rigorously determine whether these program components do indeed improve high school student outcomes and, if so, whether they have independent effects or are enhanced when they are offered as a group or in certain combinations.

I. INTRODUCTION

Youth in the United States often have trouble obtaining employment and work experience. Youth ages 16 to 19 had unemployment rates that were 3.3 times the national average in February 2019, with rates for black youth over 8 times higher (U.S. Department of Labor 2019). Work-related problems are exacerbated when youth have only a high school education. Between 1979 and 2017, median wages fell for workers with only a high school education but increased for those with a bachelor's or advanced degree (Donovan and Bradley 2018). Part of the difficulty lies in the growing gap between the skills of high school–educated youth and the needs of employers (Holzer et al. 2011). Indeed, employers in high-demand industries often rely on the H-1B visa program, which permits companies to hire foreign workers when skilled domestic workers are not available. In 2017 alone, employers submitted requests for more than 330,000 H-1B visas (U.S. Citizenship and Immigration Services 2017).

One promising approach to helping youth develop the skills that meet employers' needs is to foster career pathways that start cultivating those skills in high school and continue skill development in postsecondary education and training programs. The U.S. Department of Education (2016) identified strategies for enhancing students' high school experience to improve college and career outcomes by including four features: (1) a rigorous curriculum and technical training focused on specific in-demand industries, (2) help earning postsecondary college credits while still in high school, (3) college and career counseling, and (4) a small learning community (SLC). [The Notice of Availability of Funds and Solicitation for Grant Applications, or SGA (https://doleta.gov/grants/pdf/youthCareerConnect13.pdf) defines a SLC as "smaller, autonomous groups of students and teachers in a more personalized learning environment that can better meet the needs of students".] The U.S. Department of Labor (DOL) also saw this potential and, in April 2014, its Employment and Training Administration (ETA) awarded $107 million in four-year grants to 24 applicants across the country to implement the Youth CareerConnect (YCC) program.[2] Lead applicants could include a public or nonprofit local workforce entity, a local education agency, or another type of nonprofit entity. Through the YCC program, grantees worked to develop new or strengthen existing partnerships between high schools, institutions of higher education, employers, and local workforce development boards to support instruction and motivate students to develop the skills needed for postsecondary education and employability in occupations and industries such as health care, advanced manufacturing, and financial services that typically rely on the H-1B visa program to obtain a portion of their workers.

In collaboration with DOL's Chief Evaluation Office, ETA contracted with Mathematica and its subcontractor Social Policy Research Associates to conduct an evaluation of the YCC program, hereafter called the YCC evaluation. Because most students were still in high school at the time of the evaluation, it assessed whether the YCC program improved performance in high school in ways that might lead to high school graduation, postsecondary education or training, and increased employment and earnings. This report presents the estimated impacts of the YCC

[2] DOL has used the fees companies pay for labor certifications to hire foreign workers under the H-1B program to establish programs such as the YCC program for job training and education for U.S. citizens to upgrade their skills.

program. A separate, companion report, *Building College and Career Pathways for High School Students: Youth CareerConnect, Technical Report for the Impact Study* (Burkander et al. 2019), provides a technical discussion of the data, samples, and analysis.

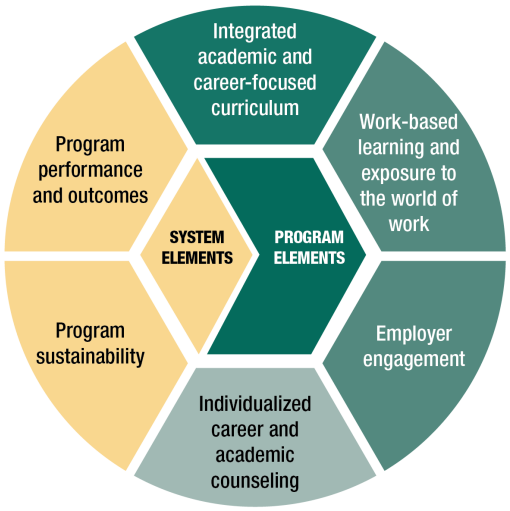
The rest of this chapter provides an overview of high school programs designed to build both college and career potential, including the YCC program (Section A); describes the grantees, school districts, and students included in the YCC program (Section B); provides an overview of the YCC evaluation (Section C); and gives a road map to the rest of the report (Section D).

A. The YCC program model drew from evidence-based approaches to building college and career potential

At its core, the YCC program aimed to improve students' post–high school employment and earnings by making the high school experience more engaging for them and strengthening America's talent pipeline. This pipeline would be built by increasing students' ability to complete postsecondary education and occupational skills training, obtain industry-recognized credentials, and secure an unsubsidized job.

To meet this goal, the SGA stated that grantees were to implement a common program model defined by six core elements, two at the system level (that is, school or school district) and four at the program level (Figure I.1). System-level core elements (the yellow portion of Figure I.1) include program performance and outcomes tracking and program sustainability. YCC grantees had to engage in reporting activities so that DOL could monitor their performance under the grant and were required to build structures and systems to sustain services and activities after YCC grant funding ended. One element of the reporting requirement was the YCC Participant Tracking System (PTS), developed by Mathematica on behalf of DOL, and used to track students' services and activities funded under YCC.

Figure I.1. DOL-required core elements for YCC grants



Program-level core elements (the green portion of Figure I.1) include an integrated academic and career-focused curriculum, work-based learning (WBL) and exposure to the world of work, employer engagement, and individualized career and academic counseling. These four elements can be categorized into three components:

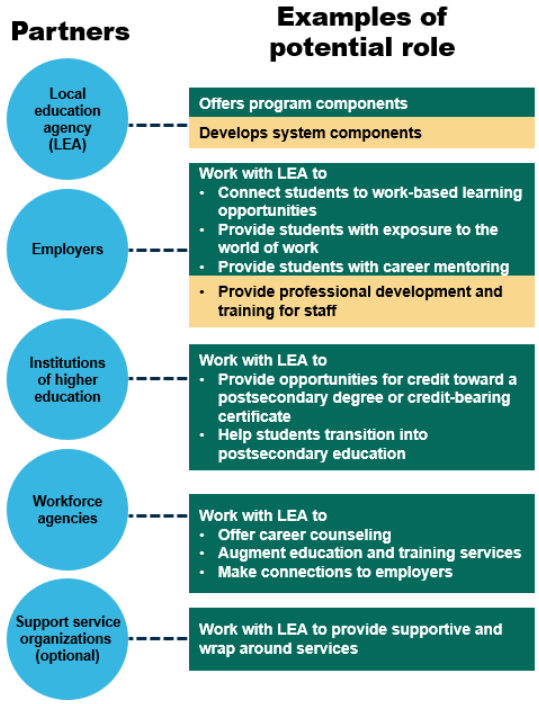
1. **Preparing students for both college and career.** Students were to receive an *integrated academic and career-focused curriculum* aligned with the state's college and career-readiness standards and with postsecondary education supports. The integrated curriculum was designed to provide youth with a career focus in selected high-growth H-1B industries or occupations in the local labor market to increase employability and prepare them for postsecondary education, long-term occupational skills training, or registered apprenticeships.

2. **Connecting students with career-track employment.** Both at school and in the workplace, students were to receive hands-on career development experiences that connect classroom instruction to work and career opportunities. In addition to actual work experience and mentoring, students would participate in field trips, job shadowing, or other types of opportunities that expose them to different career paths and prepare them for the world of work. Both *WBL and exposure to the world of work were to be made possible by strong employer engagement* through partnerships that helped provide WBL opportunities and created a path for student employment in in-demand industries and occupations. At the school or school district level, employer partners were to work closely with schools on staff professional development and training to drive program sustainability.
3. **Offering supports.** Programs were to include *individualized career and academic counseling* to strengthen students' career and postsecondary awareness and exploration of opportunities beyond high school. Counselors were to work with students to develop and maintain an individual development plan (IDP), and other personalized academic (for example, tutoring and homework assistance) and nonacademic supports (for example, assistance with finances, health and well-being, and special needs).

In addition, the SGA required YCC grantees to develop other supporting services and activities:

- **An SLC** of autonomous groups of students and teachers was to provide a personalized learning environment. Generally, the same teachers and students would remain together from grade to grade. Teachers would typically have common planning time to develop interdisciplinary projects and keep abreast of the progress of their shared students. The SLC would provide students with needed supports and allow for cross-disciplinary projects.
- **Four types of community partners** (Figure I.2)—local education agencies (schools, school districts, or both), employers, institutions of higher education (IHEs), and workforce development system agencies, including American Job Centers—would deliver career-focused training and support students academically. YCC grantees could also engage support service organizations to provide holistic support to program participants, including supportive and wraparound services, but such partnerships were not required as a condition for the grant.

Figure I.2. YCC partners



- **Professional development** to teachers and other staff would build the knowledge and skills needed to develop the core curricula and support services to guide students toward a career.

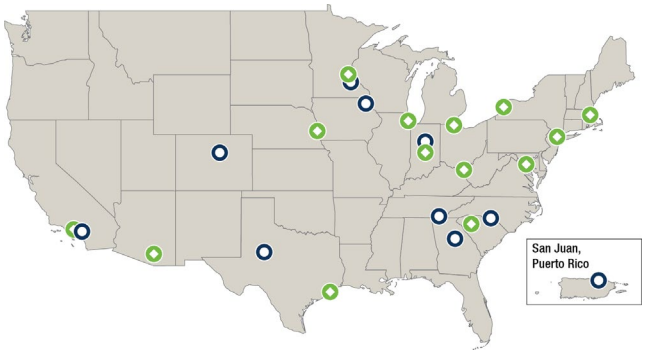
The design of the YCC program grew from the U.S. Department of Education's expectations for students' educational progress, as manifested in its college and career-readiness standards. These standards set criteria for what students are expected to know and understand for both college and careers by the time they graduate from high school (https://www.ed.gov/k-12reforms/standards). They include all grades and help students qualify for and succeed in entry-level, credit-bearing college courses leading to a degree or certificate as well as career pathway–oriented training programs (Conley 2012).

The design is consistent with three other approaches to career-focused education and training, and each is supported by experimental or quasi-experimental research providing evidence of its effectiveness:

1. **Career academy programs** helped redesign the high school experience in the 1990s with four key components: (1) a SLC; (2) a college preparatory curriculum based on a career theme that applies academic subjects to labor market contexts; (3) WBL; and (4) employer, higher education, and community partners (National Career Academy Coalition 2013; Stern et al. 1992, 2010; Brand 2009). Experimental and quasi-experimental evaluations of early career academies found that they improved academic achievement and reduced high school dropout rates for disadvantaged students (Stern et al. 1992, 2010; Kemple 2008; Kemple and Snipes 2000; Maxwell and Rubin 2000); improved preparation for and graduation from college (Maxwell 2001); and increased wages, hours worked, and employment stability (Kemple 2004; Maxwell and Rubin 2002).
2. **Sector-based** training is structured to address employer needs (Greenstone and Looney 2011; Maguire et al. 2010; Woolsey and Groves 2010), often within the workforce development system (Harper-Anderson 2008). Such training uses labor market statistics and information collected directly from employers to identify the skills needed in jobs in the local labor market. Training providers work with employers to develop curricula that meet these skill needs. Evaluations of sector-based programs have yielded promising findings. An experimental study of three relatively mature sector-based programs estimated that adult participants earned about $4,500 (18 percent) more during a two-year period than similar adults who did not participate in the programs (Maguire et al. 2010).
3. **Career pathways programs** provide an organized series of steps that lead to progressively higher credentials and employment opportunities aligned with jobs in-demand in the local labor market (Schwarz, Strawn, and Sarna 2018; Fein 2012; Hull 2005). The first step on the pathway—where the YCC program lies—provide the basic and academic skills needed for college-level training and semiskilled jobs. The pathway from high school leads to training for skills or a short-term certificate showing evidence of skills needed for entry-level jobs (Fein and Hamadyk 2018), which sets the stage for continuation along the pathway into associate's or bachelor's degree programs or obtaining a workplace credential.

B. A diverse set of grantees prepared a diverse set of students for jobs in high-demand areas

In April 2014, DOL awarded grants to 24 applicants to implement the YCC program. Program implementation started in the fall of the 2014–2015 school year with grantees enrolling 31,019 students—well above the 25,000 set as a performance goal. Enrollment in the YCC program took place in 130 high schools, 75 school districts, 3 occupational centers that provided the career and technical education needs for employment in the communities, and 3 community colleges (excluding dual enrollment districts). YCC grantees were geographically diverse. They were located in 18 states and Puerto Rico (Figure I.3) and in a wide variety of communities including 29 rural locations, 22 towns, 16 urban areas, and 11 suburban areas. Most YCC grantees (17 of the 24) implemented the YCC program in only one school district, but two had implemented it in at least a dozen schools.



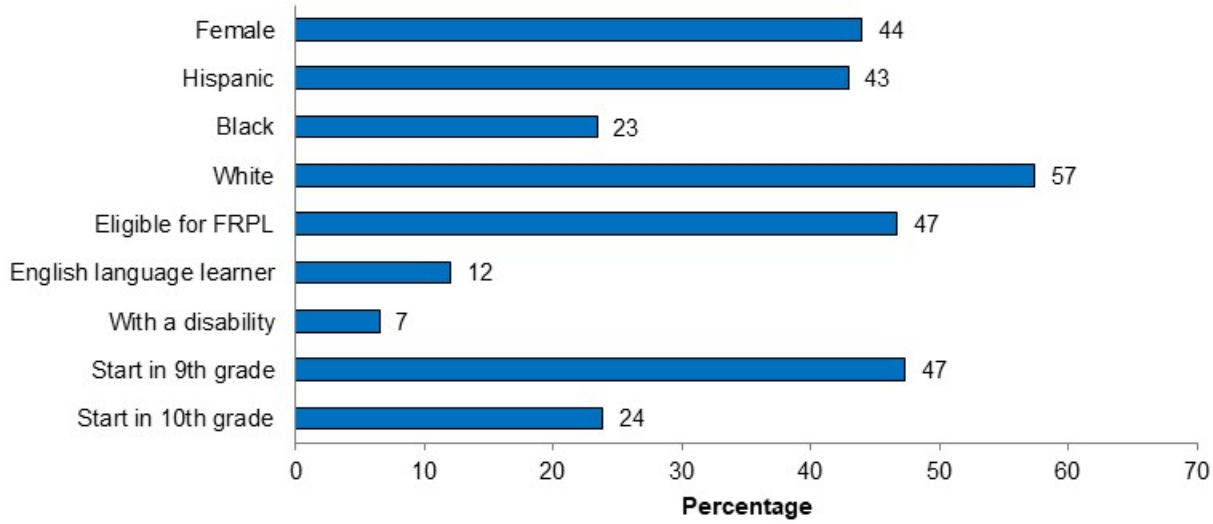
Source: https://www.dol.gov/newsroom/releases/eta/eta20140407-0

Notes: Green dots indicate grantees that participated in the YCC impact study, blue dots indicated grantees that only participated in the implementation study.

YCC grantees were diverse. Grants varied in size from $2.25 to $7 million, with seven receiving less than $3 million and six at least $6 million. The most common grant recipient was an education organization—16 of the 24 were local education agencies—although DOL also awarded grants to five nonprofit organizations, two workforce entities such as planning boards, and an institution of higher education. Finally, grantees had large variation in enrollment, with four school districts enrolling 49 percent of all YCC students as of September 30, 2018.

YCC students were also diverse (Figure I.4). Slightly less than half (44 percent) were female. The enrolled students were racially and ethnically diverse (43 percent Hispanic and 23 percent black), with a large proportion considered low-income based on their eligibility for free and reduced price lunch (47 percent). A small percentage had special needs: 12 percent were English language learners and 7 percent had a disability. Also, while almost half (47 percent) of the YCC students had enrolled in the program in grade 9, some students enrolled in higher grades.

Figure I.4. YCC students



Source: Participant Tracking System.
FRPL = free and reduced price lunch.

YCC grantees aimed to prepare students for entry-level work in high-demand industries. The PTS data on service receipt suggest that a majority of students in the program received focused career preparation services in an industry or occupation (see sidebar). Over two-thirds (72 percent) had a career focus in the industries of health care and social assistance, professional services (for example, drafting, computer systems design, financial services, and marketing), information technology, or manufacturing. Three-quarters had an occupational focus in architecture and engineering, computer and math, health care, and business and finance-related occupations.

Typical career focus for YCC students

Industry	
Health and social assistance	27%
Professional services	22%
Information technology	12%
Manufacturing	11%
Other	22%
Occupation	
Architecture and engineering	25%
Computer and math	20%
Health care practitioners and technicians	17%
Health care support	8%
Business and financial	6%

Source: Participant Tracking System.
Note: Because grantees could report on a student's industry and/or occupation and 9 percent had not selected a focus, percentages do not add to 100.

C. The YCC evaluation provides rigorous estimates of program impacts

The mixed-method YCC evaluation includes: (1) an implementation study that provided a comprehensive picture of how grantees implemented the YCC program, and (2) an impact study with two rigorous components—a quasi-experimental design (QED) study in 16 school districts (shown in green in the map in Section B) and a randomized controlled trial (RCT) in four school districts—that assessed the impact of the YCC program on key short-term outcomes. Results of the implementation study are included in a series of three reports (Dillon 2019; Geckeler et al.

2019; Maxwell et al. 2017), with some results highlighted in Chapter II of this report to provide context for the impact study.

The impact study addressed the overarching research question, *What is the impact of the YCC program on critical milestones that can be achieved in high school and momentum points associated with education and employment success?* We addressed this question by answering three sub-level questions:

1. What is the impact of the YCC program on school attendance, credit accumulation, proficiency in English language arts, and algebra progression?
2. Does the impact of the YCC program vary by (1) key student characteristics (prior academic achievement and low-income status); (2) program experiences (receiving an internship, having a mentor, and completing an IDP); or (3) cohort?
3. What appears to be the impact of the YCC program on high school graduation, staying in school, school engagement and satisfaction, positive behavior at school, postsecondary credits earned during high school, educational expectations and knowledge, work-readiness skills, paid work experiences, and reduced substance abuse?

These research questions are structured to be answered using school milestones and momentum points to capture outcomes (see sidebar). This approach allows researchers and policymakers to gauge progress toward ultimate education and employment success (Center for Postsecondary and Economic Success [CLASP] 2013). It was adopted because data collection for the YCC evaluation ended in 2018, at which time most students were 16 or 17 and still in high school. Adopting in-school milestones as outcomes allowed us to capture measurable academic achievements or intermediate successes—staying in school and graduating from high school—that can be achieved by the YCC students during the period of the evaluation. Similarly, using in-school momentum points allowed us to capture activities, behaviors, achievements, or attitudes that are empirically correlated with the completion of future education and employment milestones.

Outcomes during high school

Milestones

High school diploma

Still in school at a point in time

Momentum points

Education success

High school behaviors

- Attendance
- Credit accumulation
- School activities
- Engagement and satisfaction
- Reduced substance abuse

Postsecondary preparation

- Math and English proficiency
  - English language proficiency
  - Algebra progression
- Positive education expectations and knowledge

Employment success

- Work-readiness skills
- Paid work experience

We selected momentum points associated with both milestones and long-term education and employment success. Predictors of staying in high school (Rumberger [2011] provides a synthesis on dropouts) include attendance and credit accumulation (Ginsburg et al. 2014), positive engagement in school activities (Parr and Bonitz 2015), and school engagement and satisfaction (Stout and Christensen 2009), and lack of involvement with the criminal justice

system and substance abuse (Doll, Eslami, and Walters 2013). Predictors of postsecondary success include academic proficiencies, as shown in standardized test scores, and successful completion of courses in algebra (Hein et al. 2013; Gaertner et al. 2014); positive education expectations and knowledge; and earning postsecondary credit in high school (Lerner and Brand 2006). Predictors of paid employment for youth include work-readiness skills (Al-mamun 2012). Youth experience with paid work has also been associated with successful work outcomes as adults (Light 2001).

The strategy for answering the research questions exploited the relative strengths of the QED and RCT designs to obtain an overall picture of the effects of the YCC program (Burkander et al. [2019] provides details). The QED drew information from a single data source: school records obtained from 16 school districts. It formed a comparison group using propensity score methods to match students who participated in the YCC program to students in the same school district—and often the same high school—who did not. It developed cohorts—three cohorts for YCC programs enrolling only 9th graders and six cohorts for those enrolling both 9th and 10th graders. Cohorts were based on the school year in which a student could enroll in the YCC program: school years starting fall 2014 (cohort A), 2015 (cohort B), and 2016 (cohort C). We could obtain two to four years of data following potential enrollment in the YCC program, with the number of years based on the year of cohort development (see Table I.1).

