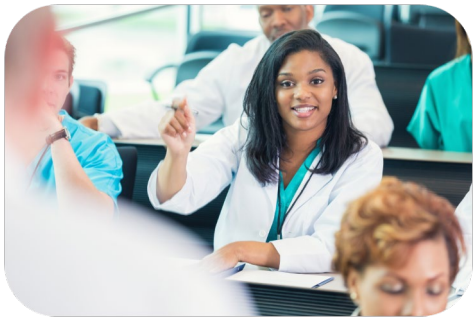

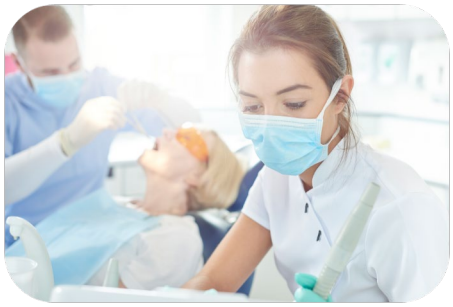

Madison Area Technical College's Patient Care Pathway Program

Three-Year Impact Report

OPRE Report 2020-161

November 2020

PACE
Pathways for Advancing Careers and Education

Madison Area Technical College's Patient Care Pathway Program: Three-Year Impact Report

A Pathways for Advancing Careers and Education (PACE) / Career Pathways Intermediate Outcomes Study Publication

OPRE Report 2020-161

November 2020
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Overview

This report documents the impacts of the Patient Care Pathway Program (PCPP) three years after random assignment. Operated between 2011 and 2014 by Madison Area Technical College (hereafter referred to as "Madison College") in Madison, Wisconsin, PCPP aimed to help low-skilled adults access and complete occupational training in the growing healthcare sector. It is one of nine programs being evaluated under the **Pathways for Advancing Careers and Education (PACE) project** sponsored by the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services.

PCPP consists of three key elements:

(1) A structured healthcare training pathway for prospective students who were denied admission to Madison College's healthcare programs due to low scores on tests assessing basic skills;

(2) Contextualized and accelerated basic skills instruction packaged with credit-bearing courses; and

(3) Proactive advising to help students navigate the program admissions process, develop an academic plan, and identify and address academic and non-academic barriers to program completion.

The evaluation of PCPP used an experimental design to assess impacts on postsecondary training, earnings and employment, and other life outcomes. Analyses in this report indicate that after three years, the program increased enrollment in occupational training, but it did not increase receipt of college credentials, employment, earnings, or family economic well-being.

This evaluation, the Career Pathways Intermediate Outcomes Study, extends the follow-up period to three years for programs in the PACE project. Future reports produced by the Career Pathways Long-term Outcomes Study will extend the follow-up period further.

Purpose

This research was undertaken to evaluate whether PCPP was successful in providing training to low-skilled adults and whether the program's efforts led to impacts on credentials, earnings, employment, and other life outcomes.

Research Questions

Three years after random assignment, what were the effects of PCPP on:

- Educational outcomes?
- Entry into career-track employment and higher earnings?
- Individual and family well-being, including income and other life outcomes?

Highlights

- ***PCPP did not increase receipt of a college credential requiring a year or more of training, the confirmatory educational outcome in this report.***

Three years after random assignment, there was no impact on receipt of college credentials requiring a year or more of training: 4 percent of the treatment group received such a credential, compared to 8 percent of the control group, a difference that is not statistically significant.

- ***PCPP increased enrollment in college occupational training but did not have impacts on other measures of educational progress.***

PCPP increased enrollment in college occupational training by 8 percentage points, and increased the length of training by one month. There was no detectable impact on other measures of educational progress, including credits earned or receipt of exam-based licenses.

- ***Impacts of PCPP on admission to two-year healthcare degree programs were initially small, but grew larger over time.***

After two years, PCPP had a 6 percentage point impact on admission to a two-year healthcare program; by four years, the impact had grown to 18 percentage points. Several factors likely contributed to these delays, including short application windows, long lags between admission and the start of the programs, and skills tests for admission. This growth in admission impacts could foreshadow impacts on credential receipt in the future.

- ***PCPP had no detectable impact on average quarterly earnings in the 12th and 13th quarters, the confirmatory earnings outcome in this report.***

Treatment and control group members both earned about $4,500 per quarter in the 12th and 13th quarters after random assignment. There was no evidence of positive impacts on earnings in any of the first 16 quarters after random assignment.

- ***PCPP had few detectable impacts on other life outcomes.***

PCPP increased health insurance coverage by 8 percentage points and reduced food insecurity by 9 percentage points. The program did not have detectable impacts on other measures of family economic well-being or self-assessed career progress.

Methods

The PCPP evaluation used an experimental research design in which program applicants were assigned at random to a treatment group that could access the program or to a control group that could not, and then compared their outcomes. The sample for this report consists of 499 program applicants who were randomly assigned between December 2011 and January 2014. The impact study used data from a follow-up survey conducted three years after random assignment, administrative records from Madison College, earnings records from the federal National Directory of New Hires, and college enrollment data from the National Student Clearinghouse. The study measured impacts on training, employment, and earnings outcomes approximately three years after random assignment for all measures and up to four years after random assignment for selected earnings and education outcomes.

Executive Summary

Madison Area Technical College (hereafter referred to as "Madison College")[1] in Madison, Wisconsin, implemented the **Patient Care Pathways Program** (PCPP) to increase educational persistence for prospective healthcare students who were denied admission to the college's healthcare programs due to low math, reading, and writing scores on admissions tests of basic skills (ACT Compass™). The goal of the program was to increase admission to and completion of one- or two-year healthcare credentials that could lead to increased healthcare employment and higher earnings.

Abt Associates is evaluating PCPP as part of the **Pathways for Advancing Careers and Education (PACE)** project, a multi-site experimental evaluation of nine education and training programs with elements of a career pathways framework, targeting low-income adults. The evaluation is being funded by the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services. This report summarizes PCPP's impacts on educational attainment, earnings and employment, and other life outcomes over a three- to four-year follow-up period. It extends analyses from an initial report that covered implementation and short-term impacts on education and employment-related outcomes (Cook et al. 2018).[2]

This evaluation, the Career Pathways Intermediate Outcomes Study, extends the follow-up period to three years for programs in the PACE project. Future reports produced by the Career Pathways Long-term Outcomes Study will extend the follow-up period further.

The Patient Care Pathway Program Evaluation

Operating between 2011 and 2014, PCPP aimed to increase admission to one- or two-year healthcare programs for the large number of prospective healthcare students who were initially denied admission due to low scores on admissions tests of basic skills—some 1,120 applicants in 2011 alone. Madison College staff estimated that 75 percent of students who were denied admission subsequently never enrolled in a healthcare program.

PCPP consisted of semester-long "academies" that had two main goals: to prepare students for enrollment in college-level healthcare diploma and degree programs and to reduce the time needed to remediate basic skills, thus hastening entry into healthcare training. Students also began earning credits, as each academy combined basic skills courses with credit-bearing ones needed for diploma and degree programs. The program also provided students with dedicated advisors, who assisted students with a range of academic and personal supports.

[1] While the formal name is still Madison Area Technical College, the school began rebranding itself as Madison College in 2010.

[2] https://www.acf.hhs.gov/opre/resource/madison-area-technical-college-patient-care-pathway-program-implementation-and-early-impact-report

Abt used an experimental evaluation design to estimate the impact of access to PCPP on its participants' postsecondary training, earnings and employment, and other life outcomes.[3] The sample for this report comprises 499 applicants who agreed to participate in the study—250 were randomly assigned to the treatment group and 249 to the control group. The analysis estimates impacts for each outcome by calculating the difference between average values in the treatment and control groups. The experiment was designed to capture the effects of the program overall rather than the separate contributions of its components.

The short-term report (Cook et al. 2018) indicated that PCPP generally implemented the program's key components as planned, including contextualized basic skills education, occupational training, and advising, though the advising component was less intensive than planned. Though treatment group members received more academic advising than control group members did, fewer than half of the treatment group received the planned three advising sessions during the semester-long program. More than 90 percent of treatment group members participated in education and training courses.

The program did face some implementation challenges. Control group members received more guidance on course selection and registration from PCPP staff than planned, reducing study contrast. In addition, healthcare program admissions policies at Madison College created barriers for PCPP academy completers to transition to healthcare programs. Many healthcare programs had short application windows, long lags between admission and the start of the program, and long waitlists. In addition, Madison College introduced a new skills test for admission to healthcare degree programs, which many students struggled to pass.

Key Findings from the Current Report

This report documents the impact of PCPP on postsecondary training, earnings and employment, and other life outcomes of students since the short-term report (at 18 months), through three to four years after each study participants' random assignment.

Impacts on Postsecondary Training

The PCPP theory of change predicted that by three years after random assignment, program participants would have had sufficient time to finish their semester-long academies and successfully complete one-year healthcare diploma and two-year healthcare degree programs. Therefore, we selected ***receipt of a college credential requiring a year or more of training*** as the confirmatory educational outcome at this follow-up point.

The short-term report found that PCPP increased enrollment in occupational training but had no impact on other measures of educational attainment at 18 months after random assignment. The three-year results are largely consistent with those earlier findings.

[3] Such a design ensures that any estimated impacts can be attributed to program access rather than to unmeasured differences between eligible study sample members with access (the treatment group) and without access (the control group).

- ***PCPP did not increase receipt of a college credential requiring a year or more of training, the confirmatory educational outcome in this report.***

Three years after random assignment, there was no impact on receipt of a college credential requiring a year or more of training. For both the treatment and control groups, very few members had received any such credential: 4 percent and 8 percent, respectively (the difference is not statistically significant). As discussed below, delays in admission to Madison College's healthcare programs suggest that students may have needed more than three years to complete these credentials.

- ***PCPP increased receipt of occupational training but did not have detectable impacts on other measures of educational progress.***

PCPP increased enrollment in college training (impact of 8 percentage points) and total months enrolled in training (impact of one month). However, there was no detectable impact on other measures of educational progress, including total credits earned, receipt of any college credential of any length, receipt of a college healthcare credential, or receipt of an exam-based certification or license.

- ***Impacts of PCPP on admission to two-year healthcare degree programs were initially small, but grew over time.***

As noted above, students faced barriers in their transition to academic programs upon completion of the academies, including short application windows, long lags between admission and the start of the program, long waitlists for core healthcare courses, and the implementation of new skills tests for admission to healthcare degree programs. The cumulative effect of these barriers may have delayed enrollment in healthcare degree program by more than a year after completing the PCPP academies.

These barriers likely contributed to the low observed rates of admission to healthcare degree programs. The research team examined admission rates to Madison College's healthcare degree programs at two, three, and four years after random assignment to assess the pattern in admissions over time. In the two years after program enrollment, few participants had been admitted to a healthcare degree program. However, by four years, larger impacts had emerged: 33 percent of the treatment group had been admitted to any of the two-year healthcare programs targeted by the academies, compared to 15 percent of the control group (impact of 18 percentage points).

These growing admissions impacts could foreshadow impacts on credentials in the future. For example, an exploratory analysis of credentials earned by four years after random assignment found that PCPP had an impact on receipt of a college healthcare credential of 8 percentage points.

Impacts on Earnings and Employment

PCPP aimed to increase receipt of college healthcare credentials, which its theory of change predicted would in turn lead to employment in higher-paying jobs and an increase in earnings. Therefore, we selected ***average quarterly earnings in the 12th and 13th quarters after***

random assignment as the confirmatory labor market outcome at the three-year follow-up point.

- ***PCPP had no detectable impact on quarterly earnings in the 12th and 13th quarters, the confirmatory earnings outcome in this report.***

Treatment and control group members both earned about $4,500 per quarter in the 12th and 13th quarters after random assignment. There was no evidence of positive impacts on earnings in any of the first 16 quarters after random assignment. This finding aligns with the lack of impact on credential receipt.

- ***PCPP increased the share employed in a job earning $13 per hour or more, but had no detectable impact on other labor market outcomes.***

The program increased the share of its participants employed in a job earning $13 per hour or more (impact of 11 percentage points), the pre-specified hourly wage threshold. However, as noted in the previous section, PCPP did not increase overall earnings. Moreover, sensitivity analysis found no impact on the share employed in a job earning $14 per hour or more. It remains to be seen whether the observed impact on earning $13 per hour or more might lead to earnings impacts in the future.

PCPP had no detectable impact on overall employment or employment in a healthcare occupation. In addition, the program had no impact on other measures of job quality—such as employment in jobs that require “at least mid-level skills” or that offer health insurance.

Impacts on Other Life Outcomes

The PCPP theory of change predicted that training would increase educational attainment, leading to better employment outcomes and improvements in family economic well-being, self-assessed career progress, psychological well-being, and family structure.

- ***PCPP had limited impact on family economic well-being.***

The program increased the share of households with health insurance coverage (impact of 8 percentage points) and decreased the share reporting food insecurity (impact of 9 percentage points). It did not have an impact on receipt of means-tested public benefits, amount of student debt, or other signs of financial distress.

- ***PCPP reduced the share of participants living with a spouse/partner and had no detectable impact on child bearing or the share living with children.***

Three years after random assignment, treatment group members were less likely than members of the control group to be living with a spouse (9 percentage point impact). There was no detectable impact on the share living with children. Among women, there was no impact on having a child since random assignment.

Possible Explanations

To summarize the main results over the three- to four-year follow-up period covered in this report: PCPP increased college enrollment, but had no impacts on receipt of college credentials

or on earnings. The report explores several possible explanations for the absence of earnings impacts:

- ***Students needed more time than expected to complete healthcare credentials due to delays in healthcare program admissions and part-time enrollment.***

As discussed above, and described more fully in the short-term report (Cook et al. 2018), students faced a number of barriers to gaining admission to healthcare credential programs upon completion of the semester-long academies. Further delaying student progress was that the vast majority of students were enrolled in school only part-time, limiting their ability to accumulate credits and progress toward a healthcare credential. The impact findings on admission to academic programs suggest that students started to overcome these delays by the third and fourth years after random assignment; however, these admissions occurred too late in the follow-up period to produce impacts on college credentials.

- ***The treatment-control contrast was weaker than expected.***

As documented in the short-term report, the advising component of the program was not as intensive as expected. Fewer than half of students reported receiving the expected three advising sessions. Moreover, control group members received more guidance on course selection and registration than planned, further reducing study contrast. The contrast between research groups may have been too small to generate impacts of a size that the study was powered to detect.

- ***PCPP did not appear to significantly reduce the need for its participants to work during training or take on student loans, which may have limited their ability to accumulate sufficient credits to earn long-term credentials during the follow-up period.***

Several of the impact findings suggest that PCPP did not significantly reduce the need for its participants to work during training or take on student loans—a goal that was not part of the program design—which may have limited their ability to quickly accumulate credits and earn credentials by three years. More than 75 percent of students were employed in each quarter after random assignment, suggesting that students were working to support themselves while going to school part-time. Despite these high levels of employment, students still faced relatively high levels of student debt. Both the treatment and control groups had accumulated more than $8,000 of student debt after three years, equal to nearly two quarters' (i.e., half a year) worth of earnings. If students were hesitant to take on more debt, this level of debt could have been a barrier to pursuing the additional courses necessary to complete their programs.

More than half of PCPP participants reported experiencing at least one sign of financial distress—such as a utility disconnection, delayed health/dental care, hunger, or trouble paying bills or making ends meet—further demonstrating that many students faced financial barriers.

To emphasize, there were no detectable impacts on any of these financial status outcomes, so this is not to say that PCPP *led* to financial distress. However, these results suggest that the program did not substantially lessen the need for its participants to work during training or take

on student loans, which may have inhibited their ability to accumulate credits and earn more credentials than did control group students.

Looking Ahead

We noted earlier that one explanation of the current findings is that four years is too early for students to complete their healthcare training and start working in the new occupation. A future report will present follow-up on participants in PCPP at approximately six years after random assignment will provide direct evidence on that conjecture, and assess whether detectable impacts on credential receipt and earnings arise by six years.

1. Introduction

The demand for healthcare workers is expected to grow in the years to come. The federal Bureau of Labor Statistics projects that healthcare occupations will add more jobs through 2026 than any other occupational group, largely due to an aging population. Over the next decade (2018 to 2028), the healthcare sector's projected growth rate, 14 percent, is much faster than any other occupational group.[4]

Producing more healthcare workers is important to satisfy the nation's healthcare needs and also has the potential to create opportunities for low-income adults to gain entry-level employment and advance to higher-skilled jobs. However, almost all jobs in healthcare require some level of education or training beyond high school; and many low-income, low-skilled adults face considerable barriers to completing even short-duration training for entry level-jobs. Institutions often assign students who need to improve their basic academic skills to developmental education courses; many students never progress beyond this coursework (Bailey, Jeong, and Cho 2010).

