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WHICH PROGRAM CHARACTERISTICS ARE LINKED TO PROGRAM IMPACTS?

Lessons from the HPOG 1.0 Evaluation

Evaluation and System Design for Career Pathways Programs:
2nd Generation of HPOG (HPOG Next Gen)

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HPOG
Health Profession Opportunity Grants
OFFICE OF FAMILY ASSISTANCE

Which Program Characteristics Are Linked to Program Impacts? Lessons from the HPOG 1.0 Evaluation

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Douglas Walton, Eleanor L. Harvill, and Laura R. Peck

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Hilary Bruck, Project Officer
Office of Planning, Research, and Evaluation
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Project Director: Julie Strawn
Abt Associates Inc.
6130 Executive Boulevard
Rockville, MD 20852

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Overview

In 2010, the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services awarded the first round of five-year grants from the Health Profession Opportunity Grants (HPOG 1.0) Program to 32 organizations in 23 states; five were tribal organizations. The purpose of the HPOG Program is to provide education and training to Temporary Assistance for Needy Families (TANF) recipients and other low-income individuals for occupations in the healthcare field that pay well and are expected to either experience labor shortages or be in high demand. HPOG 1.0 grantees designed and implemented programs to provide eligible participants with education, occupational training, support, and employment services to help them train for and find jobs in a variety of healthcare professions.

The impact evaluation of HPOG 1.0 randomized 13,717 individuals into treatment or control groups across 42 HPOG programs operated by 23 non-tribal grantees. Members of the treatment group could access the HPOG Program; members of the control group could not. The difference in outcomes between the treatment and control groups is HPOG's impact. Each program developed and implemented its own HPOG model based on ACF guidelines and its own decisions about which program features and supports would be most effective to help its participants complete training.

This paper uses variation in program characteristics—including program components, implementation features, local context, and participant traits—to explore which characteristics are associated with the size of HPOG's short-term impact on participant outcomes. We examine the relationship between program characteristics and impacts on four key HPOG outcomes—educational progress, employment, employment in healthcare, and earnings.

Many stakeholders—including practitioners, policymakers, funders, and researchers—may be interested in which combination of program components, implementation strategies, participant characteristics, and local context make important contributions to a program's impact on individuals. Insights from this kind of research can help inform future program design and implementation.

Primary Research Questions

The HPOG 1.0 *Program Implementation and Short-Term Impacts* Report ("*Impacts Report*"; Peck et al., 2018) shows that programs varied substantially both in their estimated short-term impacts and in how they were designed and implemented, a point that motivates this paper. This paper seeks to answer the following research questions:

- What characteristics of HPOG programs associate with any impacts on four key outcomes?
- How do program characteristics associate with impacts for various outcomes?

Purpose

The purpose of this paper is to identify which HPOG program characteristics associate with short-term impact magnitude. It aims to contribute to a better understanding of the HPOG Program by assessing how variation in program impacts associates with variation in various program characteristics, including design, implementation and context.

From a methodological perspective, this work also provides a model for how to analyze cross-site data from multi-site experiments. It is often not practical, feasible, or even desirable to randomize all the program characteristics that one might want to learn about. Controlling for as many characteristics as possible enables researchers to isolate at least some individual program characteristics that might enhance or suppress overall impact. These observations can prove important for program practice and also generate causal hypotheses that can be tested in future evaluations.

Key Findings and Highlights

A variety of program characteristics associate with the size of short-term impacts (measured at 15 to 18 months after program entry). The set of characteristics that contributes to impacts varies by outcome:

- For education outcomes, HPOG programs that offer greater access to tuition and financial assistance, childcare, transportation, employment supports, and emergency assistance produced larger impacts on educational progress.
- For employment outcomes, no HPOG program components or implementation features are associated with larger impacts on overall employment in the short term. However, access to employment supports and social and other services is associated with larger impacts on employment in the healthcare sector.
- The analysis also finds that access to employment supports is associated with a larger impact on earnings.

Although many participants had completed their training by the short-term follow-up point, about 20 percent were still enrolled in training. Future research will explore impacts at three years and six years after program enrollment, as part of the ACF-funded Career Pathways Intermediate Outcomes and Long-term Outcomes research projects.

This analysis does not allow us to make *causal* claims about the relationship between program characteristics and impacts. Instead, the analysis *associates* variation in impacts with variation in program characteristics, providing suggestive evidence of these relationships.