Table I.1. Cohort development for the QED component of the impact study

Cohort	2014	2015	2016	2018	Number of school years followed	Year in high school at follow-up
Programs starting in 9th grade						
9A	X			O	4	Senior
9B		X		O	3	Junior
9C			**X**	O	2	**Sophomore**
Programs starting in 10th grade						
10A	X			O	4	Fifth-year senior
10B		X		O	3	Senior
10C			**X**	O	2	**Junior**

Note: "X" designates the year in which a cohort of 9th or 10th grade students entered the YCC program. "O" indicates the year outcomes were captured. Blank cells indicate that a cohort was not developed and outcome data were not captured. **Bold face** indicates the cohort in the randomized controlled trial.

The RCT took place in four school districts, all of which were in the QED (Burkander et al. [2019], Chapter 2 provides details about their selection and their characteristics). Because it took over a year to set up and conduct the random assignment process, the RCT includes fewer cohorts than the QED: it contains two cohorts of students applying to a 9th- or 10th-grade YCC program in the 2016–2017 school year (Cohorts 9C and 10C in Table I.1), who were then followed for two years. These applicants were randomly assigned into a treatment group (who could enroll in the YCC program) or a control group (who could not enroll in the YCC but could enroll in other available programs in their schools or school districts). In addition to information

about students obtained from school records, students in three of the four school districts in the RCT completed a follow-up survey about two years after the application process. That survey provides a richer set of outcomes (high school behaviors, postsecondary preparation, and employment readiness) than could be obtained from the school records data, but one school district could not accommodate administration of the survey.

We developed and applied criteria to select school districts for inclusion in the impact study for both the QED and RCT designs. Criteria included (1) a sharp contrast between the YCC program and the alternative program(s); (2) sufficient size to warrant the expense of obtaining data; (3) availability of needed administrative data; and (4) the possibility of constructing a comparison or control group.

The school districts ultimately included in the impact study after application of these criteria represent a relatively large proportion of YCC students: about 55 percent of all YCC students were in districts included in the QED, over 25 percent were in school districts included in the four districts in the RCT, and about 15 percent were in school districts in the three districts participating in the survey conducted for the RCT. Nonetheless, compared to all YCC students, the students in the impact study were different in both their characteristics and the services they received (Table I.2):

- **More at-risk students.** Most characteristics suggest that the impact study samples contained more students at-risk of dropping out of high school (Rumberger 2011). For example, study samples contained a lower proportion of white students and greater proportions of those on free and reduced price lunch and those with a disability.
- **Greater exposure to YCC services and activities.** The impact study samples had greater exposure to YCC program services and activities—as would be expected given the criteria for study inclusion (for example, a greater proportion had school-based WBL experiences, mentorships, and career/academic counseling; and a greater proportion in the RCT took industry-specific courses).

Table I.2. Differences between impact study samples and all YCC students

	QED	RCT	RCT survey
Characteristics			
Female	—	+	+
White	—	—	—
Free and reduced price lunch	+	+	+
English language learner	—	0	—
Had a disability	0	+	0
Services			
Took industry-specific course	+	+	+
School-based work-based learning experience	+	+	+
Mentoring	+	+	+
Internship	—	—	0
Received career/academic counseling	+	+	+

Source: Table V.1 and V.2, Chapter V in Burkander et al. (2019).

Note: Table shows characteristics in which the impact study sample differed from all YCC students.

+ = impact sample had a greater proportion, at 5 percent significance level.

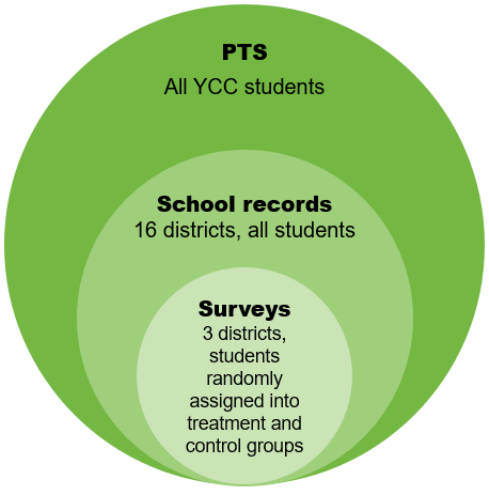
0 = no difference, at 5 percent significance level.

— = impact sample had a lower proportion, at 5 percent significance level.

1. Data sources and analysis

To answer the three research questions, the impact study used information from three data sources (Figure I.5) (Burkander et al. [2019], Chapter 2 provides details on each source).

Figure I.5. Data sources for the YCC impact study



- The **PTS** provided information on characteristics of all YCC participants and the services and activities they received. Data used for the evaluation included records between April 1, 2014, when funding started and September 30, 2018, the last day in which enrollment was allowed. Because the PTS represents a census of YCC participants, it provided a complete picture of the services and activities students received. It also allowed for identification of YCC participants for the QED and ensured students in the RCT control group did not receive services funded by the YCC program.
- **School records.** We collected school records for all students across the cohorts described in Table I.1 in the 16 school districts included in the QED (that includes the four RCT school districts). Data included baseline records on students two to three years before they could enter the YCC program as well as follow-up records about their high school experiences through spring 2018. Information in baseline records included days enrolled and present at

school, days suspended, free and reduced price lunch status, and English language learner and special education status, and middle school English language assessment and math test scores. The baseline records were used to match non-YCC students with the treatment group to develop the comparison group for the QED, to form subgroups for the subgroup analysis, and to construct covariates for the impact estimation models to improve precision. The follow-up records included information on outcomes two to four years after enrollment in the YCC program for students in the QED and two years after group assignment for students in the RCT, including days enrolled and present, credit accumulation, English language assessment scores, algebra I and II completion, and high school graduation. These records allowed us to estimate impacts of the YCC program using 6,207 students who enrolled in the program and a comparison group of 109,541 similar students who did not.

- **Surveys.** Mathematica administered baseline surveys to students and parents as well as follow-up surveys to students in the treatment and control group in three of the four school districts in the RCT. The baseline surveys were self administered with program staff distributing and collecting surveys during the period in which students applied to the YCC program (from November 2015 to August 2017). We received 527 from the 540 students who went through the random assignment process and 539 BIFs from parents, for a 100 percent response rate among parents and 98 percent among students. The follow-up surveys were completed through the web or by telephone by 440 students from August to December 2018 (an 81 percent response rate). Survey responses included information on education, employment, life stability, school activities, behavior and motivation, participation in WBL and career preparation activities, receipt of support services, and education plans. Burkander et al. (2019) provides details on survey methods.

We used regression models weighted by districts (or individuals in a sensitivity analysis) to estimate YCC program impacts for students in both the QED and RCT. Using baseline covariates to capture some of the variation in the outcomes improved precision over a simple comparison between students in the treatment and comparison/control groups of mean values on outcomes (Burkander et al. [2019], Chapter III provides details). We used a similar approach for the subgroup analysis (for example, estimating impacts by cohort), where the models included terms formed by interacting the treatment status indicator with subgroup indicators (for example, cohort indicators). We used *t*-tests to assess statistical significance of the treatment effects, and used *F*-tests to gauge differences in treatment effects across subgroups (for example, by cohort).

To focus the analysis, we pre-specified *primary* and *secondary* analyses in the study design documents. We did not describe our analyses as confirmatory or exploratory (the more traditional labeling) because the intermediate milestones and momentum points that we are able to observe as outcomes only gauge progress toward the ultimate education and employment goals of the YCC program. We based study conclusions on the smaller number of primary analysis outcomes; secondary analysis provided support for and depth to the primary analysis. Differentiating the two types of analyses, with focused primary analysis hypotheses, helped to minimize the multiple testing problem in which the chance of spurious impact findings increases

substantially when conducting hypothesis testing across many outcomes and subgroups (Schochet 2009).[3]

The primary analysis answered the first research question, the study's central question: What is the overall impact of the YCC program on school attendance, credit accumulation, and proficiency in English language arts, and algebra progression? (see the sidebar). It was conducted using the full sample in the QED school districts, which includes 16 school districts, 115,748 students, and 6 cohorts of students in the treatment and comparison samples. The QED design yielded impact estimates with statistical power and with the ability to provide a complete picture of effects across the entire YCC program. Although QED methods are not considered as rigorous in assessing causality as an RCT, research has shown that, in the education context, much of this bias can be removed using detailed matching variables, which were available for this study from the school records data used (Shadish et al. 2008).

Primary and secondary analysis

Outcomes for primary analysis

- School attendance: percentage of days a student is present out of all possible days of attendance
- Credit accumulation: Student *z*-score of total accumulated high school credits
- Proficiency in English language arts: *z*-score on English language arts exam
- Algebra progression: A binary variable with 1 indicating the student received credit for algebra (I or II)

Secondary analysis

1. RCT impact analysis
   - Replication of primary analysis using RCT sample
   - Expanded outcomes in follow-up survey
2. High school graduation analysis
3. Subgroup analysis

The secondary impact analysis included three complementary components:

1. **RCT impact analysis.** We re-estimated the primary impact analysis using school records in the four RCT districts. These impacts were used to corroborate those from the primary analysis using all 16 school districts. For this analysis, we included in the impact estimation models additional baseline covariates from the baseline survey to further improve precision, and we used weights to help correct for potential survey nonresponse bias (see Burkander et al. [2019], Chapter III). In addition, we used the RCT sample in three school districts to estimate impacts on the milestone of staying in school, and the broad array of momentum point outcomes available in the follow-up survey to help identify potential hypotheses about the mechanisms for program effects and areas for program improvement.
2. **High school graduation analysis.** Because students in cohorts 9A, 10A, and 10B (Table I.1) were old enough to have an on-time graduation by the time we of our school records data, we estimated impacts of the YCC program on whether the student had graduated for those cohorts.

[3] Because we pre-specified a limited the number of primary analysis outcomes, we did not adjust *p*-values from the statistical tests for multiple testing (Schochet 2009). This approach balanced the study objective of minimizing the chances of finding spurious impact findings with the study having sufficient power to detect impacts that truly exist (that is, balancing Type I and II errors).

3. **Subgroup analysis.** This analysis answered the second research question about whether impacts vary by (1) key student characteristics (prior academic achievement and low-income status), (2) program experiences (receiving an internship, having a mentor, and completing an IDP), or (3) cohort. This analysis was conducted using outcomes from the school records.

2. Considerations

The complementary features of the QED and RCT provide key insights about college and career pathway programs developed and implemented in high schools around 2017. Such information is critical because results from evaluations on career academies—an early version of the YCC program—were based on school environments 20 years earlier. Both changes in public school environments and the evolution of the model provide an opportunity with the YCC evaluation to determine whether the next generation of the model is effective. Still, despite the rigor with which the impact study was designed and implemented, caution must be used in interpreting its results for these reasons:

- Impacts were estimated on milestones and momentum points, not the long-term educational and employment outcomes targeted by the YCC program.
- Program spillover effects into the school or school district made it difficult to capture the conditions that would exist without the presence of the YCC program. The follow-up survey asked both treatment and control group students about the services they received, and show the extent of spillover effects in the three districts in which the survey was administered (see Burkander et al. [2019], Tables V.6 to V.8 for details). Discussions with staff during our implementation study (Geckeler et al. 2019) suggested that the YCC program spurred college and career services in schools in which the YCC program is offered. The presence of these counterfactual services lowers the contrast between the treatment and comparison groups, thereby potentially lowering estimated program impacts.
- The study had limited information on YCC program services received by the QED comparison group. The grantee survey obtained general information on services like those designed for the YCC program in non-YCC schools in one specific school for each grantee (see Chapter II), which allowed us to draw some preliminary conclusions about the general nature of differences in services offered to YCC and non-YCC students. Collecting detailed information consistently for both treatment and comparison students would have involved conducting a survey across the 16 QED school districts, which was beyond the scope of the study. As a result, we only had a general sense of counterfactual services with which to benchmark our impact findings in the QED component of the evaluation.
- The YCC program is but one type of college and career pathway program, which means our results do not generalize to the broader category of these programs as a whole.
- Both the RCT and some subgroup analyses had small sample sizes, which makes it difficult to find statistically significant impacts at the 5 percent level. Thus, it is possible that impacts did occur in reality but such impacts were not detectable within the analyses conducted for this study.

D. Structure of the report

The remainder of this report presents the findings from the impact study. It is one of six products that presents findings from the YCC evaluation (see sidebar).

In Chapter II, we frame the interpretations for the impact study by summarizing results from the implementation study. In Chapter III, we present the estimated impacts that answer the first and second research questions, which comprise the primary and secondary analyses using the school records data. We discuss secondary RCT impact analyses showing estimated impacts on an extended array of outcomes as reported in the follow-up survey in Chapter IV. In Chapter V, we summarize our findings within the broader context of college and career programs and discuss the ways in which future research might be developed to look at longer-term outcomes.

Reporting on the YCC program
Available at
https://www.dol.gov/agencies/oasp/evaluation/completedstudies

Summary of all results

- *Brief.* Summarizes the findings of the evaluation's impact and implementation studies (Maxwell and Dillion, 2019).

Implementation study reporting

- *Early years.* Explores implementation of the YCC program through the 2015-16 school year, after two years of YCC funding (Maxwell et al. 2017).
- *Implementation.* Explores the evolution of YCC program implementation through the 2017-18 school year, and the approaches grantees planned for sustaining the YCC program after grant funding ended (Geckeler et al. 2019).
- *Employer and workforce agency partnerships.* Examines YCC programs' partnerships with employers and local workforce development system agencies (Dillon 2019).

Impact study reporting

- *Impact findings.* Examines the impact of participation in the YCC program on student success during high school (this report).
- *Technical documentation.* Provides a technical discussion about the data, samples, and analysis that underlie the estimated impacts presented in the impact findings report (Burkander et al. 2019).

II. IMPLEMENTATION OF THE YCC PROGRAM

The implementation study provided evidence of how grantees operationalized the YCC program. It drew information from three rounds of visits and telephone calls to school districts and schools in which 10 grantees offer the YCC program, as well as data from the PTS and a survey administered to all grantees in 2015 and 2017 (Burkander et al. [2019], Chapter II provides details). Information from the implementation study provided essential context for the impact study in three ways:

1. **Defining YCC core program components.** The implementation study highlighted which services are offered as part of the YCC program. It also provided a sense about which of those services might not be offered without the YCC program by assessing services that were likely available in non-YCC programs in the same school. Using this information, we could identify the core YCC program components, which we categorized as those services and activities were more typically offered through the YCC program but not other programs.
2. **Building a model that links core YCC program components to expected outcomes.** Information about implementation activities gathered from the YCC grantees and their education, workforce, and employer partners allowed us to describe and illustrate a comprehensive model to explain how and why the YCC program is expected to improve behaviors and knowledge gains during high school that will lead to postsecondary education and training success and, ultimately, employment and career success. The model was developed using results from the implementation study. It combines the distinctive YCC services and activities staff reported were used to influence momentum points and milestones (as described in Chapter I) and the contextual factors that staff described as influencing the program. We used the model to inform the analytic models developed for the impact study.
3. **Providing a context for interpreting impacts.** Defining the contrast between the YCC program and the counterfactual (that is, services offered by other programs in the same school or school district) provided the essential context for interpreting and explaining the estimated impacts presented in Chapters III and IV. It is because the implementation study found evidence of a service contrast between the YCC program and the counterfactual that we have confidence that the primary analysis in the impact study could be considered a fair test of the YCC program.

In this chapter, we discuss how the implementation study findings provide insights into the impact study. In Section A, we discuss the services and activities that were implemented as part of the YCC program and that likely distinguished it from other programs. In Section B, we use these distinguishing features of the YCC program to develop the model of YCC program implementation; and in Section C, we discuss the ways that the implementation study can help interpret the estimated impacts presented in Chapters III and IV. Full results from the implementation study are provided in the series of three reports shown in the "Reporting on the YCC program" sidebar on the previous page.

A. Services and activities offered by the YCC program help define the program and its rollout

As described in Chapter I, DOL required the delivery of six core elements, four of which were program specific. The evaluation organized services and activities in these elements into three program components: preparing for college and career, connecting to career-track employment, and offering academic and nonacademic supports. Delivery of the services and activities in each of these components should have helped youth in high school achieve education and employment milestones and momentum points that would help them ultimately gain education and employment success. We first discuss the services and activities that the implementation study identified as defining the YCC program and then discuss their implementation.

1. Services and activities that define the YCC program fall into three program components

The survey administered to grantees as part of the implementation study identified categories of services and activities within each program component that distinguished the YCC program from other programs offered at the same school (see Figure II.1 for a summary and Table A.1 in the Appendix for details of the analysis).[4] Interviews with YCC program staff and students provided details that allowed us to build an understanding what might lie inside the YCC program.

Figure II.1. Services and activities that differentiated the YCC program from alternative programs

Preparing for college and career

- Instruction in work readiness or occupational skills
- Coursework structured in ways that lead to articulation to a two- or four-year college program or an industry-recognized credential
- Emphasis on active learning pedagogies

Connecting to career-track employment

- Work-based learning

Offering academic and nonacademic supports

- Small learning communities
- Individual development plans

Source: Grantee survey, 2017.

Notes: Figure shows broad categories of services and activities that could differentiate the YCC program and alternative programs within each of the three YCC program components.

Preparing students for both college and career. Survey results suggest that schools offered YCC students instruction in work-readiness or occupational skills at a higher rate than other students were offered. This instruction involved activities, such as certification examination preparation and occupational skills training. The YCC program structured coursework to provide increased opportunities to articulate to a two- or four-year college program or an industry-recognized credential. Activities included

[4] Services and activities that distinguish the YCC program were developed from what grantees said, in the 2017 survey, that the YCC program offered (1) at least 30 percentage points higher compared to *all* students in an alternative program in the same school (or similar school if the YCC program was a whole school model) and (2) at least 20 percentage points higher compared to *some* students in the alternative program. Bear in mind three caveats to this analysis: (1) schools described in the survey are not representative of all schools offering the YCC program, (2) the rate of missing data is sometimes high for services and activities offered outside of the YCC program, and (3) questions did not ask about all YCC services (for example, counseling).

campus visits to four-year colleges, visits from college faculty or representatives, dual-enrolled courses, stackable credentials, and work-readiness assessments. The YCC program also emphasized active learning, offering capstone courses, citizenship training, community service learning, and project-based learning in courses.

YCC staff and students noted that YCC grantees used their career focus to help build both academic and career-related skills in two ways: (1) they structured academic and career-related classes to complement each other, and (2) they relied on specialized curricula or educational approaches that blended academic and career-related content across courses. Specifically, the implementation study suggests that the YCC program provided:

- **Complementary academic and career-related courses** that used three features: (1) integrating a career theme across all years, (2) using career-related courses to teach academic skills and academic courses to show students how academic subjects relate to a career theme, and (3) sequencing career-related courses to build technical skills, for example by preparing students for an industry-recognized credential and certification examinations.
- **Blended curricula or instruction** that included specialized curricula or educational approaches employing developed projects that applied skills from several courses. Such approaches included project-based learning, commercially available, integrated academic and career curricula (such as Project Lead the Way), and collaborative teaching.
- **Postsecondary supports** that aimed to build students' awareness of and ability to enroll in postsecondary education and work-readiness training by fostering good work habits, appropriate traits and attitudes, social skills, communication abilities, and competencies. These supports included credit accumulation and the goal of increased student awareness of postsecondary opportunities. College tours, classroom speakers, and informal/formal college-readiness support provided by college staff intended to increase students' awareness of college and motivate students to earn college credit either in high school or through dual enrollment.
- **Work-readiness training** included training in workplace behavioral expectations, such as attendance, punctuality, and appropriate dress; workplace culture and communication, such as effective verbal and nonverbal communication and accepting feedback constructively; and workplace performance expectations, such as collaboration and problem-solving skills. While these skills could be gained through work experience, only about 19 percent of students reported in the baseline survey that they had paid work experience.

Connecting students to career-track employment. Survey results suggest that schools offered YCC students both school-based and WBL services at rates much higher than non-YCC students in the same schools, potentially with more intensity and industry exposure (Table A.1 in the Appendix provides details of the analysis). In contrast to other programs, many YCC grantees arranged for field trips to workplaces, job shadowing, and classroom speakers who described workplaces, and offered paid internships and group mentoring at rates higher than for non-YCC students. Interviews suggested that services and activities contained in this program component saw employers participating in the YCC program both in school and at the workplace.