The **Patient Care Pathway Program (PCPP)**, operated by **Madison Area Technical College** (hereafter referred to as "Madison College"),[5] sought to increase educational persistence for the large number of prospective healthcare students who were denied admission to the college's healthcare programs due to low math, reading, and writing scores on admissions tests of basic skills. Madison College staff estimated that 75 percent of students who were denied admission subsequently never enrolled in a healthcare program.

Abt Associates is evaluating PCPP as part of the **Pathways for Advancing Careers and Education (PACE)** project. Funded by the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services, PACE is studying nine programs aimed at helping low-income adults to access career pathways (see Programs in PACE box).

All nine programs include some features of the overarching career pathways framework (Fein 2012). This framework posits that postsecondary education and training should be organized as a series of steps leading to successively higher credentials and employment opportunities in growing occupations. To effectively engage, retain, and facilitate learning in a diverse population, career pathways programs integrate four program components:

(1) **Academic and non-academic assessment** to identify student needs and factors that may facilitate or hinder academic success so advisors can make appropriate placements and referrals;

4 https://www.bls.gov/ooh/healthcare/home.htm

5 While the formal name is still Madison Area Technical College, the school began rebranding itself as Madison College in 2010.

(2) **Innovative basic skills and occupational skills instruction** to make education and training more manageable for students who are likely to be balancing school and work (e.g., accelerated courses) and who may have low levels of basic skills (e.g., contextualization);

(3) **Academic and non-academic supports** (e.g., academic advising, tutoring, financial support, and referrals to support services) to help students succeed in their current academic step and to proceed to and complete subsequent steps; and

(4) **Strategies to connect participants and employers** during the program, such as internships, or post program, such as employment workshops.

Programs in PACE

- ***Bridge to Employment in the Healthcare Industry**, San Diego Workforce Partnership, County of San Diego, CA**
- ***Carreras en Salud**, Instituto del Progreso Latino, Chicago, IL^*
- ***Health Careers for All**, Workforce Development Council of Seattle-King County, Seattle, WA**
- ***Integrated Basic Education and Skills Training (I-BEST) program** at three colleges (Bellingham Technical College, Everett Community College, and Whatcom Community College), Washington State*
- ***Pathways to Healthcare**, Pima Community College, Tucson, AZ**
- ***Patient Care Pathway Program**, Madison College, Madison, WI*
- ***Valley Initiative for Development and Advancement (VIDA)**, Lower Rio Grande Valley, TX*
- ***Workforce Training Academy Connect**, Des Moines Area Community College, Des Moines, IA*
- ***Year Up**, Atlanta, Bay Area, Boston, Chicago, National Capital Region, New York City, Providence, Greater Seattle*

**Programs funded through the Health Profession Opportunity Grants (HPOG) Program.*

^*Program partially HPOG funded.*

Because the nine programs vary in their target populations, mix of components, and occupational fields, PACE is evaluating each program separately.[6] This report documents the impact of PCPP on postsecondary training, earnings and employment, and other life outcomes of students through approximately three years after they agreed to participate in the evaluation. An earlier report shared findings on implementation and short-term (18-month) impacts on education, employment, and related outcomes (Cook, Hamadyk, Zeidenberg, Rolston, and Gardiner 2018).

This evaluation, the Career Pathways Intermediate Outcomes Study, extends the follow-up period to three years for programs in the PACE project. Future reports produced by the Career Pathways Long-term Outcomes Study will extend the follow-up period further.

[6] PACE-related documents, including profiles and implementation and short-term impact reports for each program, can be found at www.acf.hhs.gov/opre/research/project/pathways-for-advancing-careers-and-education and www.career-pathways.org.

The remainder of this chapter describes PCPP's key components and context (Section 1.1). It then summarizes findings from the short-term impact report as context for this three-year report (Section 1.2). Finally, it provides a roadmap to the remainder of the report (Section 1.3).

1.1 The Patient Care Pathway Program

Prior to implementation of PCPP, students with test scores (ACT Compass™) below the required threshold for Madison College's healthcare programs (roughly 12th-grade level) had two options. The first option was completing as many as three semesters of developmental education classes at the college or elsewhere. Students who passed the required remedial courses then could be admitted directly into their healthcare program of choice without retesting. The second option for such students was raising their basic skills on their own and retesting to achieve a score high enough to be admitted.

In 2011, Madison College created a third option. Under the umbrella of PCPP, it created two "academies"—**Patient Care Academy 1 (PCA1)** and **Patient Care Academy 2 (PCA2)**. In 2013, Madison College added a third academy—**Patient Care Nursing Assistant (PCNA).** The academies had two main goals: to quickly prepare students for enrollment in college-level healthcare diploma and degree programs and to reduce the time needed to complete these programs. The academies aimed to achieve this by providing a single semester of remediation, and allowing students to pursue basic skills and occupational training simultaneously.

The PCPP academies had the following characteristics:

- **Sectoral bridge program.** Programs that package occupational training and remediation of basic skills to prepare students for a specific occupational field are referred to as "sectoral bridge" programs. There is some evidence that bridge programs that combine basic skills instruction with occupational coursework lead to improved student outcomes, such as an increase in college credits and occupational certificates earned (Zeidenberg, Cho, and Jenkins 2010). Each PCPP academy provided a set of courses delivered over a semester. The courses covered both occupational training and remedial basic skills education.
- **Sequenced training steps.** By packaging specific sets of courses in each academy, PCPP aimed to provide academic preparation for and a clear pathway toward enrollment in a healthcare diploma or degree program. There is evidence that traditional community college students can have difficulty navigating courses to efficiently obtain high-valued credentials; for example, students can have problems identifying the correct course sequence from a catalog (Jenkins and Cho 2012; Scott-Clayton 2011). PCPP sought to provide its students with strong, ready-made plans of study.
- **Acceleration.** A goal of PCPP was to accelerate students' entry into the college's healthcare programs by shortening the period of remediation—from as many as three semesters to a single semester—for applicants whose basic skills tested too low to gain admission directly. The shortened remediation period addressed the concern that most students referred to developmental education never enroll in college-level courses (Bailey et al. 2010). There is also some evidence that compressing developmental

education into shorter periods can improve outcomes for low-skilled students (Zachry-Rutschow and Schneider 2011).

- **Contextualization.** PCPP contextualized specific basic skills courses in each academy by integrating occupational content into its curriculum. Evidence for the effectiveness of contextualization is limited. Relatively few studies of contextualized basic skills instruction have been conducted in a college setting, and most studies did not use an experimental research design (Perin 2011).

PCPP also provided **dedicated advisors** to proactively and frequently reach out to their assigned students. The design envisioned that these advisors would help students navigate the college system and program admissions process, develop an academic plan, and identify and address academic and non-academic barriers. The advisors addressed barriers by referring students to resources at Madison College and within the community and by using an emergency fund to assist them with small, immediate financial needs.

College advisors often have very high student-to-advisor ratios, leaving little time for individual counseling (Grubb 2001). PCPP's advising was designed to counter that. Several rigorous studies have demonstrated that enhancing existing advising services with more-intensive advising, sometimes combined with other services, can lead to greater persistence in education, although sometimes only in the short term (Bettinger and Baker 2011; Scrivener and Weiss 2009).

All three PCPP academies had a path to one of Madison College's one- or two-year healthcare programs, which this report refers to as "destination programs." Where a student started in the program depended on his or her academic aspirations (i.e., healthcare one-year diploma or two-year degree) and skills level (as assessed by the ACT Compass in writing, reading, and math). The three PCPP academics are described further below, and Exhibit 1-1 illustrates the eligibility criteria and course composition of each academy.

- **Patient Care Academy 1 (PCA1)** targeted students interested in a one-year healthcare diploma whose Compass scores were too low to be admitted directly into their program of choice. PCA1 was also the starting point for students interested in a two-year degree but who did not have the required Compass scores to be eligible for PCA2. Students who successfully completed PCA1 earned six credits that could be counted toward a one-year healthcare diploma, which requires between 19 and 33 credits (at least another semester to one year of coursework, depending on the length of the program waitlist and the student's course load). After completing PCA1, students who successfully met the required test scores could enroll in a one-year healthcare diploma program or continue to PCA2.
- **Patient Care Academy 2 (PCA2)** targeted students interested in pursuing a two-year associate degree in healthcare[7] whose Compass scores were too low to be admitted

[7] PCA2 also targeted students interested in the one-year Surgical Technician diploma. This was considered most appropriate for those who completed PCA2 because Chemistry is a prerequisite.

directly into those programs, but were high enough to test out of PCA1. PCA2 completers earned seven credits that could be counted toward a healthcare degree, which requires between 60 and 70 credits, or generally at least another two years of coursework, depending on waitlists and course loads. During the first two semesters of the PCPP evaluation, students who successfully completed PCA2 automatically qualified to enroll in any of the college's healthcare degree programs.[8] However, beginning in May 2013, Madison College changed the admissions requirements for two-year degree programs to require that all students first take and pass the Test of Essential Academic Skills (TEAS®) assessment.[9]

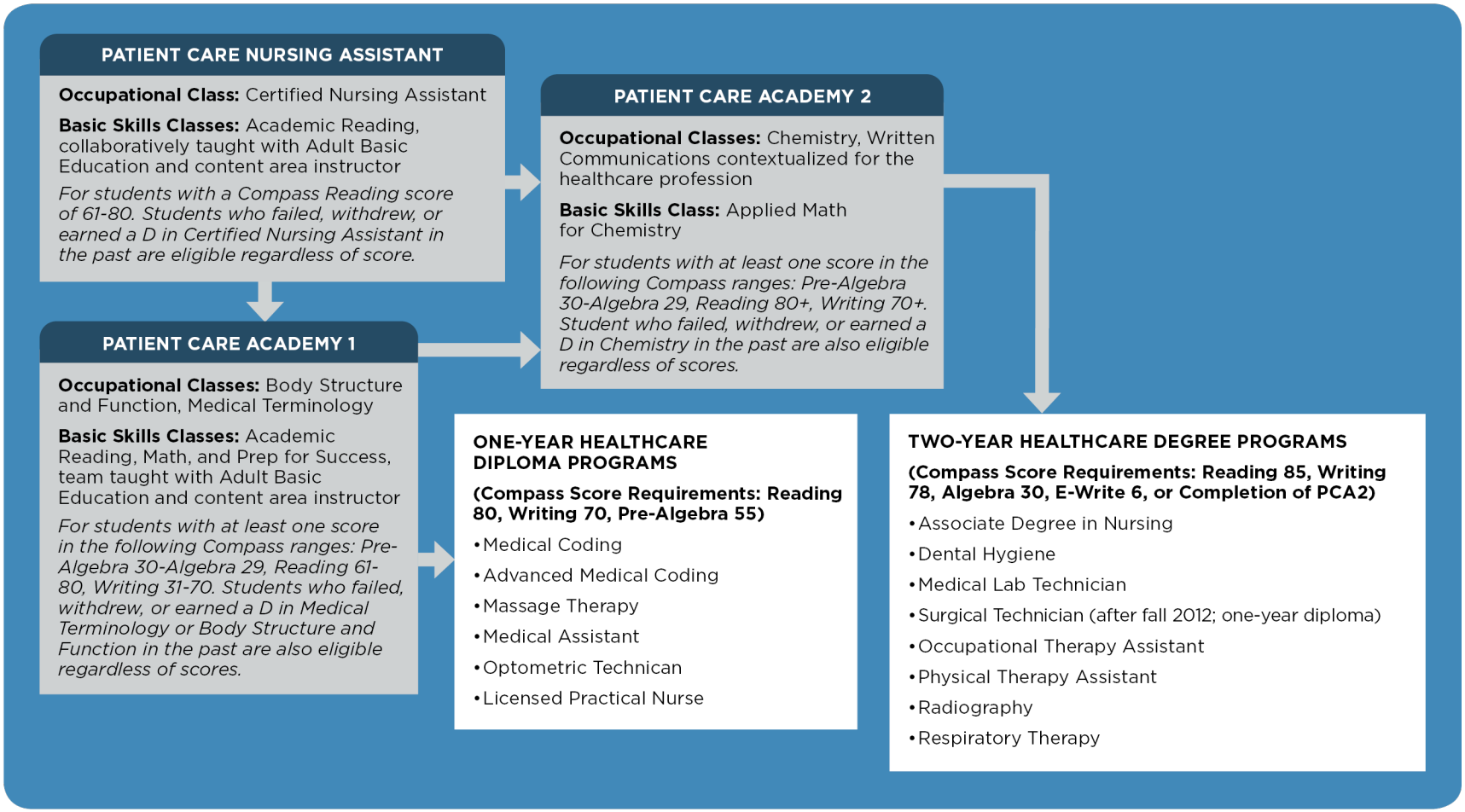
- **Patient Care Nursing Assistant (PCNA)**, added in 2013 in an attempt to bolster the study sample size, was designed for students interested in a healthcare career who could not enroll in a healthcare program because of low Compass reading scores. Students who successfully completed PCNA received a certificate that allowed them to sit for Wisconsin's Nurse Aide licensing exam, successful passing of which is required to become a Certified Nursing Assistant (CNA). After completing PCNA, students could enroll in PCA1, PCA2, or move to employment.

Madison College ended PCPP after the Spring 2014 semester, but continued to offer a version of PCA2 through a different department at the college. Further, PCPP students could continue to access PCPP advising services to discuss career goals, receive assistance completing program applications, register for classes, and troubleshoot problems through the Fall 2016 semester.

8 In addition to Chemistry, some of the two-year healthcare programs also had other coursework prerequisites such as Biology or Geometry. PCA2 completers would also have to complete any additional prerequisites in order to be admitted to such programs.

9 In January 2017, the School of Health Education's nursing program replaced TEAS with the Health Education Systems Incorporated (HESI®) exam as an admissions requirement. Other two-year healthcare programs at Madison College were expected to replace TEAS with HESI by late 2018.

Exhibit 1-1: Patient Care Pathway Program Model



Note: Prior to May 2013, students who completed PCA2 automatically met admissions requirements for the college's two-year healthcare degree programs. Starting in May 2013, all two-year healthcare degree programs added the successful passing of the TEAS exam as an admissions requirement.

1.1.1 Eligibility and Enrollment

PCPP staff used a variety of methods to recruit applicants, but relied most heavily on recruiting within Madison College, such as direct outreach to college applicants and existing college students and solicitation of referrals from the testing center and from department advisors. To be eligible to enroll in a PCPP academy, applicants had to (1) be interested in a healthcare diploma or degree and (2) have Compass test scores within a designated range or have completed equivalent coursework at Madison College. The specific Compass score requirements that the program developed for each PCPP academy are listed below (and reflected in Exhibit 1-1 above).

- To be eligible for PCA1, students were required to have Compass test scores in or above the following ranges, with at least one score in the range: Pre-Algebra 30–Algebra 29, Reading 61–80, or Writing 31–70. These ranges are comparable to a level between 8th and 12th grade.[10]
- For PCA2, students were required to have Compass test scores in or above the following ranges, with at least one score in the range: Pre-Algebra 30–Algebra 29, Reading 80+, or Writing 70+. The math range is comparable to a 9th-grade level; the reading and writing ranges are comparable to a 12th-grade level or higher.
- PCNA specified only a Compass reading score range for eligibility; students were required to have a test score in the range of Reading 61–80. This range is comparable to a level between 8th and 12th grade.

PCPP staff regularly attended Compass testing sessions and Madison College new student orientations to make presentations about the program. For interested potential applicants, a PCPP staff member held information sessions, either in groups or one-on-one, to describe the program's services, its eligibility requirements, and how random assignment governed program admissions. If needed, applicants scheduled a time to complete the Compass assessment to determine their eligibility for the program. Students with recent Compass scores or equivalent coursework could bypass the assessment.

Next, applicants attended a study intake appointment, either in a group or one-on-one, where staff confirmed their eligibility for PCPP. Program staff then randomly assigned eligible students to either the treatment group (which had access to PCPP) or the control group (which did not have access to PCPP).[11] Between December 2011 and January 2014, PCPP staff randomly assigned 500 study participants: 251 to the treatment group and 249 to the control group.[12]

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[10] Compass ranges can be converted to equivalent TABE grade levels as described here: https://wvde.state.wv.us/abe/documents/CorrelationBetweenVariousPlacementInstruments.pdf.

[11] All sample members were required to sign a form consenting to participate in the study and complete two study forms (the Basic Information Form and the Self-Administered Questionnaire).

[12] One of the treatment participants withdrew from the study after random assignment, so the study sample for this report is 499 (250 treatment and 249 control).