The paper also considers descriptively how program characteristics vary across the 42 HPOG programs examined, and identifies three “typologies”—“service-rich” programs, “education-focused” programs, and “employment-focused” programs.

Methods

To relate program characteristics to impact size, we use a multi-level model that analyzes variation across programs to identify which program characteristics influence program impacts. We consider a wide set of measures of program characteristics—including program components, implementation features, participant composition, and local context measures—and use an empirical approach to identify the characteristics most associated with impact magnitude. We conduct the empirical selection separately for each outcome, because the set of characteristics associated with impacts on one outcome might not necessarily be the same characteristics associated with impacts on another outcome.

We conducted a related analysis in the *Impacts Report* using a different process for choosing which characteristics to analyze: certain program characteristic measures were included based on their theorized relationship with impact magnitude, and other measures were selected empirically. Further, the *Impacts Report* selected program components based on their association with the impact only on educational progress, and then used the same characteristics to estimate models for all other outcomes. That analysis found that access to each of tuition assistance and other financial services, childcare, and transportation is associated with larger impacts on educational progress. Further, that analysis generally did not find evidence that the program components and implementation features of interest were associated with impact on employment-related outcomes, primarily because that analysis considered only those variables that associated with educational progress. By using a fully empirical approach and enabling model selection to vary by outcome, this paper provides a more flexible analysis of the impact of program characteristics on impact magnitude than was the case in the *Impacts Report*.

To classify programs into groups with similar characteristics, we performed a cluster analysis. This analysis identifies three main types of programs among the 42 programs analyzed, partitioning the sample according to the programs' components and implementation features, the two types of characteristics that are most under program managers' control.

Executive Summary

Recent years have seen increased interest in not just measuring whether a program works, but in learning how a program works (e.g., Solmeyer and Constance, 2015). Exploring what is inside the so-called "black box" of program implementation can help reveal the mechanisms through which program effects occur. Many workforce training programs encompass multiple components and implement them in a variety of ways to achieve their goals. As a multi-site program, the Health Profession Opportunity Grants (HPOG) Program—first funded in 2010 by the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services—provides an opportunity to examine how varied program characteristics associate with program impacts. This paper analyzes data from the HPOG Impact Study to examine those connections.

The impact study of the first round of HPOG funding (known as HPOG 1.0) used an experimental design: HPOG program applicants were randomly assigned either to a treatment group that could access the HPOG program, or to a control group that could not. The study's *Program Implementation and Short-Term Impacts Report* (Peck et al., 2018) revealed that HPOG increased enrollment in occupational training and receipt of academic, career, and other support services. These differences led to the treatment group demonstrating more favorable outcomes than the control group in terms of educational progress, employment in the healthcare sector, and earnings.

Each HPOG program developed and implemented its own model based on ACF guidelines and its own decisions about which program features and supports would be most effective to help its participants complete training and find healthcare employment. This paper uses variation in program characteristics to explore which characteristics are associated with the size of HPOG's impact on participant outcomes.

This paper addresses the following questions:

- What characteristics of HPOG programs associate with any impacts on four key outcomes?
- What characteristics associate with impacts for specific outcomes?

Data and Methodology

The sample for this paper comes from the HPOG 1.0 Impact Study, which randomized 13,717 individuals into treatment or control groups across 42 HPOG programs operated by 23 non-tribal grantees. The study uses a baseline survey, a short-term follow-up survey initiated 15 months after random assignment, and administrative data from the National Directory of New Hires (NDNH) to measure participant characteristics and outcomes. To define program characteristics, the study draws on data from implementation research, including a grantee survey and a survey of program staff and managers, as well as data from the Bureau of Labor Statistics and the Census Bureau.

This paper uses variation in program characteristics—including program components, implementation features, local context, and participant traits—to explore which

characteristics are associated with the size of HPOG's impact on participant outcomes. We examine the relationship between program characteristics and impacts on four key HPOG outcomes—educational progress, employment, employment in healthcare, and earnings.

We use a multi-level regression model, which is a statistical model that allows us to explore how variation in program characteristics affects experimentally estimated impacts on individuals. The model uses program characteristics to predict the direction and magnitude of impacts. Variation in these characteristics enables us to identify their contribution to HPOG's overall impacts. Given that there are 42 programs, we can include only a limited number of measures in the analysis. The analysis uses an empirical approach to identify which program characteristics have the strongest statistical association with impact magnitude, and then we include those characteristics in the analysis.