- **School-based activities** that included technical classes connected students with employers as part of the school's preexisting career and technical education program, as part of a newly established YCC pathway, or through a local community college or other education partner. YCC program staff coordinated such activities with a particular focus on guest speakers and employer mentoring. Guest speakers described their workplaces and careers to YCC students—mostly 9th and 10th graders—to help improve their understanding of the world of work and occupations. Even though some grantees did not offer mentoring during early implementation, those providing mentorship opportunities engaged mentors in activities that generally took place at school (for example, reviewing student résumés and providing advice about available job types, applying for jobs, and applying to and paying for college).
- **Work-based activities** connected students with career-track employment at the workplace. These activities generally fell into three categories: job shadowing, worksite tours/field trips, and internships. Staff reported difficulties in offering these work-based activities in the form of time commitments. Employers often did not have time to participate meaningfully and school staff often did not have time to coordinate and schedule these activities. Internships provided an additional challenge in the form of legal restrictions: some employers would not allow students under age 18 to work for them because of labor laws and regulations that often required employees to be fingerprinted, show proof of a negative tuberculous test, and undertake training.

Offering academic and nonacademic supports. Survey results suggest that schools offered YCC students additional supports, most notably in the form of SLCs and counseling based on an IDP framework.

- **Small learning communities.** To allow for a more specialized learning environment, SLCs had features, such as a school-within-a-school structure, teachers working with a specific group of students, and cohorts of students taking classes together. Some schools also set aside and physical space dedicated to YCC students. Schools used several structures to create SLCs for YCC students and teachers. SLCs were often organized around a career theme, such as health care.
- **IDPs.** Through the development of IDPs and other interactions with students, counselors reported gaining insight into students' personal challenges and often helped target needed support services (for example, mental health services, access to tutoring, and food pantries) to specific students. Although DOL required grantees to develop IDPs describing how students planned to achieve their academic and career goals, site visits suggested that not all grantees used a formal IDP, even if they generally followed the IDP framework when counseling students.

2. Services and activities were implemented in stages

Interviews with staff revealed that some grantees did not fully implement YCC services and activities, either due to implementation challenges or because the structure of their programs called for implementing more intensive services (such as mentoring and an internship) in the third year of the grant. As the YCC program matured, the proportion of schools offering YCC services and activities in each of the three components increased. Some of these increases might

reflect the growth in the proportion of students in higher grades, as schools focused efforts on preparing them for the transition after high school.

Early implementation stage. During the first two years of funding, YCC grantees reported focusing on integrating program elements into existing school district and school structures (Maxwell et al. 2017). The complexity of that task depended on the extent to which appropriate elements were already in place. For example, schools with counseling programs that included career planning services found it relatively easy to build on existing structures as they developed career and academic counseling for the YCC program. Overall, the implementation study suggested that, during the early implementation stage, schools offered students integrated coursework, courses leading to industry-recognized credentials, presentations by college representatives visiting schools, and field trips to workplaces. Schools considered strong employer and higher education partnerships critical to developing YCC program services and activities.

Schools often took longer to implement services that required planning and coordination with partners, such as internships, mentoring, and dual-enrolled coursework. During early implementation, many staff had only just begun to work with employer partners to coordinate mentoring and internships. Finally, dual-credit opportunities, where students obtained postsecondary credit while still in high school, involved similar difficulties because staff often needed to navigate complicated bureaucratic and logistical issues between high schools and colleges.

Later-implementation stage. In the third and fourth years of funding, schools evolved YCC services to meet the changing needs of students in the upper grades, who were approaching graduation (Geckeler et al. 2019). Employer and IHE partnerships grew stronger, as reflected in the increasing number of YCC schools offering college preparatory services and work-based experiences. An increasing number of YCC schools also offered academic and nonacademic supports in these years.

The major impediment to offering services and activities during this stage seemed to be limited by staff capacity. YCC staff often had competing demands and time limitations, which they felt made it challenging to collaborate and deliver program components. Counselors, for example, often wore multiple hats, serving, as not only as a person working with students but as the WBL coordinator, and partnering with employers. Teachers described facing similar challenges as they struggled to find time for collaboration, planning, and developing innovative coursework. Although school districts often hired additional staff to attenuate these time limitations, growth in the YCC program often offset the additional resources, leaving staff still strapped for time. Furthermore, interviews with staff indicated that, as the end of funding grew closer, positions more typically paid through grant funding, such as counselors, program coordinators, and WBL coordinators, were more likely to be cut than teachers, who were typically partially or fully paid through other school or school district funding.

As services and activities evolved to meet changing student needs in the later implementation stage, the number of students enrolled grew. Table II.1 uses information in the PTS on service and activity receipt to present participation rates of YCC students in a few key services in each of the three program components. YCC enrollment grew from just over 13,000 in 2016 students to nearly 30,000 students as of September 30, 2018 (and 31,019 in all). Some services, particularly career/academic counseling and taking industry-specific courses had very high take-up rates throughout the YCC grant period with 90 and 80 percent of students, respectively, participating by 2018. Other common activities for more than half of YCC students by 2018 included WBL activities at work sites, completion of an IDP, having a mentor, and receiving support services. About 45 percent of students participated in WBL activities at school by 2018. Participation was lower for students participating in an internship, completing a Free Application for Federal Student Aid, and having coursework leading to an industry or occupational credential. The percentage of YCC students participating in all services was higher for student participants in 2018 than in in 2016.

Table II.1. Services YCC participants received (percentage of students)

	2016	2018
Preparing students for both college and career		
Took industry-specific courses	71	80
Connecting students to career-track employment		
WBL at the work site: (for example, job shadowing)	50	63
Mentoring	40	51
WBL at school (career fairs, career exploration talks, and mock interviews)	37	45
Internship	14	19
Offering academic and non-academic supports		
Received career/academic counseling	84	90
Completed initial IDP (individual development plan)	44	53
Received support services	35	52
Completed FAFSA (Free Application for Federal Student Aid)	9	16
Sample size	**13,073**	**29,724**

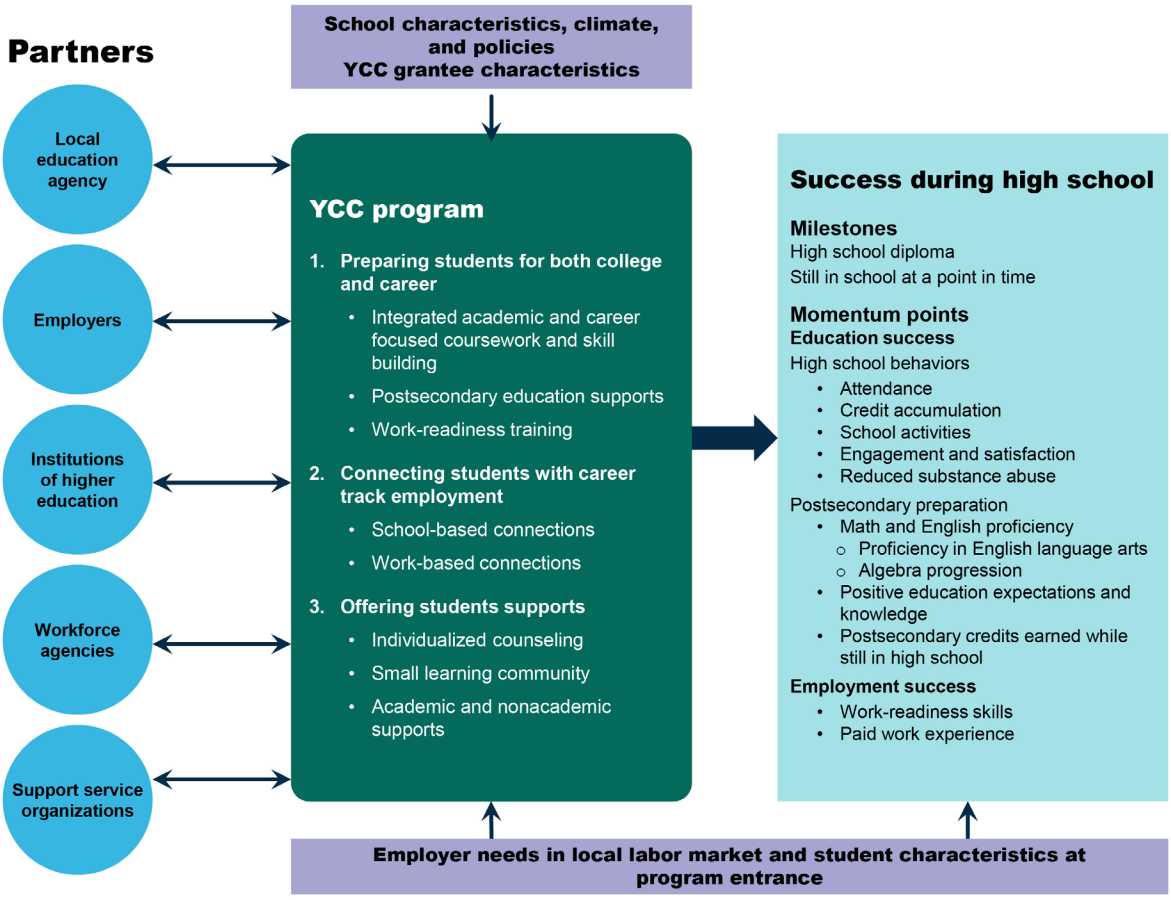
Source: Participant Tracking System for the quarters ending June 30, 2016, and September 30, 2018.
WBL = work-based learning.

B. YCC program components served as a cornerstone in building a model to guide the impact study

We developed a model that describes pathways through which the YCC program can influence student success by blending the services and activities that distinguish each of the three YCC program components, the partners who delivered them or supported students, the external factors influencing implementation, and the key milestones and momentum point outcomes captured by the impact study (Figure II.2). Partners (blue circles) allow the YCC program to offer services and activities in each of the three program components (the green box); those services and activities, in turn, increase students' success in key milestones and momentum points while they

are still in high school (the turquoise box). Of note, the three program components in the green box differ slightly from, but are consistent with, the six DOL-required core elements shown in Figure I.1 in Chapter I. The differences lie in implementation: the core elements are those outlined in the Notice of Availability of Funds and Solicitation for Grant Applications for YCC grants and the program components are derived from implementation of the YCC program. Factors external to the YCC program (the purple boxes) determine which services and activities are offered as well as outcomes. The impact study does not examine the role of partners in offering program components but focuses on the impact that the program has on outcomes, while controlling for external factors.

Figure II.2. The YCC program implementation model guiding the impact study



Source: Author, based on interviews with YCC program staff and students.

C. Implementation study findings have implications for the impact study

Several findings from the implementation study have important implications for interpreting findings from the impact study. Importantly, students enrolled in YCC programs seem to have received the services and activities that defined the YCC program; however, it appears that these implemented services increased over the course of the grant, suggesting that later cohorts of YCC students may have received a greater dosage of YCC services and activities than earlier cohorts. Taken together, the results suggest that the YCC program was distinctive enough that the impact study had the potential to detect program impacts. We discuss each of these implications.

Program implementation informs the impact study

- Grantees appeared to have implemented services and activities that were required by DOL, thereby providing a fair test of the YCC program for the impact study.
- WBL services and activities took longer to implement than other services.
- Services and activities offered to non-YCC students appear to differ from those offered to YCC students, suggesting that the impact study might be able to show impacts.

First, grantees appear to have implemented the YCC program in a manner consistent with the services and activities outlined by DOL. Although some grantees implemented some services and activities (and in some cases did not implement certain activities or services) at a slower speed, grantees generally implemented the YCC program as designed and YCC students generally participated in a range of YCC-funded services and activities. The services and activities fell into three distinct categories: preparing students for both college and career; connecting students to career-track employment in high-demand fields, and offering students academic and nonacademic supports.

Second, as schools deepened partnerships, responded to the needs of students as they advanced in grade level, and increased and improved upon service delivery, later cohorts of students may have received a higher dosage of services compared to earlier cohorts. For example, few schools offering the YCC program offered internships early in implementation, when they served mainly 9th and 10th grade students. However, as the YCC program matured, more schools offered internships and more students in grades 11 and 12 could participate in them compared to those in lower grades. Thus, impacts on outcomes related to participating in an internship might differ depending on the years in which students participated.

Third, although we cannot precisely capture the experiences of students receiving YCC services and activities if the program had not existed, surveys of grantees suggest that the YCC program offered services and activities that were not commonly or less frequently available through other programs. Most specifically, the YCC program seems to have emphasized active learning pedagogies and SLCs to offer students four types of services: (1) increased instruction in work-readiness skills, (2) coursework structured in ways that lead to articulation to a two-or four-year college or an industry-recognized credential, (3) WBL opportunities; and (4) IDPs.

III. YCC PROGRAM IMPACTS ON PRIMARY OUTCOMES

In the previous chapter, we presented evidence that YCC grantees largely implemented the services and activities that DOL required and that these services and activities appeared to differ from those offered to non-YCC students. In this chapter, we examine whether these differences translated into impacts on the study's primary outcomes. Two of these outcomes measure high school behavior—school attendance and credit accumulation—and the other two measure postsecondary preparation—proficiency in English language arts (captured by English language arts, or ELA, test score) and algebra progression. The analysis used school records data for the QED sample in 16 school districts on yearly cohorts of treatment and comparison students and combines data and samples across school districts and cohorts. In total, the analysis included 6,207 treatment students and 109,541 comparison students. The cohorts include students who started a 9th or 10th grade program in fall 2014, 2015, or 2016. Sample sizes for specific measures ranged from 3,964 to 5,716 in the treatment group, and from 62,685 to 96,776 in the comparison group.

We also present secondary analysis findings using the QED sample. We first attempt to understand how impacts varied for subgroups defined by: (1) key student baseline characteristics (prior academic achievement and low-income status); (2) cohort; and (3) YCC program experiences (received an internship, had a mentor, and completed an IDP). For the subgroup analysis sample sizes ranged from 1,067 to 4,119 for the treatment group and 7,466 to 79,781 for the comparison group. We then, present findings on impacts for on-time high school graduation for the three cohorts of students. Two of these cohorts started a program in 9th or 10th grade in fall 2014, the first year of the grant, and the third started a program in 10th grade in fall 2015.

To help compare outcomes measured on different scales, we present the estimated impacts in original and effect size (standard deviation) units. The use of effect sizes is a common approach for gauging the magnitude of impacts against common thresholds when outcomes are measured in different units (Lipsey et al. 2012; Cohen 1988 and 1977). To calculate effect sizes, we divided the impacts by the standard deviation of the outcome for students in the comparison group.

The results from the QED might not be generalizable to all districts and students. Districts were purposefully selected for the QED using criteria that created a sample of districts with a strong contrast between the YCC and alternative programs (see Burkander et al. 2019 Chapter II). Further, students included in the QED were not randomly assigned into the YCC program. Although students in the treatment and comparison groups are similar on observable characteristics (see Table A.2 in the Appendix), we cannot rule out the possibility that unobservable characteristics are not similar.

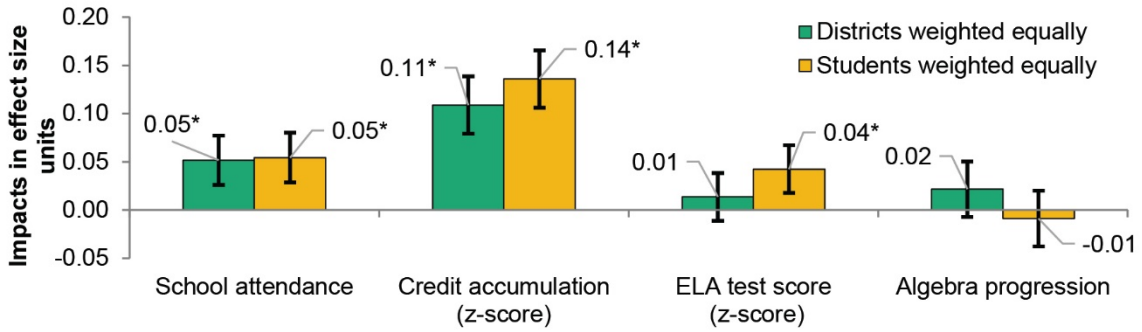
In the remainder of this chapter, we discuss the impact findings in more detail. In Section A, we discuss key features of the QED design, the primary outcomes, and the analytic methods used to estimate and interpret the impact estimates. In Section B, we report impact findings for the primary (full sample) analysis. In Section C, we present impact findings for the subgroup analysis. In Section D, we report impacts on high school graduation. Burkander et al. (2019) provide details of the methods and analysis, including the process for selecting the comparison group, construction of outcome variables, analytic methods, and results from analyses examining the sensitivity of the primary impact findings to alternative estimation methods and samples.

Key findings

Figure III.1 summarizes the results of the primary analysis by displaying impacts and 95 percent confidence intervals when either school districts or students are weighted equally to estimate pooled impacts across districts. As this figure shows:

- YCC participation led to statistically significant impacts on high school behaviors. School attendance, measured as percent of days present, increased by 0.7 percentage points (0.05 standard deviations), and credit accumulation increased by 0.11 standard deviations.
- Program impacts were smaller on postsecondary preparation. Although the 0.01 effect size for ELA test score is not statistically significant at the 5 percent level when school districts are weighted equally, the 0.04 estimate is statistically significant when students are weighted equally. Further, the impact is positive and statistically significant in 10 of 15 school districts with available ELA test score data. No evidence exists that the YCC program had an effect on algebra progression.

Figure III.1. Impacts on primary outcomes for the full sample (effect size units)



Source: School records data in 16 QED school districts.

Notes: Figure shows estimated impacts in effect size (standard deviation) units and 95 percent confidence intervals when school districts or students are weighted equally for the pooled impact estimates.

ELA = English language arts.

* Indicates significant impacts at the 5 percent level.

+ Indicates significant impacts at the 10 percent level.

Our secondary analysis suggests that:

- Few differences in impacts existed across student subgroups based on prior academic achievement and low-income status. The lone exception is that impacts on credit accumulation were larger for those with who did not have a low-income status.
- Few of the differences in impacts across cohorts are statistically significant, despite the pattern of being larger for the 2015 and 2016 cohorts than 2014 cohort on credit accumulation, ELA test scores, and algebra progression (not on school attendance).
- Impacts tended to be more positive for those who received an internship, had a mentor, or completed an IDP, which suggests that each service might benefit YCC participants. The results could be partly driven by unobserved factors that influenced both service participation and program outcomes and do not indicate which service generated the largest impact.
- The YCC program had no effect on high school graduation for the early cohorts of students who could have an on-time graduation when school records data collection in fall 2018: about 88 percent of both treatment and control group students had graduated. It is too early to measure impacts on graduation for later cohorts, when program effects may have been stronger.

A. Samples, outcomes, and methods

The sample for the primary analysis includes treatment and comparison students in the 16 QED school districts. The treatment group includes 6,207 students identified in the PTS as having enrolled in the YCC program, and the comparison group includes 109,541 students who did not enroll in the YCC program. We constructed the treatment and comparison groups in each of the 16 districts. We used the PTS to identify students in the treatment group and formed comparison groups in each district using baseline data from school records when students were in 7th and 8th grade to account for observable differences between the types of students in each group. The goal was to minimize preexisting differences between the treatment and comparison group students so that the study could estimate plausible causal effects of the YCC program on primary student outcomes. We used inverse probability weighting methods to ensure balanced research groups.

Outcome measures from school records

Primary outcomes

- School attendance: percentage of days a student is present out of all possible days of attendance
- Credit accumulation: *z*-score on total credits accumulated
- English language proficiency: *z*-score on English language arts test
- Algebra progression: binary variable with 1 indicating the student received credit for algebra (I or II)

Secondary outcome

- High school graduation: binary variable with 1 indicating a student graduated by the end of the 2017–2018 school year (for cohorts 9A and 10A,B, see Chapter I)

We constructed weights to balance the treatment and comparison samples on a range of 7th and 8th grade student characteristics from the school records, including pre-program measures of the outcomes (for example, baseline standardized test scores and school attendance; see Burkander et al. [2019], Chapter III). We constructed weights separately by school district and cohort. In 12 of 16 school districts offering a within-school YCC program model (in which a school offered both YCC and other programs), we selected comparison students from the same schools. In the four other school districts, which used a whole-school model (in which all students in a school received YCC services), we selected comparisons from similar non-YCC schools in the same district.

We tested different model specifications to construct the comparison group weights and selected the approach that performed best on our balancing tests. As discussed in detail in Chapter III of Burkander et al. (2019), the evidence suggests that we were able to identify weights that yield balanced treatment and comparison group samples that meet industry standards for obtaining credible causal program effects.

We estimated impacts by comparing the mean outcomes of the treatment and comparison groups using the weights to balance for districts. We used regression models to estimate impacts, while controlling for baseline variables used in the balancing process to improve the precision of the estimates and to adjust for remaining observable differences between the two research groups. We used the RCT-YES software (Schochet 2016) for estimation. Our benchmark approach weighted each school district equally to estimate impacts pooled across grantees. However, we

also examined the distribution of district-level impacts in order to gauge the degree to which the pooled impact estimates were influenced by a small number of school districts with very large or small impacts.[5] We also conducted an analysis in which students were weighted equally to estimate impacts for the average student rather than the average school district (the two sets of impacts could differ if an association between district sample size and district impacts exists).[6] When reporting results, we present the benchmark weighting approach first but also discuss findings using the alternative weighting approach. All figures in this section show regression-adjusted treatment group means and unadjusted control group means.