Though control group members could not participate in PCPP, they could participate in other training and services available at Madison College and in the community. Students in the control group could piece together a similar package of services to those available to students in the treatment group. Most students attending an intake session had already sought advising or were referred to the intake session by another staff member at the college. As part of the study intake process, Madison College also made available regular college advisors to assist control group students with registration in other college offerings immediately following random assignment.[13]

In addition to one-time assistance with registration, control group members could seek out Madison College's general advising and support services. They did not, however, have access to PCPP's proactive outreach and advising to help them navigate barriers in the college and guide them to relevant personal and academic support services. Control group members could access developmental education courses but not ones paired with occupational skills.

1.1.2 Characteristics of the Study Sample

Exhibit 1-2 below shows the study sample's characteristics at the time they were randomly assigned ("baseline"), both overall and for the treatment and control groups separately. The *p*-values in the last column test the hypothesis that there are no systematic differences between the groups for each characteristic.

As shown, treatment and control group members were similar in most characteristics. There were two characteristics with statistically significant differences: treatment group members were more likely to be Hispanic than were control group members, and control group members were more likely to have household incomes of $30,000 or more. However, given the number of statistical tests, the number of significant differences (2 of 11) is only slightly more than the number that would be expected by chance.[14] In conducting impact analyses for this report, the research team controlled for any bias resulting from differences in baseline characteristics, as detailed in Appendix A.

Overall, PCPP sample members were mostly female, and two-thirds identified as White, non-Hispanic. Participants were somewhat older than traditional college students (one-quarter were age 35 or older), with the largest proportion falling into the 25-34 age range. Though the study targeted low-skilled students, many had prior experience with college; about half had previously enrolled, and about one-quarter had completed at least one year. Almost all study participants had earned a high school diploma or equivalent (97 percent).

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[13] This was a requirement of the college Institutional Review Board, which determined that requiring control group members to make a second appointment with an advisor to register for classes would have added a step beyond the standard practices at the college and thus would have added an artificial barrier to class registration.

[14] This is an example of a "multiple comparisons" problem. If we were to repeat the randomization process a large number of times, out of 11 tests, on average between one and two would be expected to fall outside a 90 percent confidence interval due to chance.

Study participants varied in terms of financial security. Approximately one-quarter had annual household incomes of less than $15,000, and about 45 percent of the sample had annual household incomes of $30,000 or higher. About one-third received benefits from the Supplemental Nutrition Assistance Program (SNAP) or the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). A similar proportion reported experiencing financial hardship in the past year. Most were working at the time of random assignment, with about two-thirds working at least 20 hours per week.

Exhibit 1-2: Selected Characteristics of the PCPP Sample at Baseline

Characteristic	All Study Participants	Treatment Group	Control Group	*p*-Value
Age (%)				.234
20 or younger	23.4	19.9	26.9	
21 to 24	21.2	23.1	19.3	
25 to 34	30.0	32.3	27.7	
35 or older	25.4	24.7	26.1	
Gender (%)				.210
Female	84.3	86.4	82.3	
Male	15.7	13.6	17.7	
Race/Ethnicity (%)				.020
Hispanic, any race	8.8	12.4	5.3	
Black, non-Hispanic	20.8	19.8	21.8	
White, non-Hispanic	67.3	64.2	70.4	
Other, non-Hispanic	6.4	7.8	4.9	
Current Education (%)				.198
Less than a high school diploma	3.0	4.8	1.2	
High school diploma or equivalent	44.4	44.8	43.9	
Less than one year of college	24.8	24.4	25.2	
One or more years of college	21.6	20.4	22.8	
Associate degree or higher	6.3	5.6	6.9	
Family Income in Past 12 Months (%)				.044
Less than $15,000	25.6	27.6	23.5	
$15,000-$29,999	29.9	33.5	26.1	
$30,000 or more	44.6	38.9	50.4	
Mean ($)	$33,165	$31,694	$34,694	.285
Public Assistance/Hardship in Past 12 Months (%)				
Received WIC or SNAP	35.6	32.9	38.2	.205
Received public assistance or welfare	4.4	5.1	3.7	.593
Reported financial hardship	34.3	35.1	33.2	.635
Current Work Hours (%)				.941
0	27.9	27.4	28.5	
1 to 19	11.5	11.7	11.4	
20 to 34	32.6	31.9	33.3	
35 or more	27.9	29.0	26.8	

Characteristic	All Study Participants	Treatment Group	Control Group	*p*-Value
Expected Work Hours in Next Few Months (%)				.207
0	18.3	16.4	20.3	
1 to 19	15.1	18.1	12.1	
20 to 34	47.4	47.8	47.0	
35 or more	19.2	17.7	20.7	
Sample size	499	250	249	

Key: SNAP = Supplemental Nutrition Assistance Program. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

Source: PACE Basic Information Form.

Note: Appendix A in the appendix volume provides a fuller set of baseline characteristics, also confirming that random assignment generated well-balanced treatment and control groups. Some percentages for characteristics do not add up to 100 percent due to rounding. Public Assistance/Hardship in Past 12 Months does not add to 100 percent because the categories are neither mutually exclusive nor exhaustive.

1.1.3 Local Context

Madison College is the primary education and training provider in the Madison, Wisconsin, area for students interested in pursuing an associate degree, technical diploma, or certificate in the healthcare field. The college also had extensive experience operating bridge programs.

When developing PCPP, which operated between 2011 and 2014, Madison College anticipated that there would be a high demand for the program—both in potential applicants and in the local demand for workers with the healthcare training Madison College provided. For the former, college staff focused internally—that is, on students who applied for a healthcare diploma or degree program but failed to achieve the Compass assessment scores in reading, writing, and math required to enroll. Staff reported that the college's healthcare programs denied admission to 1,120 applicants in 2011 alone, and those denied thus were potential candidates for PCPP. Over the planned two-year study enrollment period, that would translate into a potential demand for more than 2,000 program seats.

Regarding local demand for workers, the kinds of healthcare occupations for which Madison College provides training accounted for more than 8 percent of jobs in the local economy in 2013, similar to the proportion nationally (Bureau of Labor Statistics 2014). In Madison, "Healthcare Practitioners and Technical" occupations accounted for 6 percent of jobs and "Healthcare Support" occupations for about 2 percent (Bureau of Labor Statistics 2014). For Dane County (which includes Madison), the Wisconsin Department of Workforce Development (2015) projected that over the period 2012 to 2022, employment in "Healthcare Practitioner" occupations would increase by 19 percent and in "Healthcare Support" by 18 percent.

1.2 Earlier Findings from PACE on the Patient Care Pathway Program

In its initial phase, the PACE evaluation assessed PCPP's implementation and short-term (18-month) impacts. The PCPP **implementation study** examined how planned instruction and supportive services were implemented, patterns of engagement in the program by its students, and receipt of education and training and services by the treatment group members relative to the control group. The PCPP **short-term impact study** measured the program's effects on training, credentials, and self-reported employment and career progress. Key short-term

findings provide useful context for this current report. This section summarizes those findings from the PCPP *Implementation and Early Impact Report* (Cook et al. 2018).

1.2.1 Earlier Results from the PCPP Implementation Study

Section 1.1 of this report described the components of PCPP and the intended program model (Exhibit 1-1). This section briefly summarizes program implementation and participants' experiences in the program through 18 months after random assignment.

- ***Recruitment challenges led PCPP to operate at a smaller scale than expected.***

Despite expectation that there would be high demand for the program, PCPP staff struggled to recruit enough students to meet the evaluation's sample goals. Program staff identified two key recruitment challenges. First, they were unable to reach many potential students because external partners (local employers and high schools) and advisors in other parts of Madison College did not refer all eligible students, possibly due to concerns that PCPP was relatively new and its effectiveness not established. Second, program staff found it difficult to generate interest in PCA1. Although the courses in PCA1 helped students build a foundation of skills in healthcare, not all one-year healthcare diploma programs required these courses for admission. Thus, students may not have seen the benefit of PCA1 over other credit-bearing courses in which students with low Compass scores could enroll. Further, in January 2013, Madison College announced plans to eliminate the Licensed Practical Nurse (LPN) diploma program, one of the primary one-year diploma programs into which PCA1 laddered. This may have further lessened PCA1's appeal.

Staff implemented strategies to increase enrollment in the program, including adding a full-time recruiter, working with a technical assistance provider, and adding PCNA to the pathway. However, at the end of the random assignment period, the program had recruited just 500 study participants—half of the target sample of 1,000.

- ***PCPP delivered training largely as designed.***

The program contextualized specific basic skills courses in PCA1 and PCA2 for the healthcare field as planned. In its instructional approaches, the program aimed to emphasize active learning (e.g., group work and problem-solving tasks) and to use technology to supplement in-class instruction. The program implemented these instructional approaches when possible, but instructors reported that some courses necessitated a traditional, lecture-based format.

During the first year of the study, the program added two instructional supports intended to increase students' academic success. In response to PCA2 students' difficulties with the Chemistry course, staff added a supplemental instructor who attended classes, took notes to share with students with learning disabilities who needed academic accommodations, and facilitated an optional review session for all PCA2 students each week. The program advisor also organized group tutoring for PCA1 students who needed or wanted additional instructional support. Finally, after Madison College implemented the TEAS assessment for two-year healthcare program applicants (described below), program staff added a TEAS workshop to help students prepare for it.

- ***Fewer than half of the PCPP students participated in all three of the recommended advising sessions, though most treatment group members received advising at least once.***

The program advisors aimed to meet one-on-one with the students assigned to them at least three times over the semester to monitor progress and address any needs; however, this was not required, and students were not penalized for not meeting with their advisors. The program had a blueprint for each advising session. The initial session was to cover financial aid, academic and non-academic barriers to school, and course requirements. The mid-semester session focused on academic plan development. The end-of-semester session focused on academic plans and registration for the next semester's courses. If a student failed to schedule one of the meetings, the advisor followed up by calling or emailing the student or by coming to the classroom. However, program advisors acknowledged that they were generally only persistent in trying to set up a meeting when a student had a problem, such as poor attendance or weak academic performance.

According to the 18-month follow-up survey, the majority of PCPP students who enrolled in training reported they received academic advising at least once (70 percent, compared to 55 percent of control group members—a statistically significant difference of 15 percentage points). Fewer than half (45 percent of the treatment group) reported receiving academic advising three or more times (i.e., the recommended minimum number of advising sessions), which was 10 percentage points more than the control group.

- ***Control group members received more assistance with course selection and registration than planned.***

After the short-term study period concluded, the research team learned that during one-on-one study intake sessions, PCPP staff provided potential study participants with specific course recommendations *before* random assignment (some 50 percent of control group members received the advising) and that PCPP staff provided assistance with registering for classes to some control group members *after* random assignment. Providing PCPP services to control group members this way lessened the service contrast between the treatment and control group conditions. However, the research team found that less than 15 percent of control group members enrolled in any of the recommended courses in the semester after random assignment, suggesting that the additional guidance to control group members is likely to have had at most a small negative effect on impact estimates of educational outcomes. Given that the study population was largely recruited within the college, some proportion would have enrolled in those courses even without the additional support.

- ***Healthcare program admissions policies at Madison College created barriers for PCPP academy completers to transition to and complete destination programs.***

The academies aimed to facilitate quick admission to and enrollment in destination healthcare diploma and degree programs by shortening the time necessary to increase students' basic skills and meet diploma and degree program admissions requirements. However, during the study period, four factors not addressed in PCPP's design created barriers for students' enrollment in the destination programs:

(1) Starting in May 2013, Madison College began requiring all students applying to two-year healthcare degree programs (PCA2 destination programs) to take the TEAS assessment and achieve required scores. This effectively raised admissions requirements for healthcare degree programs beyond the skills level that students were expected to acquire in PCA2. According to School of Health Education staff, TEAS was a barrier to program admission because a large share of students at Madison College, including PCA2 completers and those with Compass scores at or above the threshold required for admission to the degree programs, failed to achieve the required TEAS scores even after multiple attempts.

(2) Many two-year healthcare programs had short annual application windows. Depending on when students completed a PCPP academy, they may have had to wait up to an academic year before they could apply to a healthcare program. For example, a student completing PCA2 in a fall semester (ending in December) might have to wait until the following fall (September–October) to apply.

(3) Some healthcare programs required that students apply one year in advance of the program start date. Even after successfully applying for and being notified of admission, a student's actual admission date would not occur until the remainder of the year had passed (e.g., the student applied for the program in September, was notified of admission in November, but could not begin the program until the following September).

(4) Long program waitlists delayed students' enrollment and completion of core courses once they were admitted to their destination programs. The one- to two-year waitlists for most of the healthcare programs were a barrier to steady program progress and completion because while waiting, students could not enroll in core program courses and may have had little or no other coursework to complete.

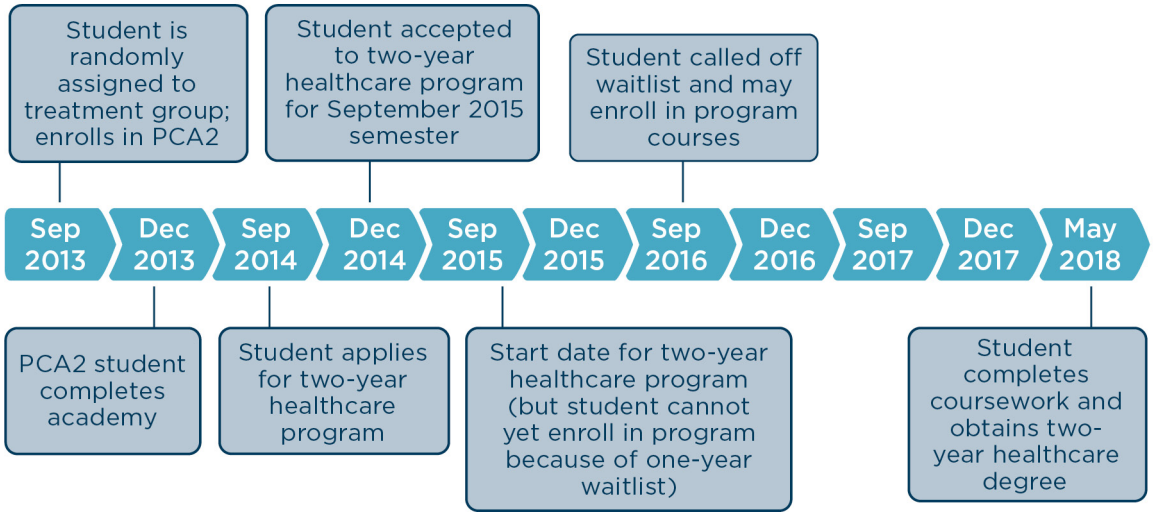
To illustrate the extent of the delays, Exhibit 1-3 provides a hypothetical timeline for a student who completes PCA2 and then faces several of these barriers to program entry and completion. As shown in the timeline, the student is randomly assigned in September 2013 and completes PCA2 in December 2013. The student then applies to a two-year healthcare program with an annual application window between September and October 2014. Prior to application, the student takes the TEAS assessment.

Assuming the student achieves the TEAS scores required by the selected healthcare program, the student is notified of acceptance to the selected healthcare program in November 2014, or 11 months after PCA2 completion. The student is admitted for the Fall 2015 semester, because the selected program does not begin until September 2015. However, the student's healthcare program has a one-year waitlist (most PCPP programs had one- to two-year waitlists). As a result, the student in this example has to wait another year to enroll in the selected program's core courses. The student in this example finally enrolls in September 2016, more than two-and-a-half years after completing the academy.

Once this student enrolls in the program's core courses, it could take another one to two years of full-time coursework to obtain a healthcare credential (and even longer if the student is enrolled in school part-time). In summary, the student in this example, who completed PCA2 in

December 2013, reasonably might not obtain a two-year degree until May 2018—five years after first enrolling in PCPP.