A related analysis conducted in the *Impacts Report* used a different process for choosing which characteristics to analyze: certain program characteristic measures were included based on their theorized relationship with impact magnitude, and other measures were selected empirically. Further, the *Impacts Report* selected program components based on their association with the impact only on educational progress, and then used the same characteristics to estimate models for all other outcomes. That analysis found that access to each of tuition assistance and other financial services, childcare, and transportation was associated with larger impacts on educational progress. Further, that analysis generally did not find evidence that the program components and implementation features of interest were associated with impact on employment-related outcomes, because that analysis considered only those variables that associated with educational progress. By using a fully empirical approach and enabling model selection to vary by outcome, this paper provides a more flexible analysis of the impact of program characteristics on impact magnitude than was the case in the *Impacts Report*.

Findings

We find that a variety of program characteristics are associated with the size of short-term impacts (measured at 15 to 18 months after random assignment). The set of characteristics that contribute to impact magnitude varies by outcome:

- For education outcomes, HPOG programs that offer greater access to tuition and financial assistance, childcare, transportation, employment supports, and emergency assistance produced larger impacts on educational progress.
- For employment outcomes, no HPOG program components or implementation features are associated with larger impacts on overall employment in the short term. However, access to employment supports and social and other services is associated with larger impacts on employment in the healthcare sector.
- The analysis also finds that access to employment supports is associated with a larger impact on earnings.

This analysis does not allow us to make *causal* claims about the relationships between program characteristics and impacts. Instead, the analysis *associates* variation in impacts with variation in program characteristics, providing suggestive evidence of these

relationships, which may be beneficial to program practice as well as generate causal hypotheses that can be tested in future research.

The paper also analyzes how program characteristics vary across the 42 HPOG programs examined. The rationale for undertaking this cluster analysis is to identify whether there were certain groups of services that might enhance (or suppress) program impacts. We find that programs can be grouped together into three "typologies"—"service-rich" programs, "education-focused" programs, and "employment-focused" programs. This analysis was not able to identify certain bundles of services that frequently appear together, suggesting that there is no specific group of program characteristics that might generate more favorable program impacts.

Conclusion

This paper's results provide evidence that various program characteristics may be important factors in generating favorable short-term impacts for HPOG participants. The particular characteristics associated with impacts vary by outcome; those that promote one outcome are not necessarily associated with promoting others. These results should be interpreted as suggestive and not causal, in part because the program characteristics measures that we use may capture other aspects of programs that are not included in the analysis.

In addition to having implications for program operations, this analysis also has implications for future research. The use of multi-level modeling and an empirical variable selection process could inform future work that explores how variation in experimental impacts is explained by various program characteristics measures.

Further, the paper discusses challenges and tradeoffs between two different measures of program characteristics: those that are measured at the program level, and those that measure individual-level treatment-control differences. Both measures hold value in answering distinct questions. Program characteristics measures reflect the availability of services, and therefore are relevant to administrators' decisions about how to configure their programs. In comparison, participant-reported, treatment-control contrast measures reflect actual receipt of services, and are relevant to how study participants' experiences are associated with program impacts. We encourage future research (1) to be explicit about which type of measure it is using (program characteristics or treatment-control differences); and (2) to explore empirically the possible differences in results based on differences in the type of measure.

1. Introduction

Many workforce training programs encompass multiple components and implement them in a variety of ways to achieve their goals. The strongest evaluation methods usually evaluate the impact of a program as a whole. Many stakeholders—including practitioners, policymakers, funders, and researchers—may also be interested in which combination of components and service delivery strategies make important contributions to program impact. Recent years have seen increased interest in not just measuring whether a program works, but in learning how a program works (e.g., Solmeyer and Constance, 2015). Exploring what is inside the so-called "black box" of a program can help reveal the mechanisms through which program effects occur.

Within the job training arena, stakeholders want to learn more about which program characteristics might be linked to program effectiveness. Career pathways initiatives, for example, are multi-faceted by design: they combine varied support services with education and training to help participants advance through successively higher levels of training and obtain employment. While the aggregate impact of these initiatives is important to learn about, it is also important to learn how best to design them, including which program components and which implementation strategies, if any, are essential contributors to program impacts. As a multi-site program, the Health Profession Opportunity Grants (HPOG) Program provides an opportunity to examine how varied program characteristics associate with program impacts.