We used *t*-tests to determine if significant differences existed between the contrasted research groups that were unlikely to have occurred purely by chance. We also conducted *F*-tests to assess differences in impacts across subgroups. We base study conclusions on the primary analysis findings and use the secondary analysis to provide support and depth.

When interpreting study findings, we consider that some school districts are missing some outcomes, cohorts, and subgroups (see Burkander et al. [2019], Chapter II). For example, 15 of 16 school districts had standardized test scores available, 14 had data on accumulated credits, 15 contain all cohorts, and only 8 contained sufficiently large samples of YCC students who did and did not have a mentor. Thus, we also conducted a range of analyses using aligned samples to help disentangle potential confounding effects due to exclusion of school districts from the samples. For instance, to help isolate how program effects varied by cohort, we estimated cohort impacts using the sample from only those school districts with all cohorts and assessed how these impacts compared to those using the sample in all 16 school districts.

B. YCC program impacts: The primary analysis

1. Impacts on momentum points associated with high school behavior

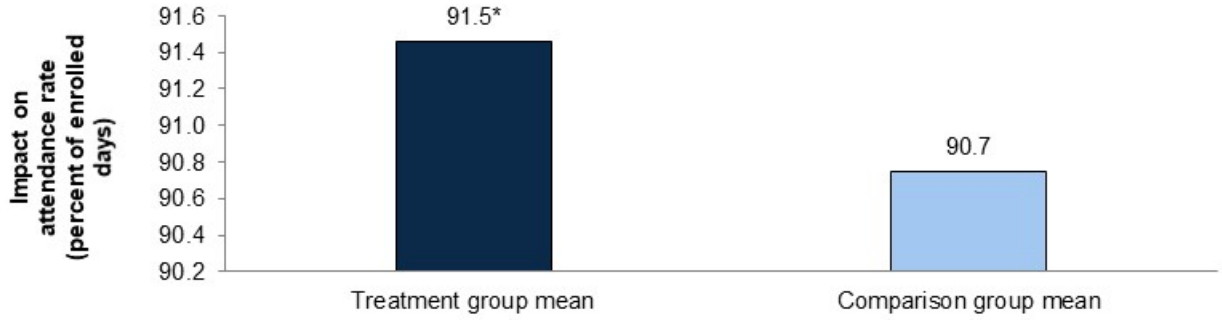
We found that participation in the YCC program led to increases in both school attendance and credit accumulation.

School attendance. The YCC program led to gains in school attendance (Figure III.2; Appendix Table A.3). On average, students in the treatment group attended 91.5 percent of enrolled days, compared to 90.8 percent for the comparison group. This impact of 0.7 percentage points is equivalent to an effect size of 0.05 standard deviations, which is statistically significant at the 5 percent level. Of note, the high attendance in the comparison group leaves little potential for the YCC program to improve the attendance rate.

[5] We do not report school district-level impacts due to small sample sizes. In addition, data-sharing agreements with some school districts prohibited data disclosure.

[6] The weights for the comparison group sum to the treatment group sample size for each cohort and school district. Thus, weighting students equally means that school districts are weighted by their treatment group sample size.

Figure III.2. YCC program impact on school attendance (percent of days attended)



Source: School records data in 16 QED school districts, Participant Tracking System.

Notes: Graph shows regression-adjusted treatment group means and unadjusted control group means. See Chapter III in Burkander et al. (2019) for more information.

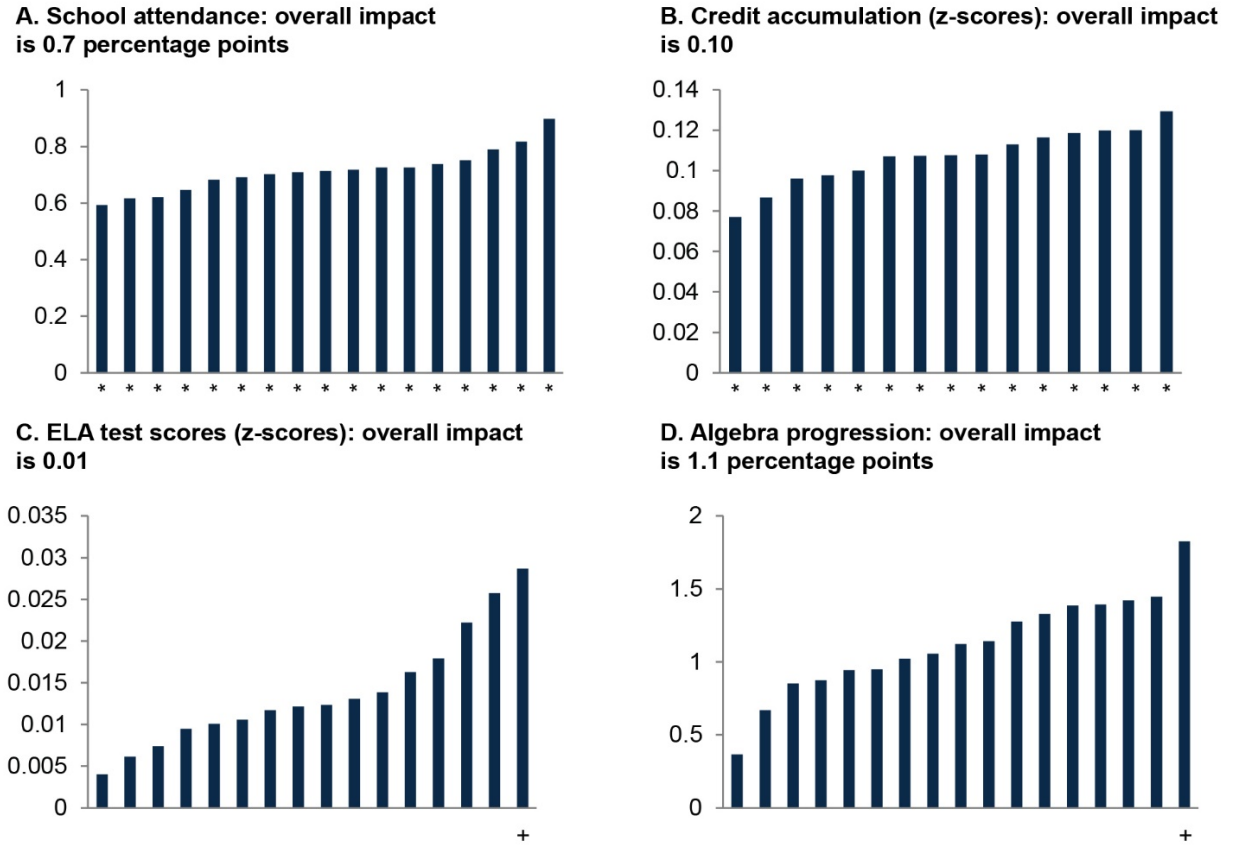
* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

The positive impact for the full (pooled sample) was not driven by any one school district. For instance, the impact on school attendance was positive in 12 of 16 school districts (not shown). Further, when we estimated the pooled impact 16 separate times, each time leaving out one different district, we found that the impact was statistically significant at the 5 percent level each time (Figure III.3, Panel A). Similarly, the impact results are similar if students, rather than school districts, are weighted equally (Figure III.1; Appendix Table A.3).

We found also that the estimated impacts and standard errors are robust to alternative estimation methods and samples. These specifications included estimating models without baseline covariates, using only the sample of students without missing baseline data, and using a nearest neighbor matching estimator instead of weighting all comparison students to resemble the treatment group (see Burkander et al. [2019], Chapter IV). In each of these specifications, the estimated impact is significant at the 5 percent level and is similar in magnitude to our benchmark impact estimate.

Figure III.3. YCC program impact on primary outcomes with one school district omitted



Source: School records data in up to 16 QED school districts with available data and the PTS.

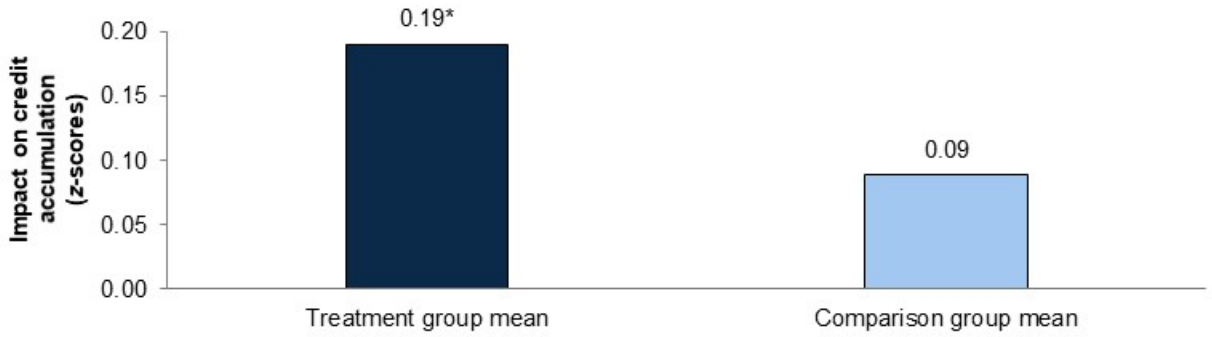
Note: The horizontal axis captures the impact estimates with one omitted district where the other 15 are used for estimation. See Chapter III in Burkander et al. (forthcoming) for more information.

*Indicates that the impact is significant at the 5 percent level when that district is omitted from the analysis.

+Indicates that the impact is significant at the 10 percent level when that district is omitted from the analysis.

Credit accumulation. We found that the YCC program increased credit accumulation (as measured by the *z*-score on total credits accumulated during the two-year study period). Students in the treatment group were on average about 0.19 standard deviations above the school district average for number of credits earned, compared to 0.09 standard deviations for the comparison group (Figure III.4 on the next page; Appendix Table A.3). This pooled impact of 0.10 standard deviations is statistically significant at the 5 percent level. The impact is equivalent to a student with an average number of accumulated credits—that is, one at the 50th percentile of the credits distribution—moving up to approximately the 54th percentile after being enrolled in the YCC program. We also found that the district-level impacts were positive in 9 of the 14 school districts with available data and that the pooled impact estimate always remained statistically significant when any one district was omitted from the analysis (Figure III.3, Panel B). The results are also robust to alternative estimation methods and samples (Burkander et al. [2019], Chapter IV).

Figure III.4. YCC program impact on credit accumulation (*z*-score)



Source: Student records data in 14 QED school districts with available data, Participant Tracking System.

Notes: Graph shows regression-adjusted treatment group means and unadjusted control group means. See Chapter III in Burkander et al. (2019) for more information.

* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

2. Impacts on momentum points associated with postsecondary preparation

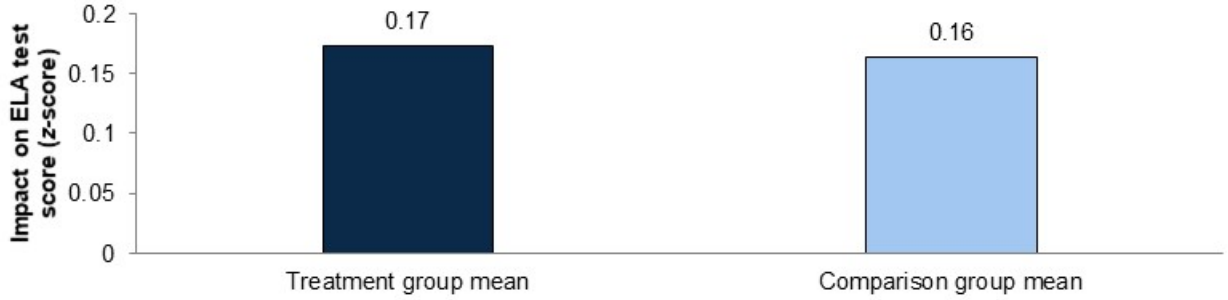
We found suggestive evidence that the YCC program increased ELA test scores but no evidence of program effects on algebra progression.

ELA test scores. Evidence suggests that the YCC program might improve ELA test scores. When school districts are weighted equally (our benchmark approach), the estimated program impact on ELA test scores is 0.01 standard deviations (equivalent to a student at the 50th percentile moving up only 0.4 percentiles) and is not statistically significant. The average ELA *z*-score was 0.17 for the treatment and 0.16 for the comparison group (Figure III.5 on the next page; Appendix Table A.3). Further, when any one school district is omitted from the analysis, the impacts statistically insignificant but show some variation, as discussed below (Figure III.3, Panel C). These results are robust to alternative specifications (Burkander et al. [2019], Chapter IV).

However, the estimated impact on ELA test scores increases to 0.04 standard deviations (a 2 percentile jump in the distribution) and becomes statistically significant when students, rather than school districts, are weighted equally to form the pooled estimates (Figure III.1; Appendix Table A.3). Further, impacts were positive in 10 of 15 school districts with available data. The key reason that the pooled findings change when students are weighted equally is that impacts on ELA test scores produced negative results in the smallest school districts. Thus, these smaller school districts had less influence over the pooled estimates when students are weighted equally, yielding impact estimates that are more positive. Another way to view this is that the largest impacts occurred when the smallest school districts were excluded from the analysis (see Appendix Table A.3). In addition, weighting students equally yields more precise impact estimates (smaller standard errors) and generates impacts that are statistically significant.

In sum, the results provide some evidence that YCC moved the needle on improving ELA test scores. However, we view this result as tentative because it is sensitive to whether school districts or students are weighted equally.

Figure III.5. YCC program impact on ELA test scores (*z*-score)



Source: Student records data in 15 QED school districts with available data, Participant Tracking System.

Notes: Graph shows regression-adjusted treatment group means and unadjusted control group means. See Chapter III in Burkander et al. (2019) for more information.

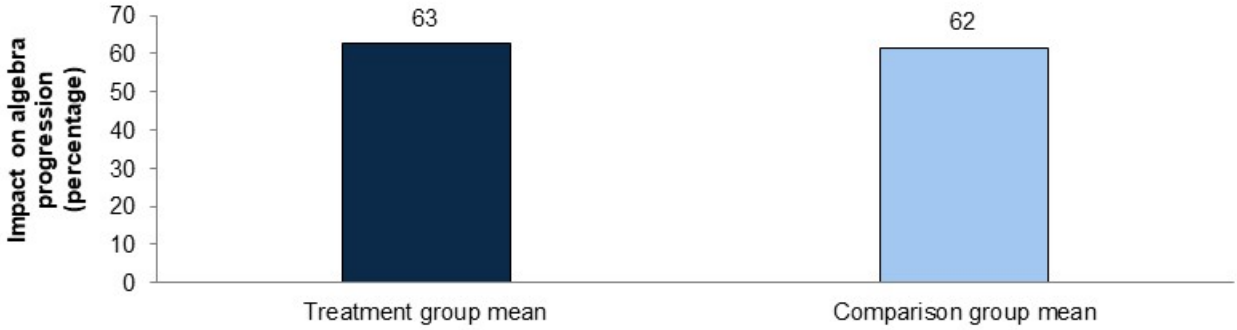
* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

ELA = English language arts.

Algebra progression. We did not find evidence of an impact of the YCC program on algebra progression (Figure III.6; Appendix Table A.3). About 63 percent of treatment students in the average school district obtained algebra credits between the baseline and follow-up points, compared to 62 percent of the comparison group, a statistically insignificant impact. The impact on algebra progression varied little across school districts, and the findings do not change when single districts are omitted from the analysis (Figure III.3, Panel D). The results are also not sensitive to alternative model specifications (Burkander et al. [2019], Chapter IV).

Figure III.6. YCC program impact on algebra progression (percent progressing)



Source: Student records data in the 16 QED school districts, Participant Tracking System.

Notes: Graph shows regression-adjusted treatment group means and unadjusted control group means. See Chapter III in Burkander et al. (2019) for more information.

* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

Comparing the QED and RCT impact findings using overlapping samples. To help assess the robustness of the QED impact findings, we estimated pooled impacts using aligned QED and RCT samples in the three school districts and two yearly cohorts included in both study designs.[7] Sample overlap exists in three school districts for algebra progression and attendance rate, two districts for credit accumulation, and one district for ELA test scores. While sample sizes are very small for the RCT-QED comparisons, yielding estimates with little precision, the results provide suggestive evidence to help verify the key primary analysis findings.

The results indicate that the aligned RCT and QED samples generally yielded similar impact estimates. The pooled impact on school attendance was 0.25 percentage points using the RCT sample and 0.23 percentage points using the QED sample. The pooled impact on credit accumulation was 0.17 standard deviations using the RCT sample and 0.27 standard deviations using the QED sample. The RCT-QED differences are somewhat larger for the impacts on ELA test scores (-0.12 versus 0.08 standard deviations) and algebra progression (11.1 versus 2.9 percentage points). There are no statistically significance differences between the RCT and QED estimates for any outcome: *p*-values for these estimates ranged from 0.46 (for ELA test scores) to 0.99 (for school attendance). Further, none of the RCT or QED impact estimates are statistically significant at the 10 percent level except for the QED impact on credit accumulation.

The similarity of the RCT and QED impact estimates on school attendance and credit accumulation provide some support for the robustness of the statistically significant estimates on these outcomes based on the larger QED sample used for the primary analysis. The results also reinforce our more tentative conclusions regarding program effects on ELA test scores since these impacts appear to be measured with more noise and are sensitive to methods and samples.

C. Impacts of the YCC program for subgroups: Secondary analysis

We examined impacts on primary outcomes for three types of student subgroups defined by the following characteristics:

- **Student baseline risk factors of low prior achievement and low-income status in 8th grade.** We estimated impacts on students based on math proficiency status (below proficient and proficient or above), reading proficiency status (below proficient and proficient or above), and low-income status (whether eligible for the free and reduced price lunch program for school districts that provided those data or whether living in a census block that had a poverty rate of 20 percent or higher for other school districts).
- **The year in which the student could have entered the YCC program (cohort).** We estimated separate impacts for the three cohorts of students starting a program in the fall of 2014, 2015, and 2016. These estimates pooled students who entered YCC in 9th and 10th grade in the same year.

[7] We excluded one school district from this analysis because it had fewer than 10 control group members.

- **YCC program experiences of the treatment group.** We estimated separate impacts by whether the treatment group student received an internship, had a mentor, or completed an IDP.

Figures in this section show regression-adjusted impacts. We alter the presentation to more efficiently emphasize contrasts between subgroups.

For each subgroup analysis, we only included students who had the data needed to define their subgroup category. We estimated impacts for each subgroup by comparing the mean outcomes of treatment and comparison group members in that subgroup. For example, to estimate impacts for low-income students, we compared the outcomes of low-income treatment students to those of low-income comparison students.