Exhibit 1-3: Hypothetical Program Enrollment and Completion Timeline for PCA2 Student

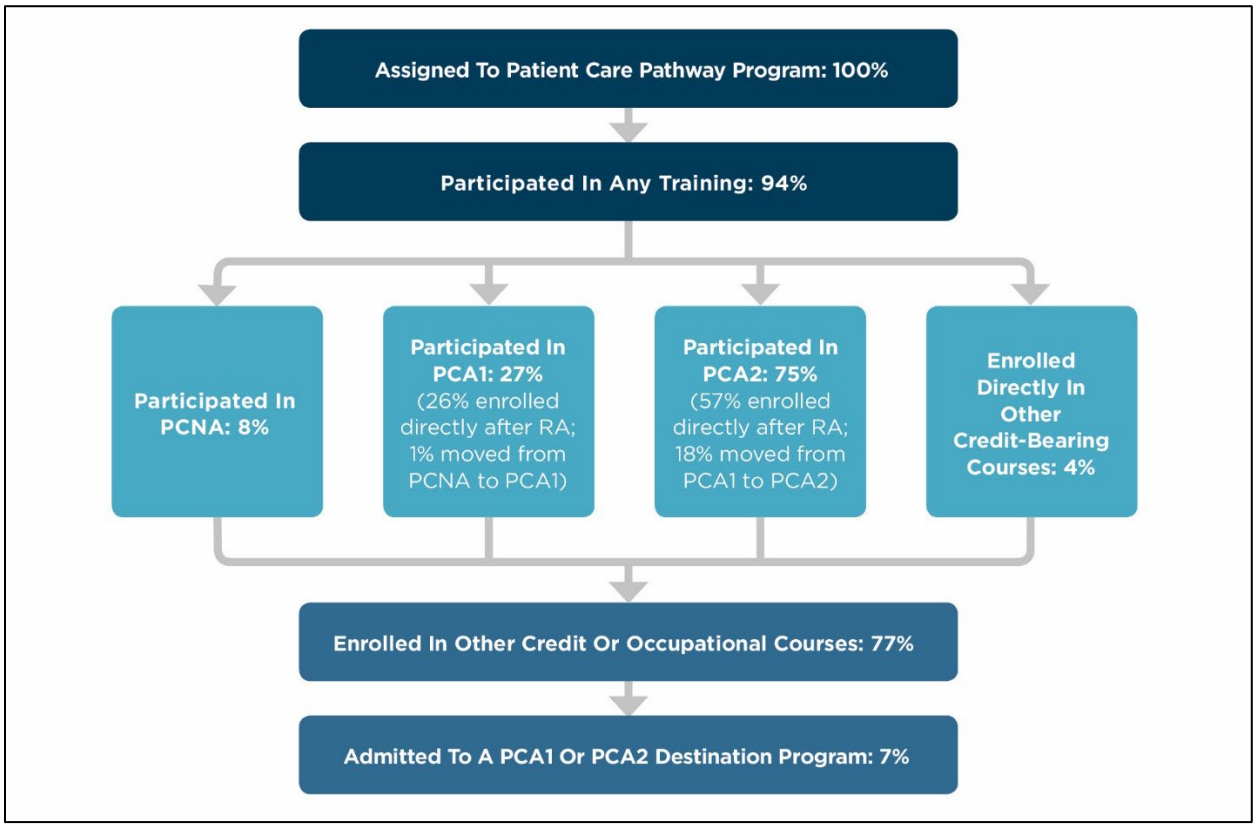


Note: This timeline assumes that the student passed TEAS sometime between December 2013 and September 2014.

- ***More than 90 percent of treatment group members participated in some type of education and training, but only 7 percent gained admission to a destination healthcare program during the 18 months following random assignment.***

Exhibit 1-4 shows the proportion of all treatment group members who achieved key program milestones by the 18-month follow-up. Overall, 94 percent of treatment group members participated in education and training courses, including those in PCA1, PCA2, and PCNA or other courses bearing college credit. Of all treatment group members, 91 percent attended one of the academies: 8 percent began with PCNA, 26 percent began with PCA1, and 57 percent began with PCA2. Another 4 percent of all treatment group members began with other credit or occupational courses and did not attend an academy.

Exhibit 1-4: Participation and Completion of PCPP Treatment Group Members within an 18-Month Follow-Up Period



Source: Cook et al. 2018.

Notes: Results are based on Madison College program records. Sample includes all 250 participants who were randomly assigned to the treatment group. Components may not sum to totals due to rounding. Percentages showing participation in the Patient Care Pathway academies do not sum to 100% because some students enrolled in multiple academies. "Other Credit or Occupational Courses" category includes credit-bearing and occupational training courses (excludes remedial and non-degree enrichment courses).

Two-thirds of PCA1 enrollees continued to PCA2; altogether, 75 percent of all treatment group members attended PCA2. Completion rates for PCA1 and PCA2 enrollees were high (81 and 78 percent, respectively); however, the completion rate for PCNA enrollees was much lower (50 percent).

Though 77 percent of all treatment group members enrolled in additional occupational courses at Madison College, most commonly after completing PCA2, only 7 percent of all treatment group members had gained admission to one of the healthcare diploma or degree programs targeted by PCA1 or PCA2 by 18 months after random assignment. Factors that could have influenced the low admission rates, as noted above, include short and infrequent application windows, lags of up to a year between application and program admission and start dates, and the adoption of the TEAS assessment as an admissions requirement.

1.2.2 Earlier Results from the PCPP Impact Study

The PACE research team designated as the confirmatory indicator of PCPP's success at 18 months after random assignment a single educational measure—*average total number of college credits earned*. The short-term analyses also examined a variety of other education outcomes, as well as several employment-related outcomes believed to provide an early indication of expected longer-term educational, employment, and earnings impacts.

For the most part, the short-term estimates cover impacts over an 18-month period after random assignment for the full sample. As part of the short-term exploratory analysis, however, the research team also estimated impacts for a longer follow-up period—30 months—for the 68 percent of the study participants who enrolled early enough to have that much follow-up available. Finally, with respect to an additional short-term outcome—admission to the healthcare programs that were the targets of the PCPP academies—the research team also explored 18-, 30-, and 35-month impacts for the full sample.

- ***PCPP had no impact on average total number of college credits earned (the confirmatory outcome at 18 months).***

PCPP did not increase the number of college credits earned 18 months after random assignment, the confirmatory outcome of interest in the short-term impact study. On average, the treatment group earned 12.0 credits in the 18-month follow-up period and the control group earned 11.1 credits.

- ***PCPP produced impacts on enrollment in occupational training.***

Treatment group members were 7 to 10 percentage points more likely than control group members to be enrolled in occupational training at successive six-month follow-up durations through 18 months. They were 7 percentage points more likely to have any such enrollment over the entire 18-month follow-up period. This higher enrollment did not generate statistically significant credit gains. Nor did the analysis show statistically significant impacts on hours of occupational training or credential receipt.

- ***There was no impact on admission to the healthcare diploma and degree programs targeted by the PCPP academies (destination programs) at 18 months, but there were positive impacts on program admission rates later.***

Admission to a destination healthcare program was an important goal of the academies and an essential step along a student's pathway to completion of a healthcare program. At 18 months, there was no statistically significant effect on admission rates. However, the research team also conducted exploratory analyses of program admissions up to 35 months after random assignment. Statistically significant impacts began to emerge by month 30; by 35 months, 27 percent of the treatment group had enrolled in a destination program, compared with 17 percent of the control group.

This 10 percentage point impact was entirely the result of an effect on admission to PCA2 destination programs. It is notable that even with this positive impact, however, only about one-third of students who completed PCA2 gained admission to a PCA2 destination program by 35

months. This indicates that some effect on destination program admission occurred, but substantially later than the PCPP theory of change implied and the research team expected.

1.3 Guide to the Rest of the Report

This report has six chapters. **Chapter 2 details the PCPP study design and analytic methods**, including a discussion of the career pathways theory of change and its implied research questions. The chapter also documents how the PCPP impact study implemented random assignment and describes its principal data sources.

Chapter 3 presents the three-year impact study findings on postsecondary education and training. As noted above, at 18 months after random assignment, PCPP had not increased the number of college credits earned, the hours of occupational training, or the likelihood of earning a certificate or other college credential. The program did increase enrollment in credit-bearing courses by 18 months, and it increased admission to destination academic programs by 35 months. This chapter reports analyses of how those early gains in enrollment and admissions to academic programs translate into impacts on healthcare credits and credentials three years out.

Chapter 4 presents the three-year impact study findings on employment and earnings. The short-term impact study conducted a relatively limited analysis of impacts on employment and earnings at 18 months because such impacts were expected to take longer to emerge. This three-year report provides more detail on impacts on labor market outcomes for a period when we might expect to see such impacts.

Chapter 5 presents the three-year impact study findings on other life outcomes such as debt, health insurance coverage, and receipt of means-tested public benefits. If PCPP led to an impact on earnings, it might also be expected to affect these outcomes.

Chapter 6 concludes with a discussion of the findings and open questions for future research.

A separate **Appendix** volume provides technical details on analysis methods, data sources, and sensitivity analysis.

2. Methods

This chapter describes the PACE research design and analytic methods as applied to the Patient Care Pathway Program three years after random assignment. It begins with a discussion of the program's theory of change. It then describes the evaluation's research design, data sources, and analysis procedures.

2.1 Patient Care Pathway Program Theory of Change

Exhibit 2-1 on the next page depicts the career pathways theory of change as applied to PCPP. It shows in detail how the program is hypothesized to produce effects on "intermediate" outcomes such as career knowledge and resources, which in turn will lead to effects on "main" outcomes such as hours of training and credential receipt in the short term, and eventually to gains in employment, earnings, additional credentials, and other life outcomes in the longer term.

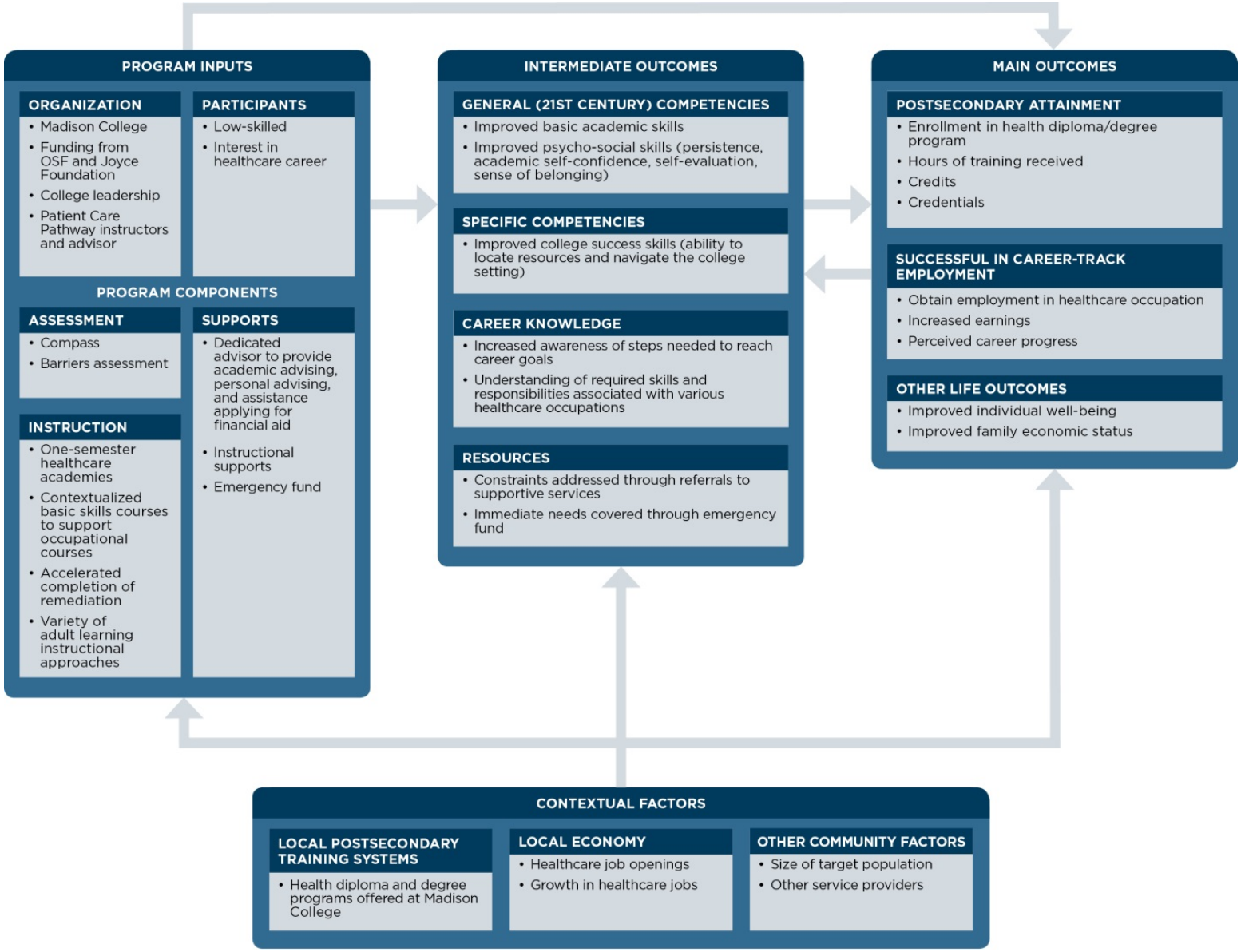
Starting in the box at the left, the theory of change begins with **program inputs**—the organizations that operate and fund the program (e.g., Madison College, Open Society Foundations, and the Joyce Foundation) and its participants (e.g., low-skilled adults with an interest in a healthcare career)—and **program components** (assessment, instruction, and supports). The implementation study (Cook et al. 2018) found that these program inputs and components were largely in place and operated as planned, with the exception of somewhat less intensive advising supports than planned.

The middle box shows the **intermediate outcomes** expected. Improving participants' competencies and career knowledge, removing barriers to school or work, and addressing life challenges are the theory's necessary precursors to improving the "main" outcomes of interest. PCPP intended to affect these outcomes quickly so that students would be better positioned to engage in education and training. The short-term report found improvements in perceived academic self-confidence and reductions in life challenges for the treatment group, but no impacts on other measures of psycho-social skills, life stressors, or family structure.

The **main outcomes**, which are the focus of this three-year impact report, appear in the far right box of Exhibit 2-1. They include postsecondary credential attainment, career-track employment, and improvement in other life outcomes, such as family economic well-being.

The short-term report assessed the impact of PCPP on postsecondary attainment after 18 months. Because the program emphasized short-term training (one-semester academies that would ladder into one- or two-year diploma or degree programs), we anticipated that some impacts on postsecondary attainment would begin to emerge within 18 months after random assignment. Though the program did increase enrollment in credit-bearing courses, it did not produce impacts on total number of credits earned or credential receipt. However, a large proportion of students in both the treatment and control groups were still enrolled in training at

Exhibit 2-1: Career Pathways Theory of Change for Patient Care Pathway Program



18 months. As a result, we anticipated that educational impacts might continue to evolve. On that assumption, in this report we re-assess impacts on *postsecondary attainment* again after three years.

The short-term report found improvements in perceived career progress, but not in other indicators of career progress such as confidence in career knowledge and access to career supports. Those results are not surprising given that the program did not have a strong employment focus and most participants had not yet received a healthcare credential.

Aside from some measures of career progress and job quality, the short-term report did not assess impacts on *employment and earnings*, anticipating that it was too early to draw conclusions at that time. However, with many treatment group members participating in relatively short-duration training programs, it seems reasonable to expect any impacts to emerge within three years. The career pathways theory of change also specifies that if improvements in educational attainment lead to improvements in employment and earnings, then that should in turn lead to improvements in *other life outcomes*. Again, it seems reasonable that these changes should be visible now, three years out.

Finally, Exhibit 2-1 shows that a number of **contextual factors** can condition impacts, including other local training programs and service providers, local economic conditions, and the size of the target population. The PCPP implementation study explored these factors (see Cook et al. 2018), and we discuss them again in this report when they are useful for explaining three-year program impacts.

2.2 Research Questions at Three-Year Follow-up

The PCPP theory of change motivates several research questions we addressed in the three-year analysis, summarized as follows:

- Three years after random assignment, what were the effects of PCPP on:
  - Educational outcomes?
  - Entry into career-track employment and higher earnings?
  - Individual and family well-being, including income and other life outcomes?

Each of these research questions is addressed, in turn, in Chapters 3 through 5.

2.3 Data Sources

Analyses in this report draw on data from several sources: baseline surveys administered to study participants immediately prior to their random assignment; enrollment, credential, and admission records from Madison College; follow-up surveys conducted approximately 18 months and now three years after random assignment; school enrollment data from the National Student Clearinghouse (NSC); and earnings and employment data from the National Directory of New Hires (NDNH). We describe each of these data sources below.