In 2010, the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services awarded the first round of five-year grants from the Health Profession Opportunity Grants (HPOG) Program (HPOG 1.0) to 32 organizations in 23 states; five were tribal organizations. A second round of HPOG grants was awarded in 2015. The purpose of the HPOG Program is to provide education and training to Temporary Assistance for Needy Families (TANF) recipients and other low-income individuals for occupations in the healthcare field that pay well and are expected to either experience labor shortages or be in high demand.[1] Both rounds of grants have included a diverse set of programs, each implementing its own version of sectoral and career pathways-based training aligned with ACF guidelines. Career pathways approaches to workforce development offer defined education and training steps between occupations in an industry sector, combined with support services, to enable individuals to enter and exit training within a pathway at various levels and to advance over time to higher skills, recognized credentials, and better jobs with higher pay.

The HPOG 1.0 grantees that are part of this analysis designed and implemented programs to provide eligible participants with occupational training to help them train for and find jobs in a variety of healthcare professions. They also offered a rich array of support services to

[1] HPOG was authorized by the Affordable Care Act (ACA), Public Law 111-148, 124 Stat. 119, March 23, 2010, sect. 5507(a), "Demonstration Projects to Provide Low-Income Individuals with Opportunities for Education, Training, and Career Advancement to Address Health Professions Workforce Needs," adding sect. 2008(a) to the Social Security Act, 42 U.S.C. 1397g(a), and extended by the Bipartisan Budget Act of 2018, Pub. L. 115-123, through fiscal year 2019.

meet participants' varied needs, with the aim of supporting program enrollment and completion, and subsequent labor market success.

Main Impact Analysis

ACF supports a portfolio of research and evaluation around the HPOG Program. This research portfolio includes the HPOG 1.0 Impact Study, which used an experimental design to measure impact: HPOG program applicants were randomly assigned either to a treatment group that could access the HPOG program, or to a control group that could not. The difference in outcomes between the treatment and control groups is HPOG's impact.

The evaluation included 23 of the 27 non-tribal HPOG 1.0 grantees. Three of the 23 grantees were also part of another evaluation in ACF's career pathways research portfolio, the Pathways for Advancing Careers and Education (PACE) Study. The HPOG grantees operated 42 distinct programs and enrolled 13,717 individuals into the HPOG 1.0 Impact Study.

The HPOG 1.0 Impact Study's *Program Implementation and Short-Term Impacts Report* ("*Impacts Report*"; Peck et al., 2018) revealed that HPOG increased occupational training and receipt of academic, career, and other support services. These differences led to the treatment group demonstrating more favorable outcomes than the control group in terms of educational progress, employment in the healthcare sector, and earnings. The *Impacts Report* also indicates that programs varied substantially in both their design and implementation and in their estimated short-term impacts.

The short-term outcomes in the *Impacts Report* were measured at about 15 to 18 months after program entry. Although many participants had completed their training by this time, about 20 percent were still enrolled in training. Future research will explore impacts after three years and after six years, as part of the ACF-funded Career Pathways Intermediate Outcomes and Long-term Outcomes (CPIO, CPLO) research projects.

Additional Analysis

The *Impacts Report* examined the question of what characteristics of HPOG programs are associated with impacts (see Peck et al., 2018, Chapter 7); however, we believe that additional analysis is warranted. In brief, the *Impacts Report* followed a pre-specified approach to analyzing program characteristics that associate with program impacts. Certain program characteristics measures were included in the analysis based on their theorized relationship with impact magnitude, and other measures were selected empirically. That approach ensured that the model included policy-relevant program characteristics, and provided evidence on the extent to which the program characteristics of interest were associated with impact magnitude. However, that approach limited the set of program characteristics that were considered. Moreover, it used the same set of characteristics for each outcome, which limited the ability to detect whether different characteristics might be related to impacts on different outcomes. The analysis in the *Impacts Report* found that access to each of tuition assistance and other financial services, childcare, and transportation is associated with larger impacts on educational progress. Further, that analysis generally did not find evidence that the program components and implementation

features of interest were associated with impact on employment-related outcomes, because that analysis considered only those variables that associated with educational progress. In this paper, we consider a broader set of program characteristics and examine whether different characteristics are associated with impacts on different outcomes.