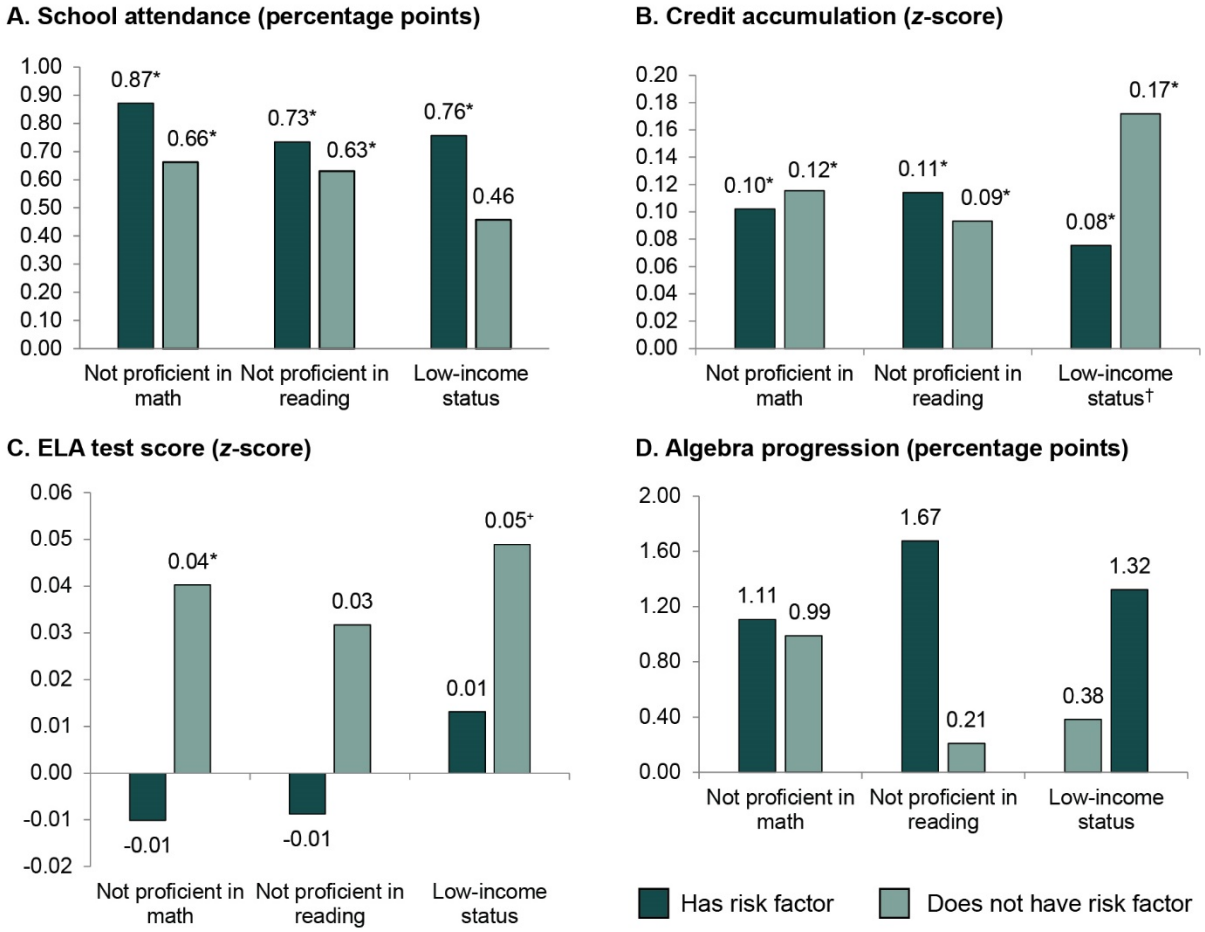
Our main conclusions regarding subgroup effects are based on *F*-tests to assess differences in impacts across subgroup levels (for example, for low- and higher-income students). However, we also present impact findings for each individual subgroup and discuss the pattern of findings.

In the following discussion, we present key findings from the subgroup analysis on the four primary study outcomes. The full set of results is presented in Appendix Tables A.3 to A.5.

1. Impacts by prior achievement and low-income status

Prior research suggests that career academy interventions may be more beneficial for low-achieving, at-risk students than other students (Kemple 2004). However, we did not observe this pattern for the YCC program (Figure III.7 on the next page; Appendix Tables A.3 to A.5). Differences in impacts across subgroups defined by prior achievement and low-income status are not statistically significant at the 5 percent level in three primary outcomes: school attendance, ELA test scores, and algebra progression. Further, estimates for the individual subgroups do not show a consistent pattern of larger impacts for students with baseline risk factors than those without them. Similarly, no clear pattern of effects exist across subgroups defined by baseline proficiency status in math or reading.

Figure III.7. YCC program impact on primary outcomes by baseline risk factor



Source: Student records data in 16 QED school districts, Participant Tracking System.

Notes: Graphs show regression-adjusted impacts. See Chapter III in Burkander et al. (2019) for more information.

† Indicates difference in impacts across subgroups is significant at the 5 percent level.

* Indicates subgroup impact is significant at the 5 percent level.

+ Indicates the subgroup impact is significant at the 10 percent level.

2. Impacts by cohort

The effects of the YCC program may have differed based on the year in which students entered the program for a number of reasons. First, YCC experiences of the treatment group may have varied over time because more of the YCC program components were in place in later years (see Chapter II). Second, cohort differences in student characteristics and peer effects have been shown to be associated with student outcomes (Hanuschek et al. 2003), and we observed some differences in key characteristics of our sample over time. For example, YCC students in the 2014 cohort had lower math scores in 8th grade than did YCC students in later cohorts (see Burkander et al. [2019], Chapter V, Table V.4).

The impact findings provide some support for differences in impacts across the earliest 2014 cohort and the later 2015 and 2016 cohorts (Appendix Table A.7).[8] When school districts are weighted equally to form the pooled estimates, none of the *F*-tests across the four primary outcomes are statistically significant at the 5 percent level, suggesting that the impacts did not vary with cohort. The results when students are weighted equally provide evidence that impacts may have been larger for the two later cohorts, however (Appendix Table A.7). In this case, we found significant differences in impacts across cohorts on credit accumulation and ELA test scores. Specifically, the impacts on credit accumulation are 0.09, 0.12, and 0.20 standard deviations for the cohorts starting in fall 2014, 2015, and 2016, respectively, and are statistically significant at the 5 percent level for the two later cohorts. Similarly, the impact on ELA test scores is insignificant for the cohort starting in 2014, but 0.07 standard deviations and statistically significant at the 5 percent level for the cohorts starting in 2015 and 2016.

3. Impacts by program experiences of the treatment group

Analysis of the grantee survey showed a strong or moderate contrast between YCC and alternative programs in the study school districts with respect to three types of work-readiness training: an internship, mentoring, and IDP completion (Chapter II). Because these experiences help differentiate YCC from other programs, we estimated separate impacts by whether the treatment group student participated in an internship (11 percent), had a mentor (51 percent), or completed an IDP (52 percent), as captured by the PTS data. In all cases, we compared the mean outcomes of treatment group students in the service subgroup (for example, those who had an internship) to a comparison group weighted to have similar baseline characteristics as the students in that subgroup.

Understanding the service contrasts. It is important to understand the contrasts we are making for the service subgroup analysis to correctly interpret the impact estimates. Our approach addresses the research question: How did YCC program students who received a particular service fare relative to comparison students with similar baseline characteristics? We are addressing, for example, how YCC students who had an internship fared relative to students in their comparison group, and how those who received mentoring fared relative to students in their comparison group. We are *not* comparing students who received an internship to those who had a mentor.

Note that about 78 percent of the treatment group received at least one of the considered services, and 31 percent received at least two services (less than 5 percent received all three services). Thus, there is some overlap across the received services (for instance, about 20 percent of the sample received mentoring and completed an IDP, and most interns also received other services). Accordingly, our impact estimates for a particular service partly reflect the effects of other services the students received. Because of small sample sizes, we could not estimate separate impacts for the many service receipt combinations (for example, those who participated in an internship and had a mentor, those who received all three services, and so on). Thus, our

[8] The analysis was conducted using school districts that contained all three cohorts (15 for school attendance, 12 for accumulated credits, 13 for ELA test scores, and 15 for algebra progression). The results are very similar using available cohorts from all school districts (not shown).

estimates of internship effects include the effects of mentoring and IDP services that interns may have received, and similarly for the other service subgroups.

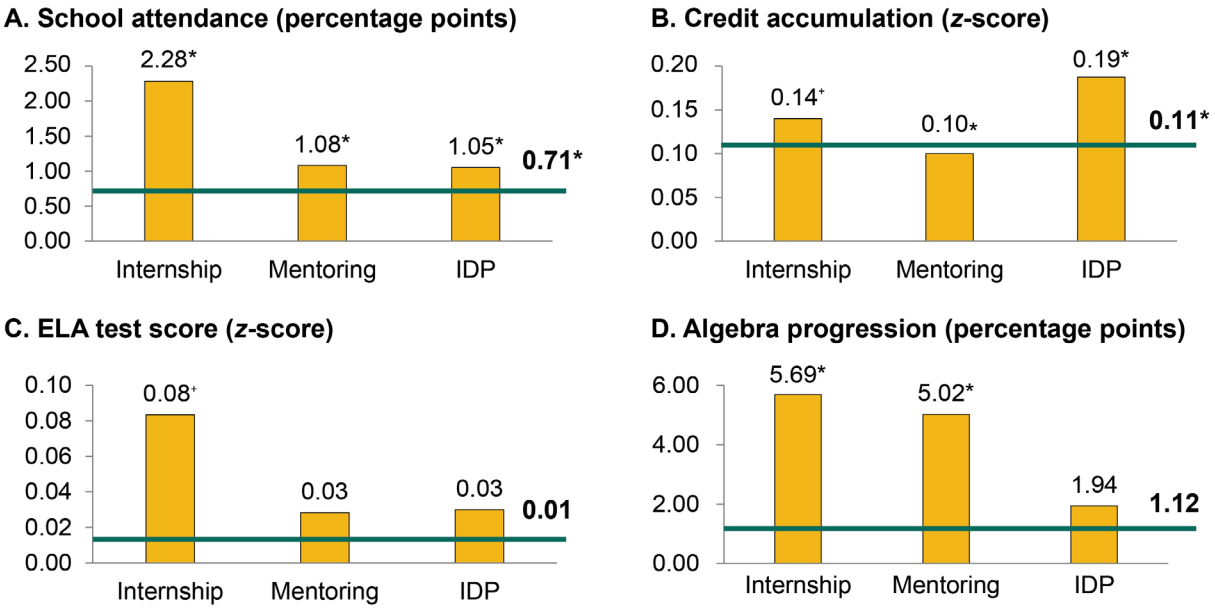
We emphasize that results from the service subgroup analysis must be interpreted carefully due to challenges in adjusting for the multiple layers of student selection into the services that could cause some bias. For instance, consider the process for a YCC student to have a mentor: the school district must offer mentoring, the student must be approved for mentoring, a suitable match must be made between the student and employer mentor, and the student must be sufficiently interested in this service to accept the offer of it. Thus, it is likely that our process for creating weights to yield balanced comparison groups for each service group only captured part of the complex process associated with student selection into services that could be correlated with study outcomes. The fact that students receiving services were higher achieving at baseline than those who did not (Appendix Table A.8) suggests that selection issues could partly drive differences in impacts. Thus, we view analysis results as informative but only suggestive of true intervention effects.

For each service subgroup analysis, we restricted the sample to school districts with at least 50 treatment students who did and 50 treatment students who did not receive the service. We did this because all school districts did not offer each service and in some districts all students received a service. The pooled impact estimates in the school districts included in the analysis were generally similar to our primary impact estimates. For example, the primary impact analysis found an impact on credit accumulation of 0.10 standard deviations, and the impact on credit accumulation among school districts included in the service receipt subgroups ranged from 0.07 to 0.11 standard deviations.

Impact results. Overall, we found suggestive evidence of larger impacts for service recipients than for the full sample for each service and for each primary outcome (Figure III.8; Appendix Tables A.8 to A.10). There is no clear evidence as to which service generated the largest impacts because the relative size of the service impacts differed across outcomes. Thus, the findings suggest that each service array benefited its participants.

As an illustration, impacts on school attendance were statistically significant for recipients in each service category, and were larger than the 0.71 percentage point impact for the full sample. The impact on school attendance was 2.28 for those receiving an internship, 1.08 for those having a mentor, and 1.05 for those completing an IDP. Similarly, the impact on credit accumulation was 0.11 for the full sample, compared to 0.14 for those receiving an internship, 0.10 for those having a mentor, and 0.19 for those completing an IDP (all impacts are statistically significant). A similar pattern of impact findings holds for ELA test scores (where the impact is significant for those who had an internship) and algebra progression (where the impacts are significant for both those who received an internship and those who had a mentor).

Figure III.8. YCC program impact on primary outcomes by service receipt



Source: Student records data in 10 QED school districts with available data, Participant Tracking System.

Notes: Graph shows regression-adjusted impacts. See Chapter III in Burkander et al. (2019) for more information.

* Indicates subgroup impact is significant at the 5 percent level.

+ Indicates the subgroup impact is significant at the 10 percent level.

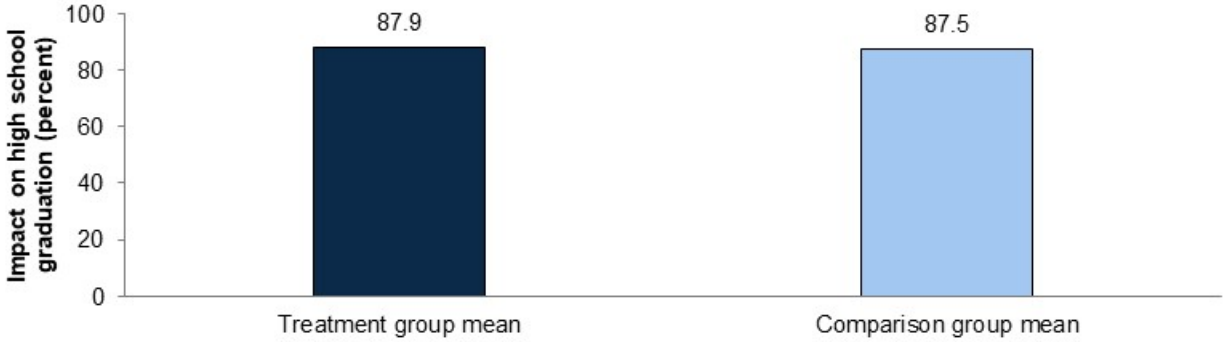
ELA = English language arts; IDP = individual development plan.

D. Impacts on high school graduation: Secondary analysis

We did not find a significant impact of the YCC program on high school graduation for the three cohorts of YCC students whose graduation status could be observed over the study period (Figure III.9 on the next page; Appendix Table A.12). The graduation rate among YCC students was 88.0 percent, compared to 87.6 percent for the comparison group, with the associated impact not statistically significant. These findings are robust to alternative estimation methods and to whether students or school districts are weighted equally to estimate the pooled impacts (not shown). Of note, the relatively high rate of graduation in the comparison group leaves little potential for the YCC program to improve the rate.

As discussed in the previous section, the patterns of findings suggests that program effects for the primary outcomes were larger for two of the later cohorts of students than for the 2014 cohort and two of the three cohorts for whom high school graduation could be observed were part of the 2014 cohort. Thus, it is possible that program effects on high school graduation will be larger for other YCC students who started the program after 2014, but it is too early to measure these effects.

Figure III.9. YCC program impact on high school graduation (percent graduating)



Source: School records data in 16 QED school districts, Participant Tracking System.

Notes: Graph shows regression-adjusted treatment group means and unadjusted control group means. See Chapter III in Burkander et al. (2019) for more information.

* Indicates significant difference at the 5 percent level.

+ Indicates the subgroup impact is significant at the 10 percent level.

IV. IMPACTS ON HIGH SCHOOL BEHAVIORS, POSTSECONDARY PREPARATION, AND EMPLOYMENT READINESS

In the previous chapter, we presented evidence that participation in the YCC program: (1) increased school attendance by 0.7 percentage points (from about 90.7 to 91.5) (2) moved a student who is at the 50th percentile in accumulating credits for high school graduation up to approximately the 54th percentile of the distribution, and (3) may have increased scores on standardized English language arts tests. All of the estimated impacts came from school records data. In this chapter, we present descriptive information on service receipt and impact estimates for a broad set of outcomes using data from a survey completed by 279 treatment and 157 control group students in three of the four RCT school districts. Surveys were administered in fall 2018, approximately two years after random assignment, when students making on-time academic progress would be in 11th or 12th grade.

We estimated impacts on high school behavior, postsecondary preparation, and employment readiness outcomes based on students' self-reported receipt of services and activities. This analysis has two notable limitations. First, as described in Chapter I, the survey sample had greater proportions of students of color and those qualifying for the free and reduced price lunch program than the overall YCC population. Thus, the findings may not generalize to all YCC students. Second, the small sample size means that the analysis does not have the power to detect program effects that are likely attainable by the YCC program. Our point estimates are small and statistically insignificant.

In the remainder of this chapter, we present the estimated impacts and the context in which they were estimated. We describe the analytic methods in Section A, present a description of service receipt in Section B, and report the impact estimates in Section C. Chapter III in Burkander et al. (2019) provides methodological details on the survey, construction of outcome variables, and analytic methods, and presents an analysis assessing baseline equivalence of the analytic samples.

Key findings

As powered, the RCT component of this study did not identify impacts (differences in outcomes for treatment and control groups) for the 20 outcomes captured by the survey in the following areas: (1) high school behaviors, (2) postsecondary preparation, and (3) employment readiness. None of the estimated impacts across these three areas were statistically significant at the 5 percent level.

A. Methods

The analyses reported in this chapter used both descriptive statistics to describe differences in the self-reported receipt of services and activities consistent with the YCC program components and experimental methods to estimate program impacts. To document differences between treatment and control groups, we report the percentages of specific services and activities treatment and control group students reported receiving. These services and activities are those that program staff described as differentiating the YCC program from alternative programs (Chapter II). For these analyses, we include weights to account for survey nonresponse.

To estimate impacts on the 20 outcomes available in the survey (see sidebar), we used methods similar to those used to estimate outcomes from the school records data (Chapter III). Specifically, we used regression models to compare the mean outcomes of the treatment and control groups, controlling for baseline covariates to improve precision. Three key differences exist between the approach to estimating impacts presented in this chapter and the one used to estimate impacts presented in Chapter III. First, the impacts in this chapter are based on a different sample. The survey was fielded only in three of the four RCT school districts, whereas the Chapter III estimates were based on the larger QED sample. Second, for the estimates presented in this chapter, we applied weights to help correct for potential survey nonresponse. Finally, the covariates employed in the two estimations differed because in this chapter: (1) additional covariates-captured information from the baseline forms were included in the analytic models to produce the impacts (covariates were not available in school records); and (2) different covariates from student records were included as controls because we included baseline covariates that were most strongly correlated with outcomes available in the survey, instead of those most strongly correlated with outcomes available in school records.

Outcome variables from the survey

High school behavior

School activities

- Participated in a school-sponsored activity

Engagement

- Believe grades are very important
- Like school a lot
- Number of hours spend on homework per week
- Positive school behavior index (0–5)

Substance abuse

- Never drank alcohol
- Never used or tried marijuana

Postsecondary preparation

- Expect to receive a two- or four-year college degree
- Expect to receive a vocational certificate
- Took an advanced placement course
- Took a dual-enrollment course
- Understand courses needed to attend a four-year college
- Understand education or training needed for desired career

Employment readiness

Work-readiness skills

- Earned a badge that leads to an industry-recognized credential
- Earned a degree, certificate, or license at school
- Grit score (0–8)
- Holds a credential
- Work-readiness index (0–8)

Paid work experience

- Ever worked for pay
- If ever worked, had a job arranged through school

We present two sets of impact findings. First, the intention-to-treat (ITT) impacts, which capture impacts of the *offer* of the YCC program, include the 25 percent of treatment group students who did not participate in YCC (no shows) and the 13 percent of control group students who did participate (crossovers). Second, we present complier average causal effect (CACE) impacts, which net out the effects of the no-shows and crossovers, thereby isolating program effects on those who complied with their research assignments (roughly, treatment group students who participated in the YCC program).

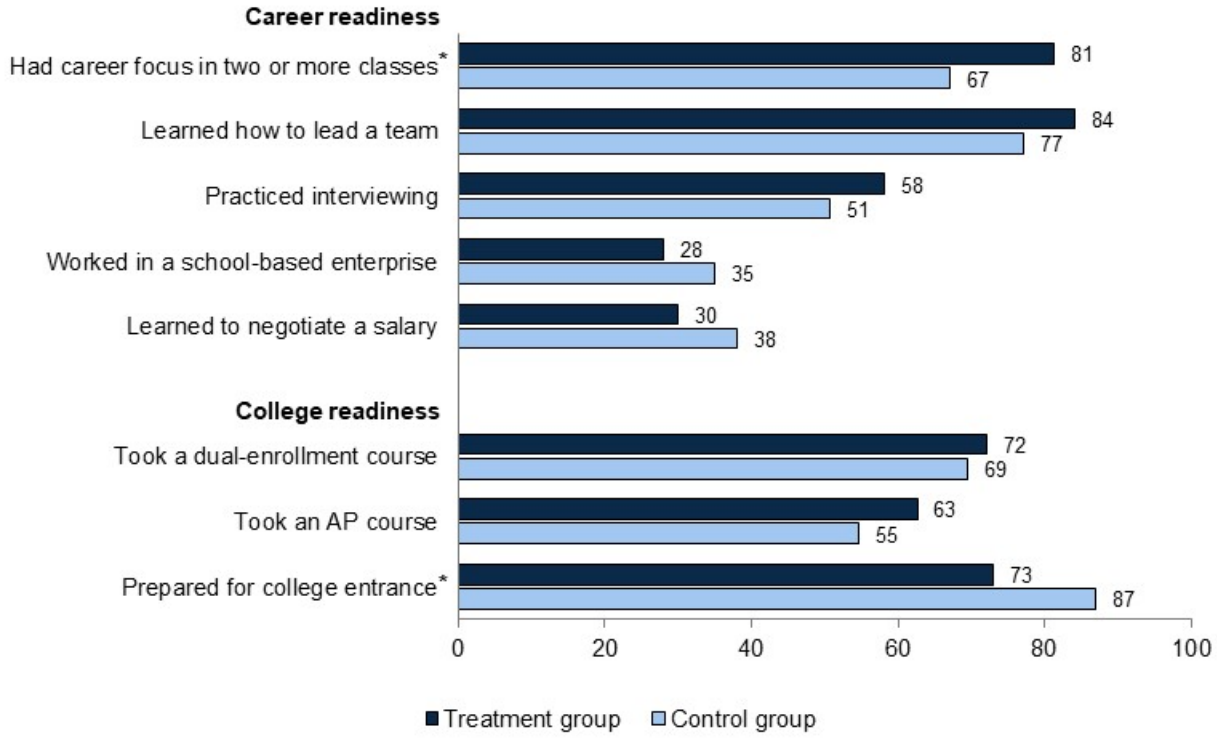
B. Self-reported differences in service receipt

We use the three program components that the implementation study identified as defining the YCC program (Chapter II) as a lens by which to examine differences in services and activities that students in the RCT treatment and control groups reported receiving: preparing for college and career, connecting to career track employment, and offering academic and nonacademic supports. We cannot directly compare the services and activities that staff said were offered to YCC and non-YCC students (and reported in Chapter II) with those that students reported receiving in the follow-up survey (and reported in this chapter) for at least four reasons. First, surveys targeted different school districts and different types of respondents. All 24 grantees completed the grantee survey in which services offered to YCC students were recorded while students in only three school districts completed the follow-up survey in which services received were recorded. Furthermore, only two of the three school districts for student reporting were included in the grantee survey for staff reporting. Second, the services and activities described by program staff and participants required different phrasing. For example, YCC staff can be asked if counselors developed an IDP with students, but students cannot be asked the same question because they might not know the term IDP; instead, they must be asked about topics discussed with counselors. Third, students were not asked about all services and activities because they would not be able to identify some (for example, whether courses used an active learning pedagogy). Finally, students may have trouble recalling services and activities they received up to two years earlier, while YCC program staff can more accurately answer questions about services and activities currently being offered.