2.3.1 Baseline Surveys

The study randomized 499 study participants between December 2011 and January 2014. All study participants completed a **Basic Information Form** just prior to their random assignment into the treatment or control group. This report uses data from those baseline surveys to describe the sample, for defining subgroups of interest, and for regression adjustment. This form captured demographic information, family characteristics, educational history, and work and earnings information. At baseline, study participants also completed a **Self-Administered Questionnaire**, which collected more sensitive personal information such as training commitment and academic confidence.[15]

2.3.2 Madison College Records

This report uses academic records from Madison College to define many of the key education and training outcomes. These records provide information on course enrollment and credential receipt for members of the treatment and control groups for four years after their random assignment. It also includes information on their admission into one-year diploma and two-year degree programs. To account for attendance at other colleges, we use NSC records to adjust the outcomes using an imputation procedure (Section 2.3.4 describes NSC data; see Appendix B in the appendix volume for a detailed description of the data and imputation).[16]

2.3.3 Follow-Up Surveys

This report focuses on outcomes measured in a three-year follow-up survey, with some reference to 18-month follow-up survey data previously analyzed in the short-term report (see Cook et al. 2018).

18-Month Survey. The first follow-up survey at 18 months provided measures of outcomes that the PCPP theory of change indicated the program might affect in the short term. Administered by telephone or in person, the survey had an overall response rate of 71 percent (72 percent in the treatment group, 69 percent in the control group). Administration began at 15 months after random assignment, and the median response occurred at 18 months. Some of the findings summarized in Chapter 1 are based on these data. The other use of the 18-month survey data in this report is to help impute values for missing data on job and education spells from other data sources.

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[15] PCPP staff administered the Basic Information Form on paper and then entered it electronically into the study database. Because the Self-Administered Questionnaire asked for personal information (criminal records, psycho-social skills, social support, career orientation and knowledge, and personal and family challenges), study participants filled out a paper form and then placed it in a sealed envelope that PCPP staff sent to Abt Associates for data entry.

[16] Appendix B details our decision to use PCPP records for education outcomes and the imputation for attendance at other colleges. According to data from NSC, more than 80 percent of the study sample attended only Madison College during the three-year follow-up period, with only a modest difference between treatment and control group members. See Appendix E for sensitivity tests for outcome measures from the different potential data sources.

Three-year Survey. We designed the second follow-up survey to measure outcomes that the PCPP theory of change indicated the program might affect over a longer time horizon, such as employment and other life outcomes. The survey also captured detail on respondents' educational history to date, a limited number of psycho-social skills, and their children's experiences with school (as applicable). The response rate for the three-year follow-up was 65 percent overall (66 percent in the treatment group, 65 percent in the control group). The median response occurred at 38 months.[17] (Appendix C provides details the outcomes based on the three-year survey used in this report.[18])

2.3.4 National Student Clearinghouse

This report uses data on college enrollment from NSC to evaluate and adjust local college records and to analyze and adjust for the survey (see Appendix D). NSC is a nonprofit organization that collects data on student enrollment, degrees earned, and other credential completion data from most U.S. institutions of higher education. Designed to aid the administration of student loan programs, researchers also use NSC data to study college access and persistence. As in most administrative data systems, data are subject to various coverage and content limitations. Most important, coverage of private, for-profit two-year colleges is very low (under 30 percent), and NSC makes no attempt to collect data from schools that are not accredited to grant degrees.

2.3.5 National Directory of New Hires

Wage records from NDNH are the primary data source for earnings and employment analyses in this report. Maintained by the federal Office of Child Support Enforcement, NDNH includes quarterly earnings measured by state Unemployment Insurance systems and earnings of federal civilian and military employees provided by various federal agencies. The PACE evaluation had access to these data for study sample members for the two years prior to their random assignment through the end of the study period.

At the time this three-year impact report was written, NDNH data were available for 16 quarters (four years) after each study participant's random assignment; however, the pre-specified confirmatory and secondary outcomes in this report use only the first 13 quarters. (See Appendix F for details.)

2.4 Evaluation Design and Analysis Plan

The PACE evaluation is using an experimental research design to estimate the impact of access to nine programs (of which PCPP is one) on participants' outcomes. When properly

[17] More than 75 percent of the respondents completed the survey 39 months or less after random assignment. The longest lag between randomization and completion was 43 months. Additional months of follow-up potentially increases recall error and shifts means for time-sensitive variables. However, the lags were well matched between the treatment and control groups, so this variation in lags between randomization and completion should not lead to false claims of program effects.

[18] The full instrument is available at http://www.career-pathways.org/career-pathways-pace-three-year-instrument/.

implemented, such a design ensures that any estimated impacts can be attributed to program access rather than to unmeasured differences between eligible study sample members with access (the treatment group) and without access (the control group).

As designed, the experiment captures impacts for all sample members, regardless of whether those assigned to the treatment group actually received the program's services. In other words, this design—an "intent to treat" approach—assesses whether the existence of the program led to better outcomes for those offered the chance to participate in it, relative to what they could have obtained without the program. For a voluntary (rather than mandatory) program, the intent to treat estimate is often the most policy relevant. However, it is important to remember that those offered a slot in PCPP are being compared to those denied a slot but who still had access to other programs and services available in the local area, rather than being compared to no training.[19]

Another important aspect of the PACE research design is that the experiment captures the effects of the local program overall, rather than the contributions of its individual components. Designers of PCPP deliberately included a package of multiple strategies (e.g., assessment, instruction, and supports) that they hypothesized were needed to produce desired impacts. As a result, the evaluation focuses on whether the program as a whole, when implemented in real-world conditions, produces an impact.

2.4.1 Hypothesis Testing

The theory of change for PCPP targets a range of outcomes of interest to policymakers, program operators, and researchers. Testing for program impacts on so many outcomes causes a statistical problem: it provides the program many chances to demonstrate success, and with enough chances, even an unsuccessful program might appear to have one or two impacts. In other words, if an evaluation does not account in some way for multiple hypothesis tests, some of its findings would reach conventional levels of statistical significance merely by chance, even if there were no real effects on any outcome. This is known as the problem of "multiple comparisons."

To avoid overinterpreting the many false positives that could arise, the PACE evaluation structures program analyses by establishing three categories of hypotheses:

- **Confirmatory hypotheses** center on the outcome(s) most critical to judging a program's success in achieving its goals within the designated time period. For PCPP, by limiting its confirmatory analysis to a single outcome in each of two separate domains, we avoid the "multiple comparisons" problem. For the PCPP three-year impact study, we specified two confirmatory tests: ***receipt of a college credential requiring a year or more of***

[19] Because Madison College is the only community college provider in the local area, most control group members interested in healthcare programs were likely to pursue education and training there. Students in the control group could piece together a similar package of services to those services available to students in the treatment group if they sought them out, including non-contextualized basic skills courses, credit-bearing courses at the college, and existing campus support services such as advising, tutoring, and disability resources.

training in the education domain and ***average quarterly earnings in quarters 12 and 13 after random assignment*** in the employment domain. Because each has a hypothesized direction (an increase in the average level of each outcome) we applied a one-tailed test of statistical significance, ignoring possible effects in the other direction.

- **Secondary hypotheses** address a parsimonious set of other important indicators of program success. Secondary hypotheses also posit effects in an expected direction, so we apply one-tailed tests for statistically significant effects only in the specified direction. For the PCPP three-year impact study, we specified outcomes that include ***number of college credits, number of months enrolled in college, receipt of exam-based credentials, employment status*** and indicators of ***career pathways employment***, indicators of ***career progress***, and measures of ***financial well-being***. The hypothesized direction is an increase in the average level for all outcomes other than some measures of financial distress, where we hypothesize a decrease.
- **Exploratory hypotheses** include a larger number of additional possible effects for related outcomes. They are intended to help improve our understanding of findings from the confirmatory and secondary analyses. Exploratory hypotheses may, but do not necessarily, speculate the direction of effects, and therefore we apply two-tailed tests. Some examples of outcomes for exploratory hypotheses for PCPP **include *quarterly earnings and employment for each quarter after random assignment***, various measures of ***job quality***, and measures of ***financial well-being*** such as living arrangements.

Prior to estimating any three-year impacts for PCPP, the research team published an analysis plan specifying key hypotheses and outcome measures (Judkins, Fein, and Buron 2018). The team subsequently assessed data quality, refined the plan, and publicly registered it on the OSF website.[20] The purpose of the analysis plan and registration was to guide the work of the research team and publicly commit to particular hypotheses and an estimation approach that aligns with ACF's commitment to promote rigor, relevance, transparency, independence, and ethics in the conduct of evaluations.[21]

2.4.2 Impact Estimation Procedures

We conducted analyses to estimate the impact of PCPP on the hypothesized confirmatory, secondary, and exploratory outcomes described above.

Random assignment ensures that, on average, study sample members in the treatment and control groups will have similar characteristics at baseline. Random assignment also ensures that measured differences in subsequent outcomes provide unbiased estimates of program impacts. To address any effects that chance differences arising from random assignment might have on estimates, analysts typically estimate impacts using a procedure that compensates for

[20] Previously the Open Science Framework; see https://osf.io/euyjc/?pid=wcus9.

[21] See https://www.acf.hhs.gov/opre/resource/acf-evaluation-policy.

chance differences in measured baseline characteristics. Such procedures also help to increase the precision of estimates.

To select baseline characteristics and estimate impacts, the PACE evaluation developed an approach that respects the conservative tradition of including out-of-balance characteristics, no matter what, in addition to empirically selected covariates, but without incurring large losses in precision. A recently developed technique, the approach is called “least absolute shrinkage and selection operator” (LASSO) (see Appendix A for details).

We then used a regression-adjustment model—including the identified covariates—to estimate impacts. All analyses of survey data applied weights developed to adjust for differential nonresponse across groups of study participants that have different likelihoods of survey response. (Additional details on these and other aspects of the analysis appear in Appendices A and B.)

The text box *How to Read Impact Tables* describes how to navigate and understand the tables in the impact chapters.

How to Read Impact Tables in This Report

The exhibits in Chapters 3-5 show the outcome measure in the left-most column (**Outcome**).

The next column (**Treatment Group**) presents the treatment group's regression-adjusted mean outcome, followed in the next column by the control group's actual mean outcome (**Control Group**). The regression adjustments correct for random variation in baseline covariates between the two groups (and thus differ slightly from the raw means) and improve the precision of the estimates.

The next column (**Impact (Difference)**) is the impact of being offered access to PCPP—that is, the difference between the treatment and control group means. The **Standard Error** column is a measure of uncertainty in the estimated impact that reflects both chance variation due to randomization and any measurement error. The column labeled **Relative Impact** presents the impact as a percentage change from the control group mean. It offers a sense of how "big" or "small" the impact of the program on the treatment group is, at least relative to the control group's level. For outcomes with no natural unit of measurement, we report an **Effect Size** instead of the relative impact. The effect size is a standardized measure that defines impacts as a fraction of the pooled standard deviation across the treatment and control groups. It offers a sense of the size of the impact relative to how much the outcome varies across the full sample and allows for comparison of the size of the impact across scale outcomes.

The final column, ***p*-Value**, is the probability that the observed or a larger difference between the treatment and control groups would occur by chance, even if there was in reality no difference between the two groups.

Statistical significance

There are several common standards for judging statistical significance. In this report, tests are considered statistically significant and highlighted in tables if the *p*-value is less than .10. The smaller the *p*-value, the more likely that the observed difference between the treatment and control groups is real, rather than occurring by chance. Tests with *p*-values of less than .10 are separately flagged:

* for .10 (10 percent level)

** for .05 (5 percent level)

*** for .01 (1 percent level)

Categories of findings

Tests of statistical significance for confirmatory and secondary outcomes are one-sided tests because we have a directional hypothesis for these impacts. The confirmatory and secondary analyses are reported using **bold text** in the tables. Tests of significance for exploratory outcomes use a two-sided test, a test we use because we do not have a directional hypothesis. Exploratory analyses are reported using regular (not bolded) text in the tables.

3. Impacts on Postsecondary Education and Training

This chapter reports the impact of the Patient Care Pathway Program on postsecondary education and training outcomes. The analysis assesses the extent to which the program increased enrollment in training and receipt of college credentials.

As described in the PCPP theory of change in Section 2.1, the semester-long PCPP academies were designed to prepare students to successfully complete one-year healthcare diploma and two-year healthcare degree programs. By three years after random assignment, it seemed reasonable to expect completion of these longer-term credentials. Thus, the confirmatory outcome for the education domain in this report is *receipt of a college credential requiring a year or more of training*. The theory of change suggests that this outcome is appropriate for assessing whether PCPP is meeting its postsecondary attainment goals after three years, as the program was intended to quickly prepare students to enroll in healthcare diploma and degree programs. However, as will be shown in Section 3.3, three years may not have been enough time for program participants to obtain a healthcare diploma or degree, due to college admissions policies that delayed progression toward healthcare credentials as well as because many students were not going to school full-time.

In addition to the confirmatory outcome, the three-year impact study identified several secondary outcomes in the education and training domain. As noted in Chapter 1, findings from the short-term report (Cook et al. 2018) suggest that institutional delays may have slowed down progression toward one-year credentials. We therefore examined impacts at three years on additional measures of training receipt, including *number of college credits earned; number of full-time-equivalent (FTE) months enrolled in college; receipt of any college credential;* and *receipt of an exam-based certification or license*. Each of these outcomes provides additional evidence as to whether PCPP improved the educational outcomes of program participants.

We also report impacts on a number of exploratory education and training outcomes not pre-specified in the PACE analysis plan (see Judkins et al. 2018). They offer insight into other important program outcomes and provide additional context for the confirmatory and secondary outcomes. Examples include *any full-time enrollment in college; any part-time enrollment in college;* and *receipt of a healthcare credential*.

The chapter proceeds as follows: Section 3.1 presents the impacts of PCPP on college enrollment and credits earned, including impacts on college enrollment over time. This will establish whether the program increased the amount of training received by the treatment group, which is a necessary first step in achieving educational progress. In Section 3.2, we consider the three-year impacts on credentials, including the confirmatory outcome. These results will show whether PCPP met its key intermediate goal of increasing receipt of college credentials. Finally, Section 3.3 explores impacts on admissions to healthcare degree programs over time and whether admissions impacts may lead to credential impacts over a longer time period.

3.1 Impact on Enrollment and Credits

This section describes impacts of PCPP on postsecondary enrollment and receipt of college credits. We report the impact on college enrollment (both full-time and part-time) and receipt of credits in the three years after random assignment. We also show the impact on college enrollment over time. For treatment group students, these outcomes include both the occupational training courses offered by the PCAs plus any additional college courses.

- ***PCPP increased college enrollment, particularly part-time enrollment, with the largest impacts occurring in the first 18 months after study enrollment.***

In the three years after random assignment, a large share of both the treatment and control groups had enrolled in college training. Ninety-eight (98) percent of the treatment group had enrolled in college at some point during these three years, compared to 90 percent of the control group, for an impact of 8 percentage points (Exhibit 3-1). The vast majority of this enrollment was part-time (less than 12 credits per term) rather than full-time: nearly all treatment group members were enrolled in part-time training at some point during the three-year period, whereas only 28 percent were enrolled in full-time training at any point. PCPP had a 9 percentage point impact on part-time enrollment, but no impact on full-time enrollment.[22]

[22] Impacts on college credentials, enrollment, and credits in this chapter are based on Madison College records. We conducted sensitivity analyses to assess whether different data sources produce different estimates. As shown in Appendix D in the appendix volume, outcomes based on NSC data were similar in impacts but somewhat lower in levels of credential receipt; as shown in Appendix E, outcomes based on the three-year follow-up survey were similar in both impacts and levels.

Exhibit 3-1: Three-Year Impacts on Enrollment and Credits

Outcome	Treatment Group	Control Group	Impact (Difference)	Standard Error	Relative Impact	*p*-Value
Madison College Academic Records						
Any college enrollment (%)	98.4	90.0	+8.5 ***	(2.1)	9.4%	<.001
Any part-time enrollment (%)	97.6	88.8	+8.9 ***	(2.3)	10.0%	<.001
Any full-time enrollment (%)	28.0	30.5	−2.5	(4.1)	−8.2%	.538
FTE (full-time-equivalent) months enrolled in college (#)	**10.4**	**9.4**	**+1.0 ***	**(0.7)**	**10.6%**	**.089**
College credits earned (#)	**20.1**	**18.7**	**+1.4**	**(1.7)**	**7.5%**	**.212**
Sample size	250	249				
Three-Year Follow-Up Survey and Madison College Academic Records						
FTE months enrolled in any school (#)	10.8	9.6	+1.2	(1.0)	12.5%	.243
Sample size	165	161				
Three-Year Follow-Up Survey						
Enrolled in training or education at survey follow-up (%)	34.3	33.2	+1.1	(5.4)	3.3%	.842
Sample size	165	161				

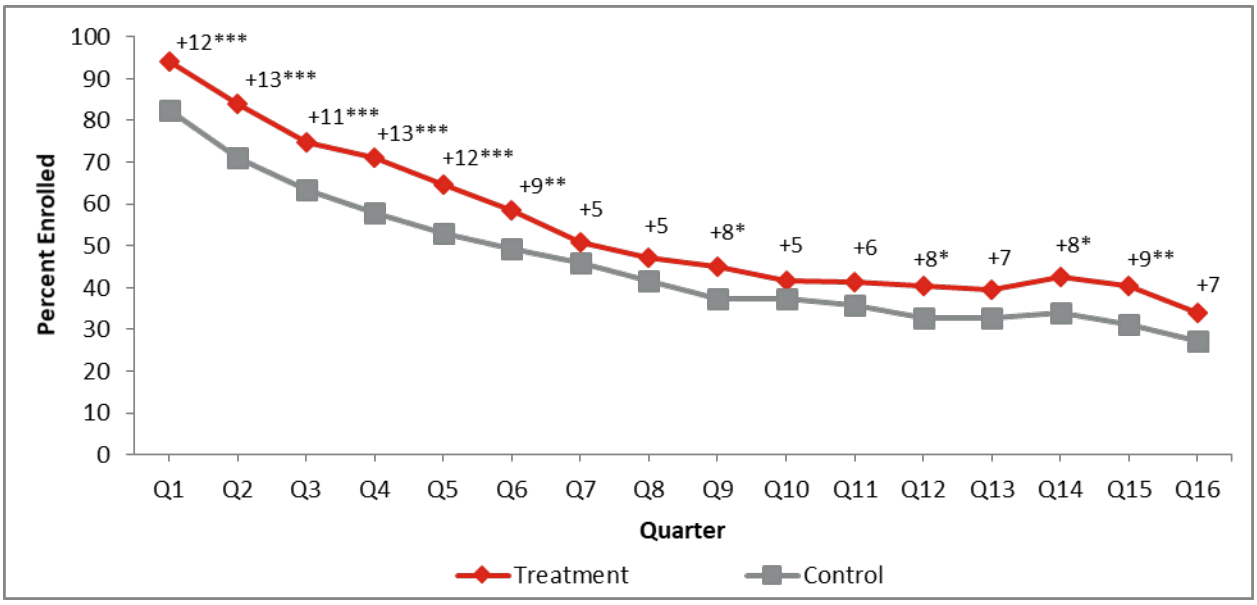
Source: Madison College academic records for enrollment and credits earned; blended Madison College academic records and three-year follow-up survey for FTE months enrolled in any type of school; three-year follow-up survey for enrollment at survey follow-up.

Note: Secondary outcomes are bolded and statistical significance is based on one-tailed tests; exploratory outcomes are not bolded and statistical significance is based on two-tailed tests. "Relative Impact" represents impacts as a percentage of the corresponding control group mean (i.e., 100 × [impact/control group mean]).

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

Exhibit 3-2 shows college enrollment for the treatment and control groups over time. Consistent with high rates of participation in the PCAs, we observe high levels of enrollment in college courses and significant impacts during the first few quarters after random assignment. The impact ranges from 11 to 13 percentage points during the first five quarters and is highly significant. Over time, the impact declines, and it is no longer significant every quarter. However, the overall trend shows a sustained positive effect on college enrollment, for a number of years after the initial training program had ended.

Exhibit 3-2: Impacts on College Enrollment by Quarter



Source: Madison College academic records.

Note: Sample size is 250 treatment and 249 control. Outcomes are exploratory, statistical significance is based on two-tailed tests. Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

- ***PCPP resulted in a small increase in the number of months enrolled in college, but did not affect the number of credits earned.***

After three years, treatment group members had enrolled in 10.4 full-time-equivalent (FTE) months of college education, compared to 9.4 FTE months for the control group (see Exhibit 3-1). The difference of one month is statistically significant, representing an 11 percent relative impact. However, the increase in the duration of enrollment did not translate to an increase in other measures of enrollment or in college credits earned, likely because the impact of one additional month of enrollment was relatively small.

3.2 Impact on Credentials

This section reports the impact on credential receipt after three years. Consistent with the modest impacts on enrollment and credits shown in the previous section, there is little evidence that PCPP increased receipt of college credentials in the three years after study enrollment.

- ***PCPP did not increase receipt of college credentials or exam-based certifications or licenses.***

As shown in Exhibit 3-3, there was no impact on *receipt of a college credential requiring a year or more of training*: 4 percent of the treatment group received such a credential, compared to 8 percent of the control group, a difference that is not statistically significant. As the confirmatory outcome, this is the key measure by which the study assesses the program's success in increasing the educational attainment of participants. The lack of impact suggests that though

the program did promote enrollment in college courses, it did not meet its goal of increasing completion of longer-term college certificates and degrees.[23]

Similarly, the program did not have an impact on receipt of a college credential of any duration, a college healthcare credential of any duration, or an associate degree. The lack of impact on college credentials is somewhat surprising, given the impacts on enrollment described in the previous section. That most of the enrollment was part-time, rather than full-time, may have slowed students' progress toward longer-term credentials.

Later in this chapter, we explore whether there are indications that students are continuing to progress toward credential attainment, though at a slower than expected rate, by examining admission rates to one- and two-year healthcare programs in the four years after program entry.

Exhibit 3-3: Three-Year Impacts on Credentials

Outcome	Treatment Group	Control Group	Impact (Difference)	Standard Error	Relative Impact	*p*-Value
Madison College Academic Records						
Confirmatory Outcome: Receipt of college credential requiring 1+ year of training (%)	**4.3**	**7.6**	**−3.4**	**2.1**	**−44.7%**	**.945**
Received any college credential (%)	**24.4**	**20.5**	**+3.9**	**3.7**	**19.0%**	**.148**
Received healthcare credential from a college (%)	23.4	18.1	+5.4	3.6	29.8%	.139
Received associate degree (%)	1.4	2.4	−1.0	1.2	−41.7%	.433
Sample size	250	249				
Blended Three-Year and 18-Month Follow-Up Surveys						
Received exam-based certification or license (%)	**30.7**	**33.0**	**−2.3**	**5.6**	**−7.0%**	**.659**
Sample size	165	161				
Blended Madison College Academic Records and Three-Year Follow-Up Survey						
Received any credential from any type of school (%)	29.2	27.3	+1.8	5.1	6.6%	.717
Sample size	165	161				

Source: Madison College academic records for college credentials; blended three-year and 18-month follow-up surveys for exam-based certification or license; blended Madison College academic records and three-year follow-up survey for credential from any type of school.

Note: Confirmatory and secondary outcomes are bolded and statistical significance is based on one-tailed tests; exploratory outcomes are not bolded and statistical significance is based on two-tailed tests. "Relative Impact" represents impacts as a percentage of the corresponding control group mean (i.e., 100 × [impact/control group mean]).

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

[23] The 90 percent confidence interval ranges from −6.9 percentage points to +0.1 percentage points. This leads us to conclude that PCPP did not have a meaningful impact on *receipt of a college credential requiring a year or more of training* in the first three years of follow-up, as most of the range of plausible impacts are either negative or only slightly larger than zero.

Consistent with PCPP's design as a healthcare bridge program, most of the college credentials received by participants were in healthcare. According to Madison College academic records, about 70 percent of the credentials received by the treatment group were Nursing Assistant certificates, which are short-duration certificates that prepare participants for relatively low-paying jobs as CNAs.

There was no evidence of impact on non-college credentials either. Treatment group participants were no more likely than the control group to earn exam-based certifications or licenses or credentials from either a college or a non-college.[24]

3.3 Impacts on Program Admission and Four-Year Credentials

As shown previously in this chapter, PCPP participants were enrolled at higher rates than control group participants; however, these impacts did not translate into more college credits or college credentials for the treatment group. In this section, we explore whether there is evidence that students were delayed in gaining admission to Madison College academic programs, and whether such delays may have slowed progress toward longer-term credentials.

As a healthcare bridge program, PCPP had as an important goal to increase admissions to healthcare diploma and degree programs at Madison College. Admission to these programs was a necessary step for students in order to earn college healthcare credentials. One factor that may have contributed to the lack of impact on credential attainment was the delays that students faced in moving into healthcare programs upon completion of a PCA. As described in Chapter 1, program participants faced various challenges in gaining admission into healthcare programs upon completing a PCA. Application windows to academic programs were short and infrequent, and there were often lags of up to a year between an application window and program admissions and start dates. Moreover, once admitted, students often faced long waitlists before they could enroll in core courses in their selected healthcare program, which slowed their progress toward diploma or degree completion. In addition, Madison College adopted the TEAS assessment as an admissions requirement for its two-year healthcare degree programs in May 2013, partway through the study's random assignment period. Program staff reported that a large share of students at Madison College, including PCA2 graduates, failed to achieve the required TEAS scores even after multiple attempts.

In this section, we report the impacts on admissions to academic programs at Madison College. We demonstrate that the data are consistent with delays in admissions, and how those delays may be related to the lack of impacts on credential attainment by three years. We then report impacts on credential attainment by four years after random assignment as an exploratory investigation of whether credential impacts may yet arise over a longer time period.

[24] The short-term report (Cook et al. 2018) found that a higher share of study participants received a professional license or credential than is reported here (49 percent of the treatment group, 42 percent of the control group). That short-term report inadvertently included all credentials reported by participants, including those earned before random assignment. Here we report only those credentials received after random assignment. In both cases, the impact is not statistically significant.

- ***Impacts on admissions to PCA2 destination programs were initially small, but grew larger by the third and fourth years after PCPP enrollment.***

Exhibit 3-4 shows the impacts on admissions at various time points over the four years after PCPP enrollment, using administrative records from Madison College. Each of the exhibit's four panels shows admissions to a different set of academic programs: the destination programs targeted by PCA1 (in Exhibit 1-1, the "One-Year Healthcare Diploma Programs"); those targeted by PCA2 (in Exhibit 1-1, the "Two-Year Healthcare Degree Programs"); other college academic programs; and any academic programs.

At 24 months after program enrollment, few students had been admitted to a PCA1 or PCA2 destination program. There was no detectable impact on admission to PCA1 destination programs; there was a 6 percentage point impact on admission to PCA2 destination programs (11 percent of the treatment group, compared with 5 percent of the control group).

Exhibit 3-4: Impacts on Admissions to College Academic Programs, by Type

Outcome	Treatment Group	Control Group	Impact (Difference)	Standard Error	Relative Impact	*p*–Value
Admission to a PCA1 Destination (One-Year Healthcare Diploma) Program in Successive Months After Random Assignment (%)						
By month 24	5.5	6.4	−0.9	(2.2)	−14.1%	.673
By month 36	8.9	8.0	+0.9	(2.5)	11.3%	.720
By month 48	9.4	9.6	−0.2	(2.6)	−2.1%	.937
Admission to a PCA2 Destination (Two-Year Healthcare Degree) Program In Successive Months After Random Assignment (%)						
By month 24	10.6	4.8	+5.8**	(2.5)	120.8%	.023
By month 36	24.5	11.2	+13.3***	(3.4)	118.8%	<.001
By month 48	32.6	14.5	+18.2***	(3.6)	125.5%	<.001
Admission to Another (non-PCA Destination) Academic Program in Successive Months After Random Assignment (%)						
By month 24	28.3	23.3	+5.0	(4.0)	21.5%	.213
By month 36	30.9	24.9	+6.0	(4.1)	24.1%	.147
By month 48	33.9	26.9	+7.0	(4.3)	26.0%	.101
Admission to Any Academic Program (PCA1 or PCA2 Destination Program or Other) in Successive Months After Random Assignment (%)						
By month 24	40.3	32.9	+7.4*	(4.5)	22.5%	.097
By month 36	54.5	40.6	+13.9***	(4.5)	34.2%	.002
By month 48	62.1	45.8	+16.3***	(4.5)	35.6%	<.001
Sample size	250	249				

Source: Madison College academic records.

Note: All outcomes are exploratory, statistical significance is based on two-tailed tests. "Relative Impact" represents impacts as a percentage of the corresponding control group mean (i.e., 100 × [impact/control group mean]).

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

By 36 months after PCPP enrollment, larger impacts on admissions to PCA2 destination programs began to emerge. Twenty-five (25) percent of treatment group members had been admitted to a PCA2 destination program by 36 months, compared to just 11 percent of the control group (an impact of 13 percentage points). Impacts grew even larger by 48 months: 33 percent of the treatment group had been admitted to a PCA2 destination program, compared to 15 percent of the control group (an impact of 18 percentage points).

Because PCPP specifically aimed to prepare participants for admission to healthcare degree programs, these observed impacts might merely reflect that the treatment group was more likely to be admitted to these specific destination programs instead of other non-PCA destination programs they would otherwise have been admitted. To explore this possibility, the third panel of Exhibit 3-4 examines admissions to non-PCA destination programs. If outcomes measuring admissions to PCA destination programs are over-aligned with the intervention, then the control group might have higher rates of admission to non-PCA destination programs. However, there is no evidence that control group members are being admitted to non-PCA destination programs at a higher rate than the treatment group are—the differences between the research groups are not significant, and the impact (although not significant) is positive for the treatment group relative to the control group.

- ***Impacts on credential attainment began to emerge by the fourth year after PCPP enrollment.***

Given that impacts on admissions to college academic programs did not emerge until several years after program enrollment, and admission to academic programs is a necessary step in obtaining credentials, we might expect impacts on credentials to arise in the years following observed impacts on admissions.

To start to explore this possibility, we examined impacts on credentials earned by four years after random assignment. As shown in Exhibit 3-5 below, rates of credential attainment had risen—at four years, more than 10 percent of treatment group members had received a college credential requiring a year or more of training (compared to 4 percent at three years), whereas 33 percent had received any college credential (compared to 24 percent at three years). Both of these four-year levels are larger than levels observed after three years, and the impacts, although not significant, are trending larger.

In addition, by four years we see weak evidence of an impact on receipt of a college healthcare credential—31 percent of the treatment group had earned a college healthcare credential, compared to 23 percent of the control group, an impact of 8 percentage points. Most of these credentials were short-duration Nursing Assistant certificates. The impact on receipt of a healthcare credential was not present at three years.

Exhibit 3-5: Four-Year Impacts on Credential Receipt

Outcome	Treatment Group	Control Group	Impact (Difference)	Standard Error	Relative Impact	*p*-Value
Receipt of college credential requiring 1+ year of training (%)	10.5	12.0	−1.6	(2.9)	−13.3%	.579
Received any college credential (%)	32.9	26.1	+6.8	(4.1)	26.1%	.100
Received healthcare credential from a college (%)	30.6	22.9	+7.7*	(4.0)	33.6%	.051
Received associate degree (%)	3.7	6.0	−2.3	(2.0)	−38.3%	.245
Sample size	250	249				

Source: Madison College academic records.

Note: All outcomes are exploratory, statistical significance is based on two-tailed tests. "Relative Impact" represents impacts as a percentage of the corresponding control group mean (i.e., 100 × [impact/control group mean]).

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

Taken together, a variety of factors—including the prevalence of part-time enrollment, relatively high levels of enrollment in the fourth year after random assignment, and increasing rates of admission to academic programs—suggest that three years might not have been a long enough time period for the education effects of PCPP to be fully realized. There is evidence of sustained impacts on both enrollment and admissions: the treatment group has higher rates of college enrollment in the fourth year than the control group does, and the treatment group is more likely to have been admitted to a college academic program by four years. These impacts, in turn, might lead to larger impacts on credentials over time—indeed, we start to see evidence of impacts on credentials by the fourth year after PCPP enrollment.

At this point, however, these results remain exploratory. We caution against drawing too strong of a conclusion about future impacts on credential attainment until the impact study can observe additional years of follow-up. The research team will examine impacts on credential attainment, as well as labor market outcomes, six years after random assignment in the coming Career Pathways Long-term Outcomes Study, the third PCPP report as part of the PACE project.

4. Impacts on Earnings and Employment

This chapter reports the impact of the Patient Care Pathway Program on earnings and employment outcomes, assessing the extent to which the program increased employment in high-quality jobs that pay well. As described in the PCPP theory of change (Section 2.1), the program is expected to have led to increased credential receipt by three years, which in turn is predicted to lead to employment in higher-paying jobs. Therefore, we selected *average quarterly earnings in the 12th and 13th quarters after random assignment* as the confirmatory outcome in the earnings and employment domain at the three-year follow-up point. This is the key measure by which we assess whether PCPP is making progress toward its labor market objectives, and it was pre-specified in the analysis plan. This chapter will show that PCPP did not lead to a meaningful impact on earnings—which is unsurprising, given the lack of impacts on credential attainment and relatively high levels of ongoing enrollment as reported in Chapter 3.

In addition to the confirmatory outcome, we identified several secondary outcomes in the earnings and employment domain. These include *employed at survey follow-up; employed in a job earning $13 per hour or more; employed in a job requiring mid-level skills; self-assessed confidence in career knowledge;* and *self-assessed access to career supports*. Each of these outcomes provides additional evidence as to whether PCPP improved the labor market outcomes of participants.