Nonetheless, it is of interest to examine the treatment and control group differences in the services and activities received, for it sets important context for interpreting the impact estimates. Here, we summarize illustrative differences within each of the three YCC program components, highlighting statistically significant differences between the treatment and control groups (full results are provided in Chapter V of Burkander et al. [2019]).

Preparing for college and career. Students in the treatment group reported that they had a greater career focus in their coursework than students in the control group (Figure IV.1 on the next page): 81 percent of treatment and 67 percent of control group students reported having a career focus in two or more classes, a significant difference at the 5 percent level. Although students in the treatment group generally reported higher rates of coursework that was structured toward entering a two- or four-year college, only one difference was statistically significant: a greater proportion of control group students reported participating in classes or activities that prepared them for college exams (87 versus 73 percent).

Figure IV.1. Treatment and control group participation in college and career preparation



Source: Follow-up survey.

Notes: Graph shows unadjusted treatment and control group means.

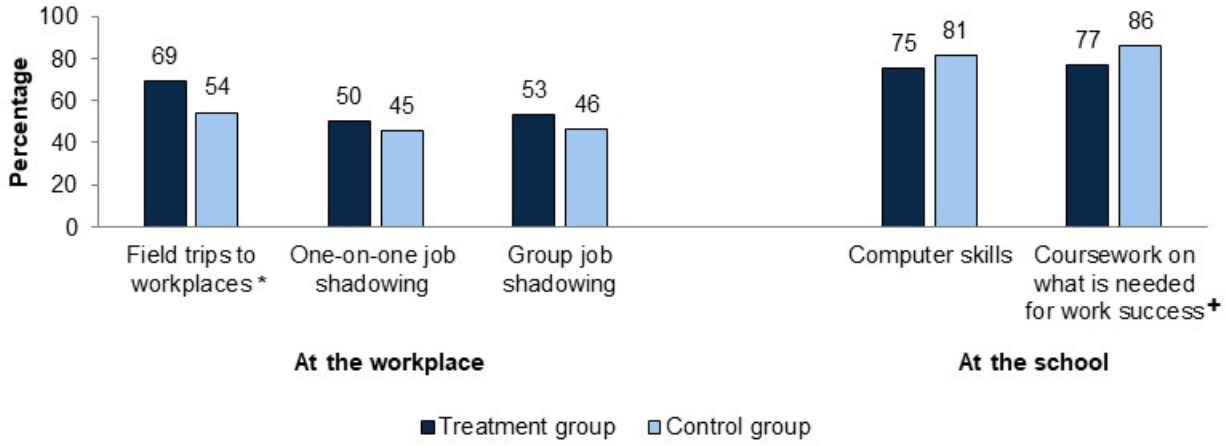
* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

AP = advanced placement.

Connecting to career-track employment. Students in the treatment group reported higher rates of participation in services and activities that linked them with career-track employment offered in the workplace, but control group students reported higher rates of participation in such activities offered in school (Figure IV.2 on the next page). Treatment group students reported higher rates of field trips to workplaces (69 versus 54 percent, a statistically significant difference at the 5 percent level). However, control group students reported higher rates of having coursework in subjects that might prepare them for a career, such as those building computer skills (81 versus 75 percent) and those covering what is needed for work success (86 versus 77 percent), a statistically significant difference at the 10 percent level.

Figure IV.2. Treatment and control group connections to career-track employment



Source: Follow-up survey.

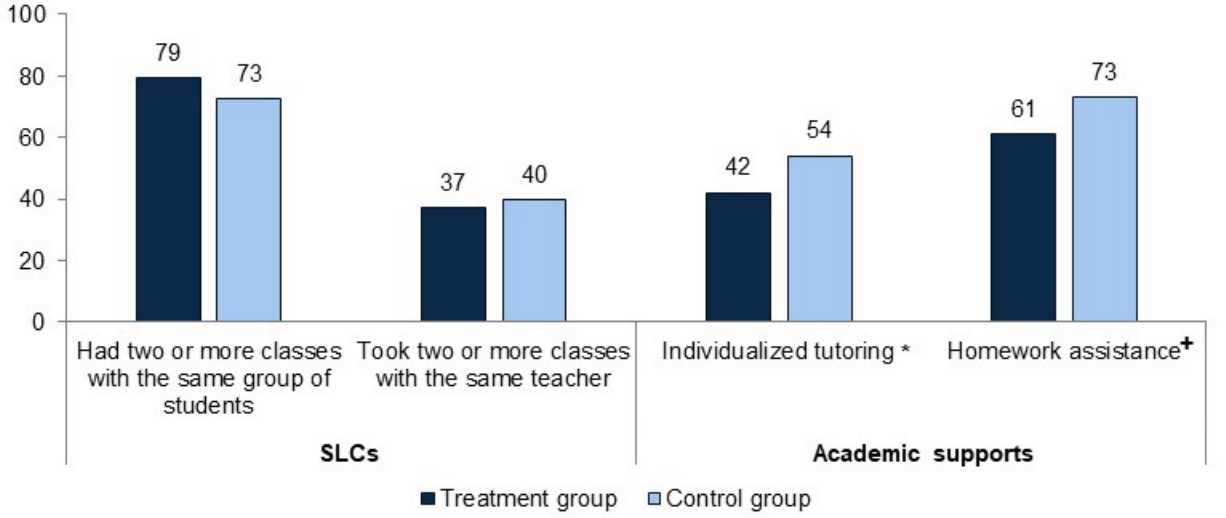
Notes: Graph shows unadjusted treatment and control group means.

* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

Offering academic and nonacademic supports. Students in treatment and control groups reported were equally likely to report being in a SLC (Figure IV.3). Control group students were more likely to report receiving academic supports at school, including individualized tutoring (54 versus 42 percent) and homework assistance (73 versus 61 percent); these differences are statistically significant at the 10 and 5 percent levels, respectively.

Figure IV.3. Treatment and control group academic and nonacademic supports



Source: Follow-up survey.

Notes: Graph shows unadjusted treatment and control group means.

* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

SLCs = small learning communities.

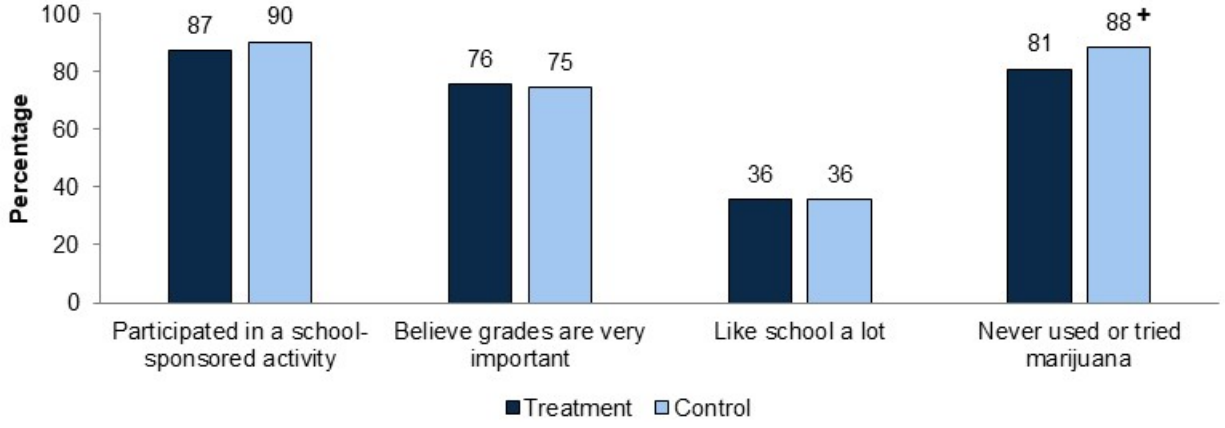
C. Impacts of the YCC program on survey outcomes

We now discuss estimated impacts of the YCC programs on the expanded set of outcomes available in the survey. These impacts differ from the descriptive statistics presented in Section B because these ITT estimates compare the mean outcomes of the treatment and control groups after controlling for baseline covariates. See Table A.13 in the Appendix for full ITT and CACE results.

Our results suggest that the YCC program did not have an impact on any of the 20 outcomes captured in the survey: none of the estimated impacts were statistically significant at the 5 percent level. [9] Only one, never used marijuana, was statistically significant at the 10 percent level. Below, we summarize ITT results for each domain, highlighting illustrative findings.

High school behavior. We found no impacts of the YCC program on any of the seven outcomes that capture high school behavior (Figure IV.4). Both groups also reported similar school engagement and satisfaction levels. Specifically, 76 percent of treatment and 75 percent of control group students reported believing grades are very important; 36 percent of both treatment and control group students reported liking school a lot. Students in both groups also reported similar experiences with substance abuse, and the difference between the percentages of the two groups who reported never using marijuana (81 percent for the treatment and 88 percent for the control group) is statistically significant at the 10 percent level. The significance levels are very similar for the ITT and CACE impact estimates (Table A.13 in the Appendix).

Figure IV.4. YCC program impact on key high school behaviors



Source: Follow-up survey.

Notes: Figure shows regression-adjusted treatment group means and unadjusted control group means, using an intention-to-treat model, which reflects the impact of the offer of the YCC program. The sample includes 279 treatment and 157 control group students across three school districts.

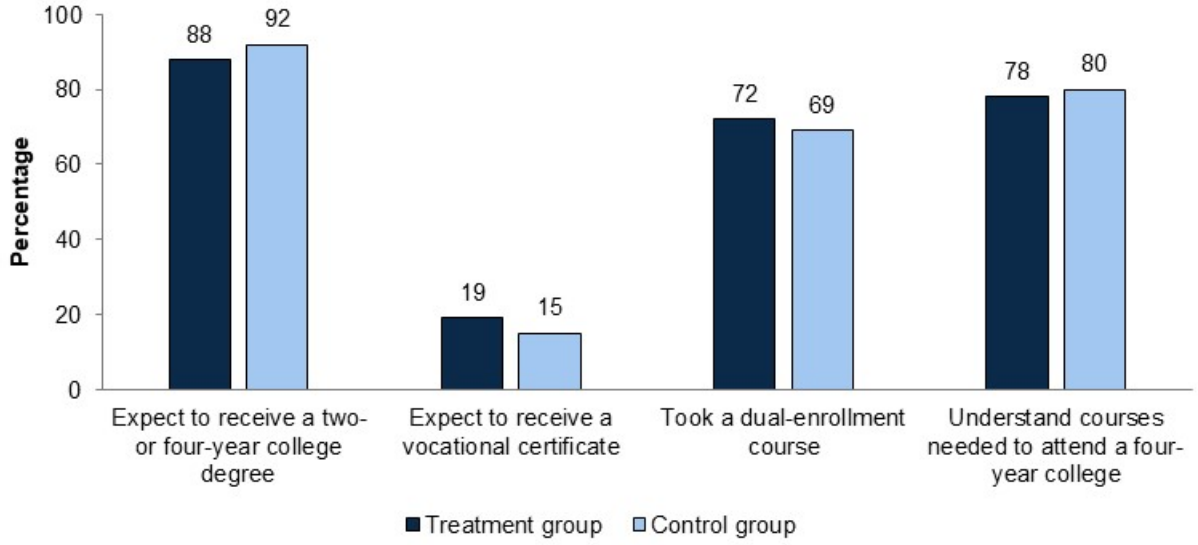
* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

[9] We estimated impacts on the all but three survey outcomes, which had insufficient variation across the sample: (1) whether the respondent expected to work at age 30, (2) whether the respondent was ever arrested, and (3) whether the respondent had never tried a drug other than alcohol or marijuana.

Postsecondary preparation. Controlling for baseline covariates, we found no impacts of the YCC program on any of the six outcomes in the postsecondary preparation domain (Figure IV.5). About 90 percent of students in both groups reported expecting to receive a two-year college degree or above, while a much lower percentage (about 17 percent) reported expecting to receive a vocational certificate. Around 70 percent of students in both groups reported taking courses while in high school that could help them earn college credit (dual-enrollment courses) and about 80 percent reported understanding what courses they needed to take to attend a four-year college.

Figure IV.5. YCC program impact on key postsecondary preparation outcomes



Source: Follow-up survey.

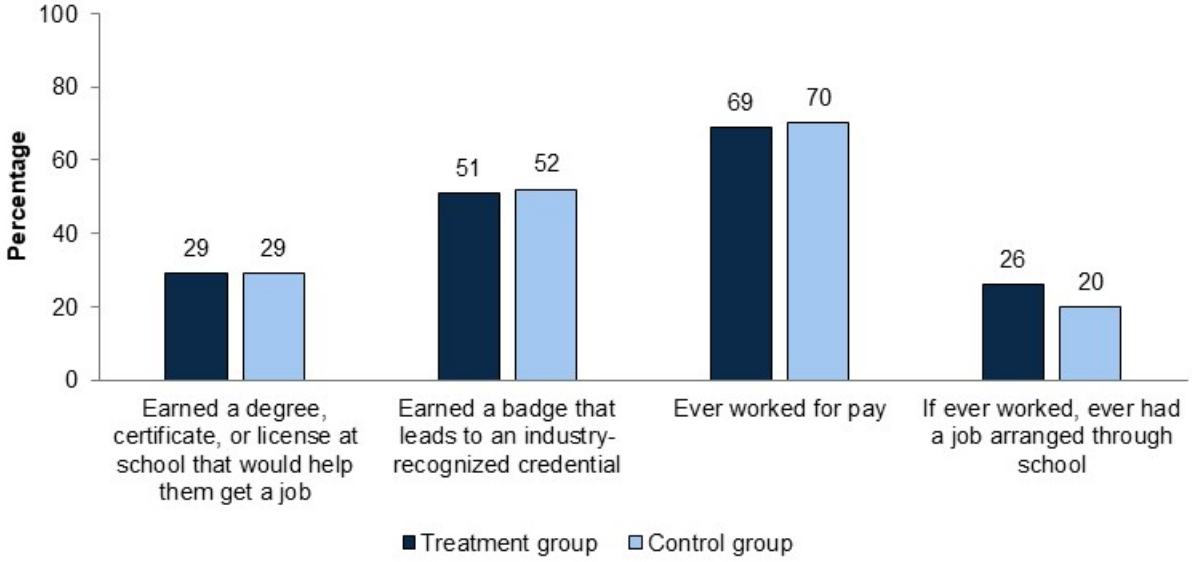
Notes: Graph shows regression-adjusted treatment group means and unadjusted control group means, using an intention-to-treat model, which reflects the impact of the offer of YCC services. The sample includes 279 treatment and 157 control group students across three school districts.

* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

Employment readiness. We found no impacts of the YCC program on any of the seven outcomes in the employment-readiness domain. As shown in Figure IV.6 on the next page, students in both groups reported similar work-readiness skills. For example, 29 percent of both treatment and control group students reported earning a degree, certificate, or license at school that would help them get a job. Approximately half of all students (51 percent treatment, 52 percent control) reported earning a badge at school for a specific skill, talent, or other achievement or taking courses at school that led to an industry-recognized credential. Students in both groups also reported similar paid work experience. Slightly more than two-thirds of all students (69 percent treatment, 70 percent control) reported ever having worked for pay; of those who had, 26 percent of treatment and 20 percent of control group students reporting having a job arranged through school.

Figure IV.6. YCC program impact on key employment readiness outcomes



Source: Follow-up survey.

Notes: Graph shows regression-adjusted treatment group means and unadjusted control group means, using an intention-to-treat model, which reflects the impact of the offer of YCC services. The sample includes 279 treatment and 157 control group students across three school districts.

* Indicates significant differences at the 5 percent level.

+ Indicates significant differences at the 10 percent level.

V. DISCUSSION

Our evaluation of the YCC program suggests that the program had small impacts on improving three of four primary outcomes that are associated with education and employment success. Importantly, this is an evaluation of a specific type of college and career program that was implemented in a nonrandom sample of districts and studied with a nonrandom sample of students. Still, the results are relevant in the current policy and programmatic context of the education-to-workforce pipeline in the U.S. Specifically, our primary analysis showed that the YCC program:

- Increased school attendance by 0.7 percentage points (from about 90.7 to 91.5 percent of enrolled days).
- Produced a small increase in accumulating credits. The increase is equivalent to the YCC program moving a student at the 50th percentile in accumulating credits for high school graduation up to about the 54th percentile.
- Might have increased proficiency in English language arts, as measured by ELA test scores. The increase is the equivalent of moving a student at the 50th percentile in the distribution of proficiency in English language arts to the 52nd percentile.
- Had no effect on students completing algebra coursework.

These impacts may be stronger as the program matured and when students received an internship, had a mentor, or completed an IDP, although we cannot rule out that the latter effects are partly driven by unobserved factors that influence both service participation and outcomes. We saw few differences in impacts across student subgroups based on their prior academic achievement or low-income status (defined as eligibility for the free and reduced price lunch program).

Taken together the findings suggest that the YCC program may have added value to participants' high school behaviors and postsecondary preparation. Although the estimated positive impacts are small, they are generally robust to alternative estimations and suggest that college and career programs have the potential to add career elements to the high school experience while slightly increasing credit accumulation and academic skills and maintaining other dimensions of the high school experience that are associated with staying in high school (Rumberger 2011). As such, the addition of career elements to the high school experience might increase long-term employment while slightly moving the needle on the outcomes that are achievable in high school.

This potential for the YCC college and career model, suggests that we need to learn more about the program components and mechanisms that produce the impacts. In this final chapter, we discuss the policy context in which YCC operated, the main conclusions we have reached from the evaluation of the YCC program, and the potential for future research to continue study of the model.

A. Current federal policies emphasize strategies similar to those tested in the YCC evaluation

Findings from the YCC evaluation are important in the current policy environment, which—like the YCC program—supports an education-to-workforce pipeline that prepares students for both college and careers in high-growth industries. The U.S. Department of Education's college and career-readiness standards (https://www.ed.gov/k-12reforms/standards) state this intention clearly:

> "It's critical that, collectively, we raise the bar so that every student in this country—regardless of socioeconomic status, race, or geographic location—is held to high learning standards that will ensure students have the skills to compete in today's global, knowledge-based economy."

Three pieces of legislation help to put this goal into action (Cushing, English, Therriault, and Lavinson 2019). The 2015 *Every Student Succeeds Act* (ESSA) provision for a "well-rounded education" supports college- and career-readiness by allowing states to leverage ESSA funding to drive college- and career-readiness standards and by requiring that all students be taught based on challenging academic content standards that prepare them to succeed in college and careers. Title I of the 2017 *Workforce Investment Opportunity Act* (WIOA) focuses on preparing adults and youth for in-demand jobs and can provide students with job training, an internship, and placement in support services. The 2019 *Strengthening Career and Technical Education for the 21st Century Act*, also known as Perkins V, may offer the nation's strongest commitment to college and career readiness by encouraging states to develop, innovate, and expand career and technical education (CTE) and to link CTE to K-12 education through ESSA and to workforce training through WIOA. As noted by Maag, Cahill, Loyd, and Barnett (2018), Perkins V:

- Includes (for the first time) a strong emphasis on the provision of WBL.
- Defines a CTE program of study as one that emphasizes the sequence of both academic and technical content at the secondary and postsecondary levels, incorporates employability skills, and is aligned to the needs of industry in the state, region, and local area.
- Seeks to align performance metrics among Perkins V, ESSA, and WIOA.