We also report impacts on a number of exploratory earnings and employment outcomes not pre-specified in our analysis plan. They offer insight into other important program outcomes and provide additional context for the confirmatory and secondary outcomes.

4.1 Impact on Earnings

This section reports the impact of PCPP on quarterly earnings, using NDNH wage records. [25]

- ***PCPP did not increase quarterly earnings in the 12th and 13th quarters after program enrollment.***

PCPP did not lead to a detectable increase in earnings for its participants relative to the control group. In the 12th and 13th quarters after random assignment, the treatment group earned on average $4,563 per quarter, which was not statistically different from the control group average of $4,739 (Exhibit 4-1 below). Considering total earnings over longer periods of time, there was no detectable impact on earnings in the last year of follow-up (quarters 10 through 13 after random assignment) or the first 13 quarters after randomization. Though not significant, treatment group members earned about $3,400 less on average than those in the control group

[25] Earnings impacts in this section are based on data from NDNH. This is a national database of earnings, but excludes certain classes of workers, notably the self-employed and independent contractors. We conducted sensitivity analyses to assess whether different data sources produce different estimates. As shown in Appendix G in the appendix volume, outcomes based on the three-year follow-up survey were similar in both levels and impacts.

over the first 13 quarters, which is consistent with forgone earnings from increased enrollment in education and training as shown in Chapter 3.

As noted in the "How to Read Impact Tables" text box (Section 2.4), there is uncertainty associated with the impact estimate in the 12th and 13th quarters after random assignment, and this uncertainty is reflected in the standard error. A major source of this uncertainty is that earnings vary substantially across individual study participants, and the treatment and control groups were selected entirely by chance. Were we to repeat the experimental evaluation of PCPP and change only the random draw that determined the treatment and control groups, then we might end up with a different impact estimate for the confirmatory earnings outcome.

When we incorporate that uncertainty into a range of plausible impacts, we cannot rule out that the true impact on the confirmatory earnings outcome is as large as +$340 or as small as −$690.[26] This leads us to conclude that PCPP did not have a meaningful impact on earnings in the first three years of follow-up, as most of the range of plausible impacts are either negative or only slightly larger than zero.

Exhibit 4-1: Three-Year Impacts on Earnings

Outcome ($)	Treatment Group	Control Group	Impact (Difference)	Standard Error	Relative Impact	*p*-Value
Confirmatory Outcome: Average quarterly earnings Q12-Q13 ($)	**4,563**	**4,739**	**−175**	**(313)**	**−3.7%**	**.713**
Total Earnings ($)						
In last year of follow-up (Q10-Q13)	17,133	18,339	−1,206	(1,122)	−6.6%	.283
Since randomization (Q1-Q13)	47,287	50,648	−3,361	(2,593)	−6.6%	.195
Sample size	244	242				

Source: National Directory of New Hires.

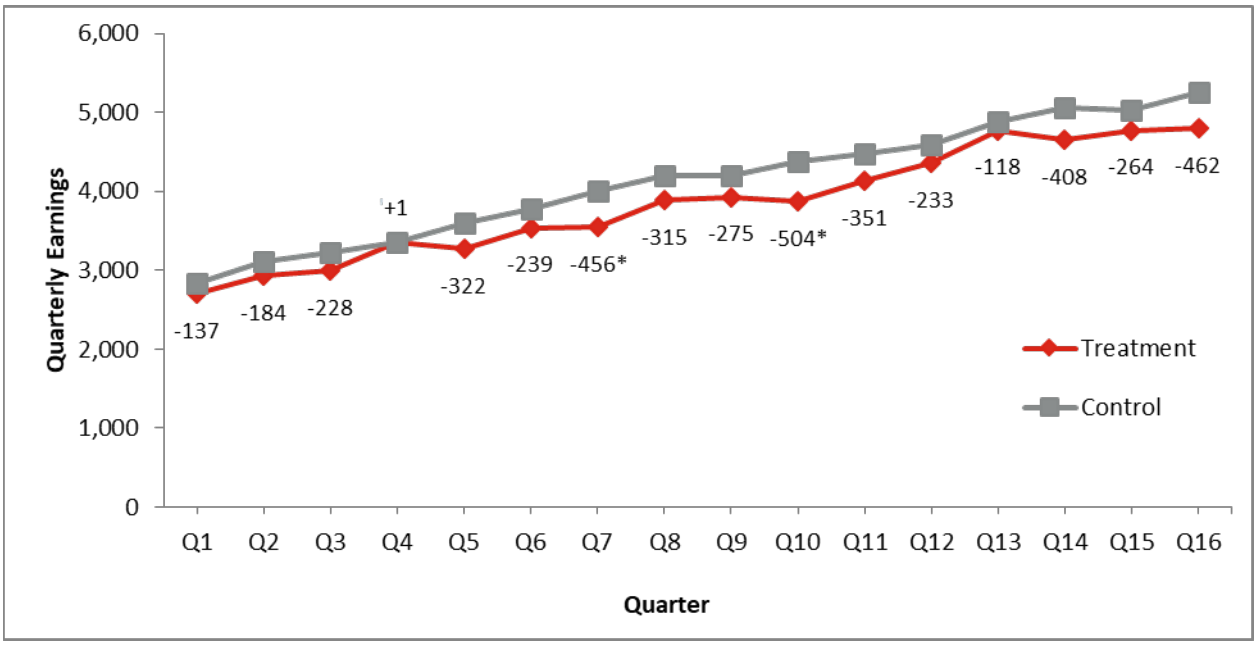
Note: Confirmatory and secondary outcomes are bolded and statistical significance is based on one-tailed tests; exploratory outcomes are not bolded and statistical significance is based on two-tailed tests. "Relative Impact" represents impacts as a percentage of the corresponding control group mean (i.e., 100 × [impact/control group mean]).

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

Exhibit 4-2 below shows the quarter-by-quarter impacts on average earnings. Across all quarters, the control group generally earned more than the treatment group, although the difference is only significant in two quarters (quarters 7 and 10). Earnings grew over time for both groups, although there is no evidence that impacts changed over time.

[26] These values are the endpoints for a 90 percent confidence interval for average earnings in quarters 12 to 13.

Exhibit 4-2: Impacts on Quarterly Earnings



Source: National Directory of New Hires.

Note: Earnings estimates within each quarter are exploratory outcomes and statistical significance is based on two-tailed tests. Sample size is 244 in the treatment group and 242 in the control group

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

4.2 Impact on Employment

This section examines impacts on the level of employment and job characteristics as captured in the three-year follow-up survey. Impacts on these outcomes provide additional context for the earnings estimates reported above.

- ***PCPP increased the share employed in a job earning $13 or more, but did not have a detectable impact on overall employment or other measures of job quality.***

The majority (75 percent) of the treatment group was employed (either full-time or part-time) at the time of survey follow-up, a rate similar to that of the control group (Exhibit 4-3 below). PCPP did lead to a substantial increase in the share employed in a job that paid $13 or more; 42 percent of the treatment group was employed in such a job, compared to only 31 percent of the control group. This was a pre-specified secondary outcome, with the $13 threshold set equal to the 60th percentile of the wage for employed control group members.

This impact might suggest that PCPP was successful in helping treatment group members move out of the lowest-paying jobs (below $13 per hour) and into somewhat higher paying jobs ($13 per hour or more). However, as noted in the previous section, PCPP did not increase overall earnings. Moreover, sensitivity analysis found no impact on the share employed in a job earning $14 per hour or more. It remains to be seen whether the observed impact on earning $13 per hour or more might lead to earnings impacts in the future.

Exhibit 4-3: Three-Year Impacts on Employment and Career Progress

Outcome	Treatment Group	Control Group	Impact (Difference)	Standard Error	Relative Impact	*p*-Value
Employed at survey follow-up (%)	**75.1**	**74.4**	**+0.7**	**(5.1)**	**0.9%**	**.446**
Indicators of Career Pathways Employment						
Employed and: (%)						
Earning $13 per hour or more[a]	**41.6**	**30.8**	**+10.8****	**(5.6)**	**35.1%**	**.027**
Working in a healthcare occupation (any industry)	30.1	23.4	+6.7	(5.3)	28.6%	.211
Working in a job requiring at least mid-level skills[b]	**12.7**	**19.5**	**-6.8**	**(4.4)**	**−34.9%**	**.941**
Indicators of Job Quality						
Employed and: (%)						
Working at least 32 hours per week	45.0	45.0	0.0	(5.9)	0.0%	.999
Working straight day, evening, or night shifts	62.3	57.0	+5.3	(6.0)	9.3%	.373
Working in a job that offers health insurance	49.5	51.0	-1.4	(5.8)	−2.7%	.806
Working in a job with a supportive working environment[c]	41.5	33.9	+7.6	(5.8)	22.4%	.191
Sample size	165	161				

Source: PACE three-year follow-up survey.

Note: Secondary outcomes are bolded and statistical significance is based on one-tailed tests; exploratory outcomes are not bolded and statistical significance is based on two-tailed tests. "Relative Impact" represents impacts as a percentage of the corresponding control group mean (i.e., 100 × [impact/control group mean]).

[a] $13 per hour is the 60th percentile of the wage distribution for control group members who were employed at survey follow-up.

[b] O*NET Job Zone 3 or higher.

[c] A job is considered to have a supportive working environment if the worker reports a rich combination of family-friendly policies, helpful coworkers and supervisors, high job satisfaction, generous fringe benefits, and opportunities for advancement.

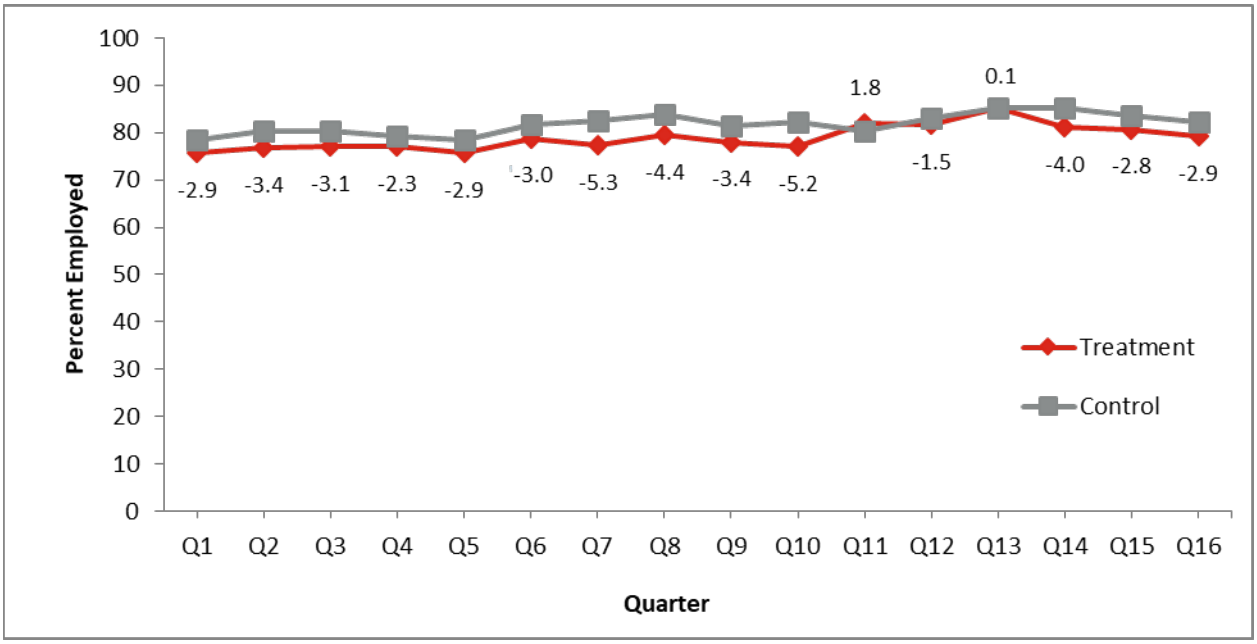
Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

Overall, there is little evidence that PCPP led to increased employment in high-quality jobs. Treatment group members were no more likely than control group members to report their current job required "at least mid-level skills," classified as jobs with O*NET Job Zone 3 or higher.[27] Similarly, treatment group members were no more likely to report working in a job that offers health insurance, or working in a job with a supportive working environment. Interestingly, there is no detectable impact on employment in a healthcare occupation, despite PCPP serving as a bridge program to healthcare training. This result is consistent with the lack of impact on receipt of healthcare credentials, as reported in Chapter 3. An important caveat is that these survey-defined outcomes are based on fairly small sample sizes, with large standard errors, which limits our power to detect significant impacts.

[27] O*NET defines occupations in Job Zone 3 as those that "need medium preparation." Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate degree. O*NET lists Medical Assistant as an example of an occupation in Job Zone 3; see https://www.onetonline.org/help/online/zones.

In addition to the survey outcomes, we also explored quarterly employment rates in NDNH data. Exhibit 4-4 shows quarterly employment rates over the four years after random assignment. In most quarters, the control group is employed at a slightly higher rate than the treatment group, but none of the quarterly impacts is significant. Notably, employment rates are quite high—more than 75 percent of the sample is employed, even in the early quarters when a majority of the sample was enrolled in training. This highlights that most participants were not exclusively in training during their participation in PCPP.

Exhibit 4-4: Impacts on Quarterly Employment



Source: National Directory of New Hires.

Note: Employment estimates within each quarter are exploratory outcomes and statistical significance is based on two-tailed tests. Sample size is 244 in the treatment group and 242 in the control group.

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

5. Impacts on Other Life Outcomes

This chapter explores impacts of the Patient Care Pathway Program on other life outcomes, including family economic well-being, self-assessed career progress, psychological well-being, and family structure. The PCPP theory of change in Section 2.1 predicts that the training provided will increase educational attainment, leading to better employment outcomes and improvements in economic and psychological well-being. However, given the lack of impacts on educational attainment or earnings and employment outcomes, it would be surprising to observe substantial improvements in measures of well-being. It is possible that the sustained rates of training might affect family structure, which we explore in this chapter.

5.1 Impact on Family Economic Well-Being

This section reports impacts on family economic well-being. Key secondary outcomes include *health insurance coverage, receipt of means-tested public benefits, student debt,* and *signs of financial distress*. We also consider additional exploratory outcomes of economic well-being.

- ***PCPP increased the share of participants with health insurance coverage.***

Exhibit 5-1 shows the impacts of PCPP on the economic well-being of its participants and their households. Ninety-three (93) percent of the treatment group reported having health insurance coverage, compared to 85 percent of the control group, for an impact of 8 percentage points. It is not clear what is driving this impact—we see no impact on receipt of Medicaid, and as noted in Chapter 4, there was no impact on availability of employer-provided health insurance.

One possible explanation is the additional advising received by the treatment group (see Section 1.2) might have addressed barriers and provided referrals to help access health insurance benefits.

Exhibit 5-1: Impacts on Family Economic Well-Being

Outcome	Treatment Group	Control Group	Impact (Difference)	Standard Error	Relative Impact	*p*-Value
Has health insurance coverage (%)	**93.3**	**85.0**	**+8.3****	**3.7**	**9.8%**	**.012**
Receipt of Means-Tested Benefits						
Any means-tested public benefits (%)[a]	**50.1**	**45.4**	**+4.7**	**5.3**	**10.4%**	**.810**
Individual receipt of TANF (%)	3.2	1.4	+1.7	1.6	121.4%	.294
Individual receipt of SNAP (%)	27.5	25.1	+2.4	4.6	9.6%	.595
Individual receipt of Medicaid (%)	23.6	24.0	−0.4	4.5	−1.7%	.930
Debt						
Student debt ($)[b]	**8,976**	**8,036**	**+940**	**1,325**	**11.7%**	**.761**
Unsecured debt of $5,000 or more (%)[c]	35.0	36.1	−1.1	5.7	−3.0%	.852
Parental student debt ($)	57	128	−71	66	−55.5%	.285
Financial Status						
Any signs of financial distress (%)[d]	**53.7**	**53.8**	**−0.2**	**5.5**	**−0.4%**	**.489**
Average monthly household income ($)	3,682	3,622	+60	283	1.7%	.833
Average monthly personal income ($)	1,576	1,564	+12	137	0.8%	.929
Didn't experience food insecurity (%)	91.3	82.5	+8.8**	3.7	10.7%	.018
Sample size	165	161				

Note: Secondary outcomes are bolded and statistical significance is based on one-tailed tests; exploratory outcomes are not bolded and statistical significance is based on two-tailed tests. "Relative Impact" represents impacts as a fraction of the corresponding control group mean (i.e., 100 × [impact/control group mean]).

[a] Receipt of TANF (Temporary Assistance for Needy Families), SNAP (Supplemental Nutrition Assistance Program), WIC (Special Supplemental Nutrition Program for Women, Infants, and Children), Medicaid, Section 8/Public Housing, or Low Income Home Energy Assistance Program by anyone in household.

[b] Student debt measures debt accrued since random assignment.

[c] Unsecured debt is debt other than student debt and secured debt (mortgages and title loans). Spousal debt included.

[d] Signs of Financial Distress is a flag for utility disconnects, delayed health/dental care, hunger, or trouble paying bills or making ends meet.

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

- ***PCPP had no impact on most other measures of economic well-being.***

For most other measures of economic well-being, there was little evidence of impact. The program did not decrease receipt of public assistance benefits, either across a composite measure of six different benefit programs or separately for individual receipt of Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), or Medicaid. The program did not have a detectable impact on student debt accrued since random assignment, unsecured debt, household income, or a composite measure of financial hardship. The lack of impact on measures of economic well-being is generally unsurprising, given that PCPP did not offer any tuition assistance and did not lead to an increase in earnings. Notably, more than half of the treatment and control group members reported that they experienced at least one measure of financial hardship—such as a utility disconnection, delayed health/dental care, hunger, or trouble paying bills or making ends meet.

The program reduced food insecurity—91 percent of the treatment group reported that they did not experience food insecurity, compared to 82 percent of the control group, for an impact of 9 percentage points. It is unclear how this improvement in food security arises, given that PCPP

had no detectable impacts on employment, earnings, household income, or SNAP receipt. One possible explanation is the additional advising received by the treatment group. The advisor may have addressed barriers and provided referrals during the advising sessions—for example, to local food resources. In addition, as will be shown in Section 5.3, fewer treatment respondents are living with a spouse and children, so perhaps a smaller household size could have improved food adequacy.

One notable non-impact finding is the relatively high level of student debt. Both the treatment and control groups had more than $8,000 of student debt, which is equal to nearly two quarters' worth of earnings (as reported in Chapter 3, average quarterly earnings were about $4,500 in the 12th and 13th quarters). PCPP did not offer tuition assistance, which likely contributed to the lack of a detectable impact on the level of student debt.

5.2 Impact on Self-Assessed Career Progress and Psychological Well-Being

This section reports impacts on self-assessed career progress and psychological well-being. As noted in the analysis plan, improvements to these outcomes are hypothesized to be related to postsecondary educational attainment and career progress (Judkins et al. 2018).

- ***PCPP did not have a detectable impact on self-assessed career progress or most measures of psychological well-being.***

We find no detectable evidence of impacts on several measures of self-assessed career progress (Exhibit 5-2). Both the treatment and control groups report generally high levels of confidence in career knowledge, access to career supports, and perceived career progress. This is consistent with the findings from the previous chapter, which did not detect impacts on earnings or employment.

Exhibit 5-2: Impacts on Self-Assessed Career Progress and Psychological Well-Being

Outcome	Treatment Group	Control Group	Impact (Difference)	Standard Error	Effect Size	*p*-Value
Self-Assessed Career Progress						
Confidence in career knowledge[a]	**3.29**	**3.29**	**0.00**	**(0.07)**	**0.00**	**.503**
Access to career supports[b]	**1.72**	**1.72**	**+0.00**	**(0.03)**	**+0.01**	**.456**
Perceived career progress[c]	3.38	3.33	+0.05	(0.08)	+0.08	.497
Psychological Well-Being						
Grit[d]	3.09	3.07	+0.03	(0.06)	+0.05	.669
Core self-evaluation[e]	3.29	3.17	+0.12**	(0.06)	+0.23**	.049
Index of life challenges[f]	1.62	1.70	−0.09	(0.06)	−0.16	.183
Sample size	165	161				

Source: PACE three-year follow-up survey.

Note: Secondary outcomes are bolded and statistical significance is based on one-tailed tests; exploratory outcomes are not bolded and statistical significance is based on two-tailed tests. "Effect Size" represents impacts as a fraction of the pooled standard deviation across the treatment and control groups. See Appendix C in the appendix volume for a description of outcome measures.

[a] Seven-item scale measuring self-assessed career knowledge; response categories range from 1=strongly disagree to 4=strongly agree.

[b] Six-item scale measuring self-assessed access to career supports; response categories range from 1=no to 2=yes.

[c] Three-item scale on whether reaching long-range education goals and employment goals and whether on career path; response categories range from 1=strongly disagree to 4=strongly agree.

[d] Eight-item scale measuring self-assessed persistence and determination; response categories range from 1=strongly disagree to 4=strongly agree.

[e] Twelve-item scale measuring self-assessed confidence in one's abilities, self-esteem, and control; response categories range from 1=strongly disagree to 4=strongly agree.

[f] Five-item scale of situations that could interfere with school, work, job search, or family responsibilities; response categories range from 1=very often to 5=never, but were reverse coded to agree with the coding system used at baseline, so higher values indicate more frequent interference.

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

We examined several measures of self-assessed psychological well-being. Both treatment and control group members reported generally high levels of psychological well-being and low levels of challenges. PCPP produced an impact on core self-evaluation of 0.12 points on a four-point scale, for an effect size of 0.23. This is a modest impact, suggesting that the program led to an improvement in treatment group members' confidence in their own abilities, self-esteem, and control.

5.3 Impact on Family Structure

This section explores impacts on family structure. Because participation in training is costly in time and other resources, we might expect PCPP to affect its participants' decisions to form families or have children.

- ***PCPP reduced the number of participants living with a spouse.***

We observe that treatment group members were 9 percentage points less likely than the control group to be living with a spouse (50 percent of the treatment group, compared to 59 percent of the control group). (See Exhibit 5-3.) There are also impacts on several composite living arrangement outcomes: compared to the control group, treatment group members were 8 percentage points more likely to be living with children but no spouse or partner, and 12 percentage points less likely to be living with both children and a spouse/partner. One possible

explanation for this result is that the treatment group was enrolled in college at a higher rate than the control group, which may have left them with less time for romantic relationships.

- ***There was no detectable impact on child bearing or the presence of children.***

Among women (who make up 84 percent of the sample), there was no detectable impact on child bearing or pregnancy since random assignment. For the full sample, there was no impact on the share living with children or the number of children living in the household

Exhibit 5-3: Impacts on Family Structure

Outcome	Treatment Group	Control Group	Impact (Difference)	Standard Error	Relative Impact	*p*-Value
Living Arrangements						
Living with parents	22.0	19.4	+2.5	(4.6)	12.9%	.587
Living with spouse	49.9	59.4	−9.5*	(5.6)	−16.0%	.094
Family Structure						
Not living with spouse/partner or children	28.5	26.6	+1.8	(5.1)	6.8%	.719
Not living with spouse/partner, living with children	21.6	14.0	+7.6*	(4.3)	54.3%	.074
Living with spouse/partner, not living with children	22.0	19.5	+2.5	(4.7)	12.8%	.599
Living with spouse/partner and children	27.9	39.8	−11.9**	(5.3)	−29.9%	.024
Presence of Children						
Had child since random assignment or currently pregnant (females only)[a]	23.5	24.2	−0.7	(5.2)	−2.9%	.900
Number of children living with respondent						
No children	50.5	46.2	+4.3	(5.5)	9.3%	.438
1 child	17.8	20.9	−3.1	(4.9)	−14.8%	.529
2 children	17.5	21.1	−3.6	(4.4)	−17.1%	.412
3+ children	14.3	11.9	+2.4	(3.7)	20.2%	.523
Sample size	165	161				

Note: Secondary outcomes are bolded and statistical significance is based on one-tailed tests; exploratory outcomes are not bolded and statistical significance is based on two-tailed tests. "Relative Impact" represents impacts as a fraction of the corresponding control group mean (i.e., 100 × [impact/control group mean]). "Children" refers to children age 17 or younger, living with respondent at least half the time, for whom the respondent or spouse/partner is the legal guardian.

[a] Sample in this row includes female respondents only, 143 treatment and 131 control.

Statistical significance levels based on differences between research groups: *** 1 percent level; ** 5 percent level; * 10 percent level.

6. Discussion and Conclusions

Madison College designed the Patient Care Pathway Program to prepare students for enrollment in college-level diploma and degree programs and to reduce the time needed to earn these credentials. To accomplish this, the program provided contextualized basic skills instruction and enhanced academic advising to students whose test scores were too low to be admitted directly to a college-level program.

The original intent of the program was to quickly prepare students for admission to one- and two-year healthcare diploma and degree programs, with the expectation that students would be able to earn such credentials within three years. However, as discussed in Chapter 3, the actual timeline appears to be substantially longer than this expectation, due to a combination of admissions delays, long waitlists for healthcare programs, and a prevalence of part-time rather than full-time enrollment.

As of three to four years after random assignment, there were no detectable impacts of PCPP on credential attainment. The treatment group was no more likely than the control group to earn college credentials or professional licenses. Similarly, PCPP did not have a detectable impact on earnings, and it had limited impact on other measures of job quality or well-being—which is unsurprising, given the lack of credential impacts.

In this concluding chapter, we first put the findings in the context of recent evaluation findings of similar programs. Next, we offer possible explanations for the impact findings, and then close with questions for future research.

6.1 Findings in the Context of Recent Research

To provide some context for PCPP's three-year impact findings, we briefly explore the literature on bridge programs (these programs are sometimes referred to as "developmental education" programs in the literature). The existing literature typically focuses on education impacts, and often for follow-up periods shorter than three years, which is an important distinction from the analyses presented in this report.

Although bridge programs offer a promising approach in preparing students for college programs, a 2011 research review found limited evidence from rigorous evaluations regarding their effects (Zachry-Rutschow and Schneider 2011). Since that time, several additional evaluations have been conducted, including rigorous experimental studies.

Several evaluations show limited impacts on college achievement. One example is a 24-week bridge program called New Visions, at Riverside Community College (RCC) in California. The RCC bridge program offered contextualized basic skills courses in math, English, and reading, as well as occupational skills courses in office-related computer software. Compared to a randomly assigned control group, the treatment group members were slightly more likely to enroll in courses at RCC, but outside the New Visions program; and they were no more likely to accumulate regular college credits (Fein and Beecroft 2006).

Several evaluations have assessed the impacts of developmental education delivered in various contexts. An experimental evaluation of a summer bridge program in Texas showed no effects on subsequent earning of credits (Barnett et al. 2012). However, unlike PCPP, this program had no credit-bearing courses and was not contextualized to a particular occupational area. Another evaluation focused on learning communities, in which small cohorts of students are placed together in the same courses. That evaluation at six community colleges—five of which focused on developmental education—found modest impacts on credits earned but no impacts on college persistence (Visher et al. 2012), which is broadly consistent with the PCPP education results.

Other programs show more promising results. A notable example is the Integrated Basic Education and Skills Training (I-BEST) program in Washington State. I-BEST incorporates occupational training and contextualized basic skills into college-level occupational programs and allows entry to students with lower skills levels than are generally required for college enrollment. I-BEST is another of the nine programs participating in the PACE project. The PACE short-term impact report on I-BEST found that the program had positive effects on occupational credits and college credentials earned within 24 months of random assignment (Glosser, Martinson, Cho, and Gardiner 2018). Other non-experimental studies of I-BEST have shown similar effects (Zeidenberg et al. 2010). However, I-BEST includes elements that are not part of PCPP, notably team teaching by basic skills and occupational training instructors in credit-bearing courses that lead to an occupational credential; “fill-the-gap” funding for expenses not met by financial aid; and dedicated advisors who provide assistance with career planning as well as academic issues.

Another example is an intensive bridge program offered by the City University of New York (CUNY) called the CUNY Start program. CUNY Start offers a semester of instruction in developmental math, reading, and writing, combined with advising services and financial assistance. Early findings from an experimental study suggest that students in the treatment group made substantially more progress in developmental education than the control group, and they went on to enroll at CUNY colleges at a higher rate than control group students (Scrivener et al. 2018). Like PCPP, CUNY Start used a cohort model (in which students participate as a group) and was designed to reduce the time required to gain admission to college academic programs. Unlike PCPP, which did not offer tuition assistance, CUNY Start offered substantial financial assistance; students were required to pay only a $75 fee for the entire semester.

In summary, it is difficult to say whether the PCPP findings are in line with other research on bridge programs, as that literature is somewhat mixed and most of the available evidence assesses only short-term impacts on educational outcomes. In general, earlier studies found little evidence of impacts on credits or credentials. More recent evaluations—including I-BEST and CUNY Start—show some significant impacts on education and training outcomes, although their program models and services differ somewhat from those of PCPP.

6.2 Possible Explanations for Impact Findings

This section explores possible explanations for PCPP's three-year impact findings. We focus this discussion on educational impacts, because the lack of impact on credentials is likely driving the lack of impact on earnings and other measures of well-being.

- ***Students needed more time than expected to complete healthcare credentials due to delays in healthcare program admissions and part-time enrollment.***

The PCPP theory of change predicted that students would be able to obtain healthcare credentials by three years after program enrollment. However, as described in Chapter 3, participants faced delays in moving into healthcare programs upon completion of a PCA. Application windows to academic programs were infrequent, with lags of up to a year between application and the start of the program. Once admitted, students often faced long waitlists before they could enroll in core courses in their healthcare programs, which further slowed their progress toward diploma or degree completion. In addition, the adoption of the TEAS assessment as an admissions requirement for the two-year healthcare degree programs partway through the study's random assignment period may have been a barrier to program admission. Further slowing progression toward healthcare credentials was that most students were enrolled in school only part-time.

The impact findings on admission to academic programs suggest that some PCPP students managed to overcome these delays by the third and fourth years after random assignment; however, these admissions occurred too late in the follow-up period to produce impacts on college credentials thus far.

- ***The treatment-control contrast was weaker than expected.***

As documented in the short-term report, the advising component of the program was not as intensive as expected. Fewer than half of treatment group students reported receiving the expected three advising sessions. Moreover, control group members received more guidance on course selection and registration than planned, further reducing study contrast. The contrast between research groups may have been too small to generate impacts of a size that the study was powered to detect.

- ***PCPP did not appear to significantly reduce the need for its participants to work during training or take on student loans, which may have limited their ability to accumulate sufficient credits to earn long-term credentials during the follow-up period.***

Several of the impact findings suggest that PCPP did not significantly reduce the need for its participants to work during training or take on student loans—a goal that was not part of the program design—which may have limited their ability to quickly accumulate credits and earn credentials by three years.

First, we note that more than 75 percent of students were employed in each quarter after random assignment, suggesting that students were working to support themselves while going to school part-time (Chapter 4). Despite these high levels of employment, students still faced

relatively high levels of student debt. Both the treatment and control groups had accumulated more than $8,000 of student debt after three years, equal to nearly two quarters' worth of earnings (Chapter 5). If students were hesitant to take on more debt, this level of debt could have been a barrier to pursuing the additional courses necessary to complete their programs.

Second, more than half of PCPP participants reported experiencing at least one sign of financial distress—such as a utility disconnection, delayed health/dental care, hunger, or trouble paying bills or making ends meet—further demonstrating that many students faced financial barriers.

To emphasize, there were no detectable impacts on any of these outcomes, so this is not to say that PCPP *led* to financial distress. However, these results suggest that the program did not substantially lessen the need for its participants to work during training or take on student loans, which may have inhibited their ability to accumulate credits and earn more credentials than did control group students. As described in Section 6.1, two of the more successful developmental education programs—I-BEST and CUNY Start—provided financial assistance to participants, whereas PCPP did not. Such support likely reduced financial hardship and enabled I-BEST and CUNY Start participants to more successfully take advantage of the developmental education offered by those programs.

6.3 Questions for Future Research

As part of the PACE project, the research team plans to produce a third report that will examine impacts on credential attainment and labor market outcomes six years after random assignment. That report of the Career Pathways Long-term Outcomes Study will be based on analysis of administrative data from NSC and NDNH. Given the three-year findings, there are several questions of particular interest for this future research:

- ***Are there detectable impacts on longer-term college credentials by six years?***

Given that substantial impacts on admission to academic programs did not occur until the third and fourth years after random assignment, it is possible that credential impacts may yet arise with a longer follow-up period. Six years should provide sufficient time for any impacts on credential attainment to be fully realized.

- ***If there are impacts on college credentials, are there also impacts on labor market outcomes?***

The six-year report will examine impacts on quarterly earnings and employment. The PCPP theory of change predicts that impacts on credentials will in turn lead to improved labor market outcomes. Detectable impacts on earnings after six years would only be expected if the program produced impacts on college credentials.

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