Although ESSA, WIOA, and Perkins V play important and complementary roles in preparing students for the current and future workforce, in many ways they simply codify the integration of career and academic education that many public high schools already have in place. Consider these trends:

- **Most public high school students complete at least one CTE course.** By 2009, 95 percent of 9th-grade students in public school attended a school that offered CTE instruction, and 85 percent of public high school graduates had completed one or more occupational CTE courses (U.S. Department of Education 2014).
- **Offering students a career-themed curriculum, defined as a sequence of courses that integrate core academic and CTE themes, is commonplace.** In 2014–2015, the last year for which data are available, 51 percent of U.S. high schools offered a career-themed curriculum to some or all students, with 25 percent of all high school students participating in one (U.S. Department of Education 2017).

The YCC program, as a high school–based program that blends academic and career-focused learning and aims to prepare students for both college and careers, fits squarely into the current environment for high school programming. DOL envisioned the program as the next generation of high school reform (U.S. Department of Education 2016) that builds on the evidence-based models of career academies (Stern et al. 2010, 1992; Kemple 2008, 2004; Maxwell and Rubin 2002, 2000; Maxwell 2001; Kemple and Snipes 2000;), sector-based initiatives (Greenstone and Looney 2011; Maguire et al. 2010; Woolsey and Groves 2010), and career pathways (Schwarz, Strawn, and Sarna 2018; Fein 2012; Hull 2005). The four-year program represented a $107 million investment, and DOL authorized this study to assess whether the program was implemented as intended and had an impact on youth.

B. The YCC program was largely implemented as intended and can be distinguished from other services available to youth

Grantees largely implemented the YCC program as DOL intended them to do. Although some grantees took longer to implement program services and activities than others, and some did not implement all of them, students enrolled in the YCC program typically had access to services and activities to help prepare for both college and careers, connect them to career-track employment, and support academic success.

The implementation study identified a range of services and activities that differentiated the YCC program from alternative programs. These services and activities fell into three program components and were offered at a higher rate to YCC students than other students:

1. **Preparing students for both college and career**, which took these forms:
   - Instruction in work-readiness or occupational skills
   - Coursework structured to lead to college and industry-recognized credentials
   - Emphasis on active learning pedagogies

2. **Connecting students to career-track employment**, which included activities that unfolded in school and at the workplace:
   - School-based activities included employer mentoring, guest speakers from the workplace, résumé writing workshops, mock interviews staged by industry professionals, and connections to a training program
   - Worked-based activities included field trips to the workplace, job shadowing, and internships

3. **Offering academic and nonacademic supports**, which most importantly included:
   - Small learning communities
   - Individual development plans for both college and career that counselors used when counseling students.

As programs matured over time, more students enrolled in YCC program services and activities, and students already in the YCC program moved into higher grades. With this maturation, some grantees deepened and expanded partnerships and services and activities, which might have facilitated their ability to offer an internship and mentoring to students as they advanced into higher grade levels. Grantees also expanded IDPs, and students' participation in industry-specific courses over time.

C. The YCC program had small, but significant impacts on increasing school attendance and credit accumulation

Both attendance and passing classes (that is, accumulating credits) are indicators that students are on track to receive a diploma (Rumberger 2011; Allensworth, Balfanz, and Dynarski 2017). Low rates of attendance can undermine student achievement (Ginsberg, Jordan, and Chang 2014), and slowed academic progress toward graduation through insufficient credit accumulation can lead to academic disengagement and eventual dropping out of high school (Doll, Eslami, and Walters 2013).

Two of our four primary outcomes examined these momentum points. We found evidence that the YCC program led to small but statistically significant gains in student attendance and credit accumulation (Figure V.1 summarizes the evidence). The treatment group of YCC students in the 16 QED school districts attended 91.5 percent of enrolled days compared to 90.7 percent for the comparison group, on average. Total credits earned during the two- to four-year impact study period were, on average, about 0.19 standard deviations above the school district average number of credits earned for the treatment students, compared to comparison students, which were 0.09 standard deviations above the district average (an impact of 0.10 standard deviations). This impact is equivalent to a student who is at the 50th percentile of the credits distribution moving up to approximately the 54th percentile. These results are robust to a range of sensitivity analyses in estimation methods and samples.

Figure V.1. Summary of YCC program impacts on primary outcomes

	Weighted equally by school district	Weighted equally by student
School attendance	*	*
Credit accumulation	*	*
Proficiency in English language arts		*
Algebra progression		

Note: Green shading indicates a positive significant impact. Red shading indicates negative significant impact. Blank cells indicate no significant impact.

* Indicates significant difference at the 5 percent level.

D. The YCC program may increase proficiency in English language arts but not algebra progression

Two of our four primary outcomes examined momentum points associated with success in college: ELA test score, which captures proficiency in English language arts, and progression in algebra (Gaertner et al. 2014; Hein et al. 2013). We found evidence that the YCC program might have improved ELA test scores but no evidence that it helped students progress in algebra during the two- to four-year study period (see Figure V.1 on preceding page). Although our benchmark analysis used weighted district models, our sensitivity analysis used weighted student models as a check for robustness. When school districts were weighted equally, the estimated impact of the YCC program on ELA scores was statistically insignificant. However, the impacts were positive in 10 of the 15 school districts and were statistically significant when students, rather than districts, were weighted equally (because the smallest school districts had negative impacts), suggesting that the YCC program might have affected proficiency in English language arts.

E. Impacts do not appear to vary by student subgroups based on prior academic achievement or low-income status

Prior research on career academies showed that this educational approach provides greater benefits for students with a high or moderate risk of dropping out of school (Kemple 2004). We conducted analyses to assess whether the impacts of YCC services differed by subgroups of students defined by their prior math and reading achievement as well as whether the student was from a low-income family. Differences in impacts for these subgroups were not statistically significant at the 5 percent level, and estimates for individual subgroups did not consistently show larger impacts for students with baseline risk factors than those without these risk factors. The only exception is that impacts on credit accumulation may have been larger for students who were not from a low-income family.

F. Impacts may be stronger for students who participated in an internship, had a mentor, or completed an IDP

To identify key program features that may improve student outcomes, we estimated separate impacts for students who participated in an internship (11 percent of the treatment group), had a mentor (51 percent), or completed an IDP (52 percent). We compared the outcomes of treatment group students in each service subgroup (for example, those who had an internship) to a comparison group weighted to have similar baseline characteristics as the students in that subgroup. Impacts on school attendance were larger for service subgroups than the 0.71 percentage point impact on enrolled days attended for the full sample: 2.20 percentage point impact for those receiving an internship, 0.94 for those having a mentor, and 1.13 for those completing an IDP (all impacts are statistically significant). Impacts on credit accumulation for the service subgroups were typically larger than the 0.10 standard deviations for the full sample: 0.15 standard deviations for those receiving an internship, 0.09 for those having a mentor, and 0.19 for those completing an IDP (all impacts are statistically significant). With ELA test scores, the impact was significant for those who had an internship. Although the impacts on algebra progression were not statistically significant for the overall sample, the impacts were significant

for both those who received an internship and those who had a mentor. The findings suggest that each of these services benefited YCC participants, but the data do not indicate which services generated the largest impact and the effects cannot be isolated to a single type of service since most students participated in multiple types of services throughout their YCC enrollment. We cannot rule out that these effects are partly driven by unobserved factors that influenced both service participation and program outcomes.

G. Impacts may be larger for later cohorts as the YCC program matured

The implementation study found that grantees deepened program components over time, which we might expect to translate into stronger program impacts for later cohorts of students. We examined whether the effects of the YCC program varied based on whether students enrolled during the first, second, or third years of the grant. This analysis included, depending on the outcome, between 12 and 15 of the 16 QED school districts, with students in all three cohorts and all needed data available. While the characteristics of students across cohorts varied somewhat, results when school districts are weighted equally showed larger impacts for the two later cohorts (although they are not statistically significant) on credit accumulation, proficiency in English language arts, and algebra progression but not on school attendance. When students are weighted equally, however, the results for these cohorts appear larger and are statistically significant at the 5 percent level for credit accumulation and proficiency in English language arts.

H. We found no impacts on expanded measures of students' high school behaviors, postsecondary preparation, and employment readiness

We found no evidence that the YCC program had an impact on high school graduation. About 88 percent of both treatment and control group students in the three cohorts of students that could have an on-time graduation had actually graduated by the time school records were available in 2018.[10] This analysis was done using students who enrolled in a program early in the grant period. Because program effects may have been larger for students enrolling in the program during later years, it is possible that the YCC program will affect the high school graduation rate of the later two cohorts, but we cannot measure the effect because these students were too young to have graduated when data collection ended.

The YCC program did not appear to impact any of the 20 outcomes captured by the survey in the following three areas: (1) high school behaviors, (2) postsecondary preparation, and (3) employment readiness. Point estimates were small, and none of the estimated impacts were statistically significant at the 5 percent level. The RCT analysis, however, has two notable limitations. First, as described in Chapter I, the survey was conducted in only three RCT school districts, and students included in the RCT were somewhat more at risk than the overall YCC population, with greater proportions of students from racial and ethnic minorities and qualifying for the free and reduced price lunch program. Thus, the findings from the RCT may not

[10] Students from disadvantaged groups often take longer than four years to earn a high school diploma (Murnane 2013).
(continued)

generalize to all YCC students. Second, the small sample size in the RCT means that the analysis was not sufficiently powered to detect program effects. [11]

I. Further research is needed to assess long-term impacts and continue to explore the impacts of WBL

The YCC program aimed to strengthen the talent pipeline by putting students on a pathway to complete postsecondary education and secure unsubsidized employment in middle- to high-skilled occupations and in industries that often rely on hiring foreign workers through the H-1B visa program. Because data collection for this evaluation ended in 2018, we could only assess the program's impact on outcomes that students could achieve while in high school and it could not assess the longer-term impacts the program intended to produce. Although the results show that the YCC program moved the needle on key momentum points associated with longer-term education and employment success, we do not know whether this movement translates into long-term gains. Future research needs to explore whether this is the case. Indeed, the seminal career academy evaluation demonstrated that impacts on high school interventions on employment can sometimes take years to surface (Kemple 2004, 2008). It will be feasible to continue research on the students in this evaluation using a restricted use data file (Vigil, Burkander, and Maxwell 2019) and to follow up with students from 11 of the 16 school districts in the QED to collect National Student Clearinghouse data.

Our findings reinforce the need to understand the mechanisms and processes that lead to the positive impacts, for this understanding could turn the small impacts shown in this study into larger impacts. Indeed, research grounded in principle stratification analysis found an earnings increase for students who remained enrolled in a career academy throughout high school (Page, 2012), suggesting program components offered in later years (such as internships) or the full complement of components might be enhance labor market outcomes. Findings from this evaluation suggest that WBL and counseling focused on both college and careers might be program components on which future research might focus to gain an understanding of the specific precursors in high school college and career programs that improve labor-market outcomes for we find larger impacts for those who received an internship, had a mentor, or completed an IDP (which focuses counseling on careers as well as college). While this finding supports the growing interest in WBL—as demonstrated by the emphasis placed on this approach in Perkins V—we cannot rule out the possibility that our findings might be partly driven by unobserved factors that influence both service participation and program outcomes. Future research might focus on whether those components have independent effects or are enhanced when they are offered as a group or in certain combinations by randomizing which students receive combinations of program components (for example) and following those students over time to assess which combination of components improve labor market outcomes.

Finally, our findings suggest that future research might explore whether the impacts in college and career program are stronger as the program matures. Our findings suggests students in the later cohorts who experienced larger impacts still had one or two years remaining in high school

[11] An analysis being not sufficiently powered means that, due to small sample size, it is not possible to detect impacts that truly exist unless the impact is unreasonably large.

at the time of data collection and may continue to receive YCC services, including intensive WBL activities, such as an internship and mentoring that are more often offered to students in 11th and 12th grade.

In short, both the recent legislative changes and the trend of recognizing the potential strength of the dual approach of preparing students for both college and careers means that research on college and career programs such as the YCC program are highly relevant. Although our findings were obtained for one specific type of college and career program and (for the QED) a nonrandom group of students. Still, findings from the evaluation can support the positive impacts found in college and career programs (for example, Kemple 2008) and suggest areas for further research to focus. Policy makers, educators, the public workforce system, and industry partners should therefore continue to seek information on the best approaches to help young people prepare for and move into careers that align with the demand for skilled workers in the United States economy. Findings from the evaluation of the YCC program support the potential for a continued focus on college and career pathways.

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Appendix

Data Tables

In this appendix, we present tables and figures that augment information presented in the text. We present tables in the order in which they are referenced in the text. Table A.1 supports Chapter II; Tables A.2 to A.12 support Chapter III; and Table A.13 supports Chapter IV.

We used several guidelines when developing the tables in this chapter:

- Tables include the maximum number of sample or respondents (where appropriate), even though item-specific nonresponse might reduce that number in some cells.
- * Indicates significant differences at the 5 percent level.

  + Indicates significant differences at the 10 percent level.
- Further details on analytic tables can be found in Burkander et al. (2019), except where noted.
- Acronyms include the following:

ACT	American College Test
CACE	complier average causal effect
ELA	English language arts
FAFSA	Free Application for Federal Student Aid
FUS	follow-up survey
HS	high school
IDP	individual development plan
ITT	intention-to-treat
n.a.	not applicable
PTS	Participant Tracking System
QED	quasi-experimental design
YCC	Youth CareerConnect

Table A.1. Services and activities available to YCC students and students not in the YCC program but in the same school

Preparing for both college and career	Connecting students with career-track employment	Offering academic and nonacademic supports
Strong contrast		
• Campus visits to four-year colleges • Capstone courses • Certification examination preparation • Citizenship training • College entrance exam preparation courses • College faculty or representatives visiting HS classes • Community service learning • Courses articulated to a two- or four-year college • Courses leading to an industry-recognized credential • Dual-enrolled courses • Occupational skills training • Project-based learning in courses • Stackable credentials • Training in decision making and determining priorities • Training in organization and teamwork • Work-readiness assessments (for example, WorkKeys)	• Attendance at conferences of trade associations • Connections to a training program • Field trips to workplaces • Internships (paid) • Internships (unpaid) • Internships at a place of work (not required) • Internships at a place of work (required) • Job shadowing (group) • Job shadowing for individual students • Mentors (group) • Mentors (individual) • Mock interviews staged by industry professionals • Résumé writing workshops • Speakers to describe workplaces and careers	• Acceleration strategies to get lower-performing students up to speed • Assistance with FAFSA completion • Cohort classes at each grade level • Costs paid for credential attainment (for example, fees for certification examinations) • Developmental or special education • Fees paid for tests or examinations (for example, ACT) • Financial aid planning assistance • Homework assistance • IDPs • Individualized tutoring • Peer-centered activities (peer mentoring or tutoring) • School supplies support • Services for students with disabilities • Teachers with a regularly scheduled common planning period • Teachers work with a specific group of students • Transportation support • Tuition or financial assistance • Work clothes or uniform support • Work-related equipment (for example, personal computer)
Moderate contrast		
• Advanced placement coursework • Campus visits to two-year colleges	• Referral to program at an American Job Center	• Physical space dedicated to students
Weak contrast		
		• School-within-a-school structure

Source: Grantee surveys 2017 (Geckeler et al. 2019 presents full results).

Notes: The table shows the contrast in services and activities between those offered in YCC program and those offered in the same school but outside YCC (or by a similar school in the school district if YCC is school-wide), with the three sections of the table categorizing magnitude differences in 2017. Services and activities in the strong contrast section were offered to YCC students at a rate at least 30 percentage points higher than they were offered to *all* of the students outside the YCC program and at least a 20 percentage point higher rate than they were offered to *some* of the students outside the YCC program. Those in the "moderate contrast" section were offered to YCC students at a rate between 10 to 20 percentage points higher than they were offered to all students (and did not fall into the strong contrast group) and those in the weak contrast section were offered to YCC students at a rate that was less than a 10 percentage point higher than they were offered to all students.

Table A.2. Baseline equivalence for the QED treatment and matched comparison group samples (percentage unless otherwise stated)

Baseline characteristic	Treatment group mean	Comparison group mean (unweighted)	Comparison group mean (weighted)	Difference in means (weighted)	Effect size
Age at entry into 8th grade (in years)	14.1	14.1	14.1	0.0	0.01
Female	44.0%	50.1%	43.7%	0.3	0.01
Race/ethnicity[a]					
American Indian	0.4	0.3	0.3	0.1	0.01
Asian	5.6	4.3	5.6	0.1	0.00
Black	33.6	30.6	33.3	0.1	0.00
Hispanic	27.2	30.7	27.4	-0.2	-0.00
White	31.0	32.1	31.2	-0.2	-0.00
Multiracial	2.3	2.0	2.2	0.0	0.00
Low -income status, 7th grade	64.4	66.2	63.6	-0.0	-0.00
Low-income status, 8th grade	62.1	64.6	61.7	-0.0	-0.00
School attendance, 7th grade	95.1	95.0	95.2	-0.1	-0.01
School attendance, 8th grade	95.2	94.6	95.2	-0.0	-0.01
Ever suspended, 7th grade	10.7	11.3	10.6	0.1	0.00
Ever suspended, 8th grade	10.8	11.0	10.5	0.1	0.00
Math assessment scores, 7th grade (*z*-score)	0.1	-0.1	0.1	-0.0	-0.00
Math assessment score, 8th grade (*z*-score)	0.2	0.0	0.2	0.0	0.00
Reading assessment scores, 7th grade (*z*-score)	0.1	-0.0	0.1	-0.0	-0.00
Reading assessment score, 8th grade (*z*-score)	0.1	-0.0	0.1	0.0	0.00
English language learner, 8th grade	.5	9.9	9.8	-0.6	-0.02
Repeated a grade in middle school	6.8	8.0	6.6	0.1	0.01
Received special education services, 8th grade	11.2	14.1	11.3	-0.2	-0.00
Sample size	**6,207**	**109,541**	**6,207**	**n.a.**	**n.a.**

Source: School records, PTS.

Note: Weighted comparison group means that each comparison student is weighted by $\frac{\hat{p}_i}{1-\hat{p}_i}$, where $\hat{p}_i$ is the estimated propensity score. Number may not add to 100 percent because participants can belong to more than one category. Baseline equivalence tests for each sample used in the primary impact analysis can be found in Chapter V (Tables V.14 and V.15) in Burkander et al. (2019).

[a] We conducted an *F*-test to assess the joint baseline equivalence across all race and ethnicity categories; differences were not significant at the 5 percent level (*p*-value = 0.867).

Table A.3. YCC program impacts on primary outcomes

			School districts equally weighted			Students equally weighted		
	Treatment group mean	Control group mean	Impact estimate	Effect size	*p*-value of impact estimate	Impact estimate	Effect size	*p*-value of impact estimate
School attendance (percent of enrolled days)	91.5	90.8	0.7*	0.052	0.002	0.7*	0.054	0.000
Credit accumulation (*z*-score)	0.2	0.1	0.1*	0.109	0.000	0.1*	0.136	0.000
ELA exam score (*z*-score)	0.2	0.2	0.0	0.014	0.380	0.0*	0.042	0.001
Algebra progression (percent progressed)	62.6	61.5	1.1	0.022	0.245	-0.4	-0.009	0.517
Sample size	**5,713**	**96,778**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**

Source: School records, PTS.

Notes: The table shows regression-adjusted treatment group means and unadjusted control group means, where the comparison group is weighted to resemble the treatment group. Weights are defined to be one for all YCC participants and $\frac{\hat{p}_i}{1-\hat{p}_i}$ for the comparison group students, where $\hat{p}$ is the estimated probability of being in the treatment group. The difference in means is the average treatment effect among YCC students. Reported sample sizes are the largest sample across outcomes – sample sizes vary across analyses due to missing outcome data.

Table A.4. YCC program impacts on primary outcomes, by math proficiency in 8th grade

			School districts equally weighted			Students equally weighted		
	Treatment group mean	Control group mean	Impact estimate	Effect size	*p*-value of impact estimate	Impact estimate	Effect size	*p*-value of impact estimate
Students who were below proficient on middle school math assessments								
School attendance (percent of enrolled days)	89.2	88.4	0.7*	0.053	0.048	0.8*	0.060	0.001
Credit accumulation (*z*-score)	-0.1	-0.2	0.1*	0.116	0.000	0.1*	0.122	0.000
ELA exam score (*z*-score)	-0.3	-0.3	-0.0	-0.009	0.697	0.0*	0.041	0.015
Algebra progression (percent progressed)	55.5	53.8	1.7	0.032	0.187	-0.0	-0.001	0.968
Students who were proficient or above on middle school math assessments								
School attendance (percent of enrolled days)	93.8	93.2	0.6*	0.046	0.039	0.6*	0.044	0.015
Credit accumulation (*z*-score)	0.4	0.3	0.1*	0.095	0.001	0.1*	0.132	0.000
ELA exam score (*z*-score)	0.6	0.6	0.0	0.031	0.152	0.0*	0.038	0.046
Algebra progression (percent progressed)	70.0	70.0	0.2	0.004	0.887	-1.3	-0.026	0.340
Sample size	**5,639**	**94,935**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**

Source: School records, PTS.

Notes: The table shows regression-adjusted treatment group means and unadjusted control group means, where the comparison group is weighted to resemble the treatment group. Weights are defined to be one for all YCC participants and $\frac{\hat{p}_i}{1-\hat{p}_i}$ for the comparison group students, where $\hat{p}$ is the estimated probability of being in the treatment group. The difference in means is the average treatment effect among YCC students. Reported sample sizes are the largest sample across outcomes – sample sizes vary across analyses due to missing outcome data. Tests of differences show that there were no statistically significant differences in impacts between students proficient and below proficient in math.

Table A.5. YCC program impacts on primary outcomes, by reading proficiency in 8th grade

			School districts equally weighted			Students equally weighted		
	Treatment group mean	Control group mean	Impact estimate	Effect size	*p*-value of impact estimate	Impact estimate	Effect size	*p*-value of impact estimate
Students who were below proficient on middle school reading assessments								
School attendance (percent of enrolled days)	89.0	88.1	1.0*	0.063	0.018	0.8*	0.058	0.002
Credit accumulation (*z*-score)	-0.1	-0.2	0.1*	0.104	0.002	0.1*	0.110	0.000
Reading exam score (*z*-score)	-0.4	-0.4	-0.0	-0.010	0.687	0.0*	0.039	0.030
Algebra progression (percent progressed)	54.2	53.1	1.1	0.021	0.416	-0.2	-0.005	0.789
Students who were proficient or above on middle school reading assessments								
School attendance (percent of enrolled days)	93.4	92.8	0.7*	0.048	0.026	0.7*	0.055	0.001
Credit accumulation (*z*-score)	0.4	0.3	0.1*	0.118	0.000	0.2*	0.173	0.000
Reading exam score (*z*-score)	0.6	0.6	0.0*	0.039	0.040	0.0*	0.050	0.003
Algebra progression (percent progressed)	69.4	68.4	1.0	0.019	0.475	-1.0	-0.019	0.457
Sample size	**5,647**	**94,971**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**

Source: School records, PTS.

Notes: The table shows regression-adjusted treatment group means and unadjusted control group means, where the comparison group is weighted to resemble the treatment group. Weights are defined to be one for all YCC participants and $\frac{\hat{p}_i}{1-\hat{p}_i}$ for the comparison group students, where $\hat{p}$ is the estimated probability of being in the treatment group. The difference in means is the average treatment effect among YCC students. Reported sample sizes are the largest sample across outcomes – sample sizes vary across analyses due to missing outcome data. A test of differences shows that when students are equally weighted the impacts on credit accumulation are statistically different between students who are above and below proficient in reading in 8th grade.

Table A.6. YCC program impacts on primary outcomes, by low-income status in 8th grade

			School districts equally weighted			Students equally weighted		
	Treatment group mean	Control group mean	Impact estimate	Effect size	*p*-value of impact estimate	Impact estimate	Effect size	*p*-value of impact estimate
Low-income students								
School attendance (percent of enrolled days)	89.1	88.4	0.8*	0.053	0.027	0.8*	0.063	0.000
Credit accumulation (*z*-score)	0.0	-0.0	0.1*	0.076	0.007	0.1*	0.118	0.000
ELA exam score (*z*-score)	-0.0	-0.0	0.0	0.013	0.500	0.0*	0.048	0.001
Algebra progression (percent progressed)	57.8	57.5	0.4	0.007	0.747	-0.4	-0.008	0.617
Non-low-income students								
School attendance (percent of enrolled days)	94.3	93.9	0.5	0.032	0.126	0.3	0.025	0.200
Credit accumulation (*z*-score)	0.5	0.3	0.2*	0.173	0.000	0.2*	0.188	0.000
ELA exam score (*z*-score)	0.6	0.5	0.0+	0.047	0.064	0.0+	0.044	0.066
Algebra progression (percent progressed)	66.1	64.8	1.3	0.025	0.415	-1.2	-0.025	0.411
Sample size	**5,504**	**95,205**	**n.a**	**n.a**	**n.a**	**n.a**	**n.a**	**n.a**

Source: School records, PTS.

Notes: The table shows regression-adjusted treatment group means and unadjusted control group means, where the comparison group is weighted to resemble the treatment group. Weights are defined to be one for all YCC participants and $\frac{\hat{p}_i}{1-\hat{p}_i}$ for the comparison group students, where $\hat{p}$ is the estimated probability of being in the treatment group. The difference in means is the average treatment effect among YCC students. Reported sample sizes are the largest sample across outcomes – sample sizes vary across analyses due to missing outcome data. A test of differences shows that when school districts or students are equally weighted the impacts on credit accumulation are statistically different between low-income and non-low-income students.

Table A.7. YCC program impacts on primary outcomes, by year starting program

			School districts equally weighted			Students equally weighted		
	Treatment group mean	Control group mean	Impact estimate	Effect size	*p*-value of impact estimate	Impact estimate	Effect size	*p*-value of impact estimate
Students entering the YCC program in fall 2014								
School attendance (percent of enrolled days)	89.6	88.7	0.9	0.064	0.210	1.4*	0.104	0.007
Credit accumulation (*z*-score)	0.2	0.1	0.1	0.066	0.129	0.1*	0.093	0.001
ELA exam score (*z*-score)	0.2	0.2	-0.0	-0.004	0.881	-0.0	-0.000	0.988
Algebra progression (percent progressed)	75.2	75.8	-0.5	-0.010	0.777	-1.2	-0.023	0.353
Students entering the YCC program in fall 2015								
School attendance (percent of enrolled days)	91.5	90.9	0.6	0.042	0.152	0.6+	0.047	0.054
Credit accumulation (*z*-score)	0.1	0.0	0.1*	0.129	0.000	0.1*	0.123	0.000
ELA exam score (*z*-score)	0.2	0.2	0.0	0.024	0.354	0.1*	0.073	0.000
Algebra progression (percent progressed)	75.8	73.2	2.7+	0.051	0.073	0.2	0.005	0.836
Students entering the YCC program in fall 2016								
School attendance (percent of enrolled days)	92.0	91.3	0.7*	0.052	0.019	0.4*	0.033	0.048
Credit accumulation (*z*-score)	0.2	0.1	0.1*	0.131	0.000	0.2*	0.199	0.000
ELA exam score (*z*-score)	0.2	0.1	0.0	0.039	0.175	0.1*	0.076	0.004
Algebra progression (percent progressed)	41.4	39.9	1.5	0.029	0.349	-0.3	-0.006	0.823
Sample size	**5,587**	**95,475**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**

Source: School records, PTS.

Notes: The table shows regression-adjusted treatment group means and unadjusted control group means, where the comparison group is weighted to resemble the treatment group. Weights are defined to be one for all YCC participants and $\frac{\hat{p}_i}{1-\hat{p}_i}$ for the comparison group students, where $\hat{p}$ is the estimated probability of being in the treatment group. The difference in means is the average treatment effect among YCC students. Reported sample sizes are the largest sample across outcomes – sample sizes vary across analyses due to missing outcome data.

Table A.8. Differences in baseline characteristics between service recipients and non-recipients by service type (percentage unless otherwise stated)

	Differences in means, school districts equally weighted			Differences in means, students equally weighted		
Baseline characteristic	Internship	Mentoring	IDP	Internship	Mentoring	IDP
Age at entry into 8th grade	0.0	0.0	-0.1*	0.0	0.0	-0.1*
Gender	0.2*	0.0+	0.0	0.1*	0.0	0.0
Race/ethnicity						
American Indian	0.0	-0.0	-0.0	0.0	-0.0	0.0
Asian	0.0	-0.0	0.0*	0.0	-0.0*	0.0*
Black	0.0*	-0.0	-0.0+	0.0	-0.1*	-0.0*
Hispanic	-0.0	0.0*	0.0	0.0	0.1*	-0.0
White	-0.0*	-0.0	-0.0	-0.0+	-0.0	0.0+
Multiracial	0.0	0.0	-0.0	0.0	-0.0	-0.0
Low-income status, 7th grade	-0.0	0.0	-0.0	-0.0	0.0*	-0.0*
Low-income status, 8th grade	0.0	0.0	-0.0	-0.0	0.0	-0.0
Attendance rate, 7th grade	0.6*	-1.2*	0.8*	0.6*	-0.1	0.8*
Attendance rate, 8th grade	1.0*	0.6*	0.4+	0.7*	0.4*	0.4*
Ever suspended, 7th grade	-0.0	-0.0*	-0.0	-0.0	-0.0*	-0.0+
Ever suspended, 8th grade	-0.0	-0.0*	-0.0*	-0.0	-0.0*	-0.0*
Math assessment scores, 7th grade	-0.0	0.0	0.1*	0.1*	0.0*	0.1*
Math assessment scores, 8th grade	0.0	0.1*	0.2*	0.1*	0.0+	0.1*
Reading assessment scores, 7th grade	0.1+	0.1*	0.1*	0.2*	0.1*	0.2*
Reading assessment scores, 8th grade	0.1*	0.1*	0.1*	0.2*	0.1*	0.1*
Received special education services, 8th grade	-0.0+	-0.0	-0.0*	-0.0*	-0.0	-0.0*
English language learner, 8th grade	-0.1*	0.0	0.0	-0.1*	0.0+	-0.0
Repeated a grade in middle school	0.0	-0.0	0.0	-0.0	-0.0	-0.0

Source: School records, PTS.

Note: Means are weighted to give equal weight to all school districts.

Table A.9. YCC program impacts on primary outcomes, by participation in an internship

			School districts equally weighted			Students equally weighted		
	Treatment group mean	Control group mean	Impact estimate	Effect size	*p*-value of impact estimate	Impact estimate	Effect size	*p*-value of impact estimate
Students who participated in an internship								
School attendance (percent of enrolled days)	92.5	90.2	2.3*	0.121	0.000	2.7*	0.202	0.000
Credit accumulation (*z*-score)	0.2	0.1	0.1+	0.079	0.075	0.2*	0.212	0.000
ELA exam score (*z*-score)	0.2	0.2	0.1*	0.053	0.020	0.1*	0.069	0.017
Algebra progression (percent progressed)	66.5	60.8	5.7*	0.080	0.006	4.1*	0.082	0.014
Students who did not participate in an internship								
School attendance (percent of enrolled days)	90.1	89.6	0.5	0.028	0.118	0.6*	0.041	0.026
Credit accumulation (*z*-score)	0.0	-0.0	0.0	0.026	0.272	0.1*	0.101	0.000
ELA exam score (*z*-score)	0.2	0.1	0.1*	0.032	0.028	0.1*	0.071	0.000
Algebra progression (percent progressed)	53.3	52.7	0.7	0.009	0.561	-2.1*	-0.042	0.017
Sample size	**3,294**	**154,198**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**

Source: Student records data in the 4 QED school districts in which at least 50 treatment students received an internship and at least 50 treatment students did not receive an internship, and the PTS.

Notes: The table shows regression-adjusted treatment group means for those treatment students who did and did not participate in an internship, and unadjusted control group means, where the comparison group is weighted to resemble either service recipients or nonrecipients. Weights are defined to be one for all YCC participants and $\frac{\hat{p}_i}{1-\hat{p}_i}$ for the comparison group students, where $\hat{p}$ is the estimated probability of being in the treatment group and being either a service recipient or non-recipient. The difference in means is the average treatment effect among YCC students. Reported sample sizes are the largest sample across outcomes – sample sizes vary across analyses due to missing outcome data. A test of differences shows that when school districts are equally weighted the impacts on school attendance and algebra progression are statistically different between students who participated in internship and those who did not participate in an internship. When students are equally weighted the impacts on school attendance, credit accumulation and algebra progression are statistically different between the two groups.

Table A.10. YCC program impacts on primary outcomes, by receipt of mentoring

			School districts equally weighted			Students equally weighted		
	Treatment group mean	Control group mean	Impact estimate	Effect size	*p*-value of impact estimate	Impact estimate	Effect size	*p*-value of impact estimate
Students who received mentoring								
School attendance (percent of enrolled days)	90.7	89.7	1.1*	0.065	0.010	1.2*	0.091	0.000
Credit accumulation (*z*-score)	0.1	0.0	0.1*	0.085	0.002	0.0+	0.038	0.067
ELA exam score (*z*-score)	0.1	0.1	0.0	0.025	0.240	0.1*	0.064	0.001
Algebra progression (percent progressed)	62.7	57.7	5.0*	0.088	0.000	2.7*	0.055	0.006
Students who did not receive mentoring								
School attendance (percent of enrolled days)	91.1	90.3	0.8*	0.047	0.030	0.6*	0.046	0.013
Credit accumulation (*z*-score)	0.1	-0.0	0.1	0.053	0.101	0.2*	0.207	0.000
ELA exam score (*z*-score)	0.0	0.0	0.0	0.005	0.814	0.0	0.032	0.104
Algebra progression (percent progressed)	50.8	53.7	-2.9*	-0.051	0.023	-4.6*	-0.089	0.000
Sample size	**4,588**	**173,196**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**

Source: Student records data in the 8 QED school districts in which at least 50 treatment students received mentoring and at least 50 treatment students did not receive mentoring, and the PTS.

Notes: The table shows regression-adjusted treatment group means for those treatment students who did and did not receive mentoring, and unadjusted control group means, where the comparison group is weighted to resemble either service recipients or nonrecipients. Weights are defined to be one for all YCC participants and $\frac{\hat{p}_i}{1-\hat{p}_i}$ for the comparison group students, where $\hat{p}$ is the estimated probability of being in the treatment group and being either a service recipient or non-recipient. The difference in means is the average treatment effect among YCC students. Reported sample sizes are the largest sample across outcomes – sample sizes vary across analyses due to missing outcome data. A test of differences shows that when school districts are equally weighted the impacts on algebra progression are statistically different between students who received mentoring and those who did not receive mentoring. When students are equally weighted the impacts on credit accumulation and algebra progression are statistically different between the two groups.

Table A.11. YCC program impacts on primary outcomes, by completion of an IDP

			School districts equally weighted			Students equally weighted		
	Treatment group mean	Control group mean	Impact estimate	Effect size	*p*-value of impact estimate	Impact estimate	Effect size	*p*-value of impact estimate
Students who received an IDP								
School attendance (percent of enrolled days)	92.1	91.1	1.1*	0.068	0.002	1.1*	0.082	0.000
Credit accumulation (*z*-score)	0.2	0.0	0.2*	0.162	0.000	0.2*	0.237	0.000
ELA exam score (*z*-score)	0.1	0.1	0.0	0.031	0.125	0.1*	0.067	0.001
Algebra progression (percent progressed)	62.7	60.7	19	0.035	0.145	2.6*	0.053	0.013
Students who did not receive an IDP								
School attendance (percent of enrolled days)	91.1	90.8	0.3	0.022	0.276	0.6*	0.049	0.014
Credit accumulation (*z*-score)	0.0	-0.0	0.0	0.015	0.546	0.0	0.030	0.182
ELA exam score (*z*-score)	0.0	0.0	0.0	0.009	0.653	0.0+	0.032	0.088
Algebra progression (percent progressed)	51.4	54.1	-2.7*	-0.048	0.043	-3.4*	-0.069	0.000
Sample size	**4,797**	**175,019**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**

Source: Student records data in 9 QED school districts with at least 50 treatment student completing an IDP and 50 treatment students not completing one, and the PTS.

Notes: The table shows regression-adjusted treatment group means for those treatment students who did and did not complete an IDP, and unadjusted control group means, where the comparison group is weighted to resemble either service recipients or nonrecipients. Weights are defined to be one for all YCC participants and $\frac{\hat{p}_i}{1-\hat{p}_i}$ for the comparison group students, where $\hat{p}$ is the estimated probability of being in the treatment group and being either a service recipient or non-recipient. The difference in means is the average treatment effect among YCC students. Reported sample sizes are the largest sample across outcomes – sample sizes vary across analyses due to missing outcome data. A test of differences shows that when school districts are equally weighted the impacts on school attendance, credit accumulation and algebra progression are statistically different between students who received an IDP and those who did not. When students are equally weighted the impacts on credit accumulation and algebra progression are statistically different between the two groups.

Table A.12. Impacts of the YCC program on HS graduation

			School districts equally weighted			Students equally weighted		
	Treatment group mean	Control group mean	Impact estimate	Effect size	*p*-value of impact estimate	Impact estimate	Effect size	*p*-value of impact estimate
Graduated from HS (percent)	88.0	87.6	0.4	0.011	0.724	1.2	0.035	0.165
Sample size	**1,732**	**27,576**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**

Source: Student records and the PTS.

Notes: The table shows regression-adjusted treatment group means and unadjusted control group means, where the comparison group is weighted to resemble the treatment group. Weights are defined to be one for all YCC participants and $\frac{\hat{p}_i}{1-\hat{p}_i}$ for the comparison group students, where $\hat{p}$ is the estimated probability of being in the treatment group. The difference in means is the average treatment effect among YCC students.

Table A.13. YCC program impacts on follow-up survey outcomes (ITT and CACE estimates)

	ITT treatment group mean	ITT control group mean	ITT impact estimate	*p*-value of ITT estimate	CACE impact estimate	*p*-value of CACE estimate
HS behavior						
School activities						
Participated in a school-sponsored activity	87.0	90.3	-3.2	0.308	-6.9	0.303
Engagement and satisfaction						
Believe grades are very important	75.7	74.5	1.2	0.808	2.5	0.807
Like school a lot	35.9	35.9	0.0	0.993	0.1	0.992
Number of hours spend on homework per week	11.9	11.6	0.3	0.721	0.7	0.721
Positive school behavior index (0–5)	3.5	3.5	-0.0	0.926	-0.0	0.927
Substance abuse						
Never drank alcohol	85.2	83.9	1.3	0.755	2.8	0.755
Never used or tried marijuana	80.8	88.2	-7.4+	0.053	-15.6+	0.065
Postsecondary preparation						
Expect to receive a two- or four-year college degree	88.3	91.8	-3.5	0.283	-7.7	0.287
Expect to receive a vocational certificate	18.7	15.2	3.6	0.430	7.4	0.428
Took an advanced placement course	61.7	54.5	7.2	0.184	14.9	0.187
Took a dual-enrollment course	72.2	69.3	2.9	0.607	6.4	0.604
Understand courses needed to attend a four-year college	78.1	79.9	-1.8	0.661	-3.9	0.662
Understand education or training needed for desired career	89.5	84.3	5.2	0.298	11.2	0.297
Employment readiness						
Work-readiness skills						
Earned a badge that leads to an industry-recognized credential	50.8	51.6	-0.8	0.891	-1.7	0.891
Earned a degree, certificate, or license at school	28.7	29.0	-0.4	0.950	-0.8	0.950
Grit score (0–8)	3.6	3.7	-0.1	0.142	-0.2	0.144
Holds a credential	5.5	8.2	-2.6	0.367	-6.0	0.376
Work-readiness index (0-8)	6.5	6.6	-0.1	0.525	-0.2	0.529
Paid work experience						
Ever worked for pay	68.9	69.8	-1.0	0.827	-2.0	0.827
If ever worked, had a job arranged through school	26.0	19.5	6.5	0.313	15.1	0.315
Number of respondents	**279**	**157**	**n.a.**	**n.a.**	**n.a.**	**n.a.**

Source: FUS data.

Notes: The table shows regression-adjusted treatment group and unadjusted control group means. The ITT estimates measure impacts of the offer of the YCC program, whereas the CACE estimates measure impacts for those who complied with their research assignments (roughly, treatment group members who participated in YCC).

Note: The horizontal axis captures the impact estimates with one omitted school district where the other 15 are used for estimation. See Chapter III in Burkander et al. (2019) for more information.

*Indicates that the impact is significant at the 5 percent level when that school district is omitted from the analysis.

+Indicates that the impact is significant at the 10 percent level when that school district is omitted from the analysis.

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