The current paper examines the following questions:

- What characteristics of HPOG programs associate with any impacts on four key outcomes?
- What characteristics associate with impacts for specific outcomes?

To associate program characteristics with variation in impacts, we use a multi-level regression model. This statistical model allows us to explore how variation in program characteristics affects experimentally estimated impacts on individuals. In the model, we use program characteristics to predict the size of impacts (or "impact magnitude"). Variation in these characteristics enables us to identify their contribution to impact magnitude. The challenge is that we have only 42 programs and more than 42 distinct program characteristics, including measures of what the programs offer, how they implement those offerings, whom they serve, and their local contexts. We can include only a limited number of measures in the analysis. We want to be able to isolate the impacts of certain program components and implementation features; but we also need to be able to control for variation in, for example, local labor market conditions and the kinds of people that the programs target and serve. We therefore use a statistical approach that identifies which measures should be included in the analysis.

The paper also analyzes how program characteristics vary across the 42 HPOG programs. We perform a cluster analysis to classify programs into groups with similar characteristics, partitioning the sample according to the programs' components and implementation features, the two types of characteristics that are most under program managers' control. This analysis can help identify whether there were certain groups of services that might enhance (or suppress) program impacts.

The analysis in this report does not allow us to make *causal* claims about the relationships between program characteristics and impacts. Instead, the analysis *associates* variation in impacts with variation in program characteristics. It is possible that the selected program characteristics did indeed lead to the observed variation in impacts; however, it is also possible that the relationship between the characteristic and impact is due to omitted variables that are not measured and included in the analysis. For example, suppose programs with more-skilled leaders have larger impacts, and the programs with more-skilled leaders also happen to offer peer support opportunities to students. The offer of peer support may correlate well with impact magnitude, even though peer support itself does not affect impacts directly. For this reason, readers should view the results presented in this paper as *suggestive* evidence about a relationship between program characteristics and impacts and as hypotheses that merit further investigation.

About This Report

This paper proceeds as follows: First, a Methodology section describes the data and measures we used for this analysis, along with the analytic procedures. Next, we describe the HPOG 1.0 programs, including the variation in their goals, design, and implementation, as characterized by the measures we developed for analyzing the programs. We then report results of the analysis that associates program characteristics with overall program impacts. We then present results from the cluster analysis, describing the three "typologies" of programs with similar characteristics. In concluding we discuss implications for program design and implementation and for future evaluation research.

2. Methodology

Each of the HPOG grantees in the HPOG 1.0 Impact Study developed and implemented its own program(s) based on ACF guidelines and its own decisions about which program components and supports would be most effective in achieving its objectives. Each program offered a unique set of services, training courses, and personnel.[2] The programs operated within unique economic conditions and targeted and served distinct populations.

This section describes how we use this naturally occurring variation in service provision and delivery, local conditions, and types of participants to explore which of these characteristics associate with impact magnitude. We begin by describing the sample and available data. We then define the measures used, including both program characteristics and outcomes measures. More detail on the measures is provided in Appendix A. The analytic model for assessing the association between characteristics and impacts is presented in Appendix B.

Sample and Data

The sample for this paper comes from the HPOG 1.0 Impact Study (Peck et al., 2018). The 23 grantees participating in the study operated 42 programs and enrolled participants at 92 locations, which we refer to as "administrative divisions."

Random assignment of participants into the HPOG 1.0 Impact Study began between March and September 2013 and ended by November 2014. The final analysis sample of 13,717 participants included 5,044 control group members and 8,673 treatment group members.

This paper uses data collected from the following sources:

- HPOG 1.0 Impact Study participant survey collected at baseline through the Performance Reporting System (PRS)[3]
- PACE baseline information form for the programs evaluated in the PACE Study
- HPOG grantee survey, collected by the HPOG National Implementation Evaluation (NIE)[4]

HPOG Units

HPOG grantee – the funded unit of the national HPOG Program. The Impact Study included 23 non-tribal grantees.

HPOG program – a unique set of services, training courses, and personnel. Many grantees fund and operate one program; some fund multiple programs. The study included 42 programs.

HPOG administrative division – a set of program intake locations with a dedicated case management and/or counseling staff that advises participants, connects them to education and training services, and provides participants with support services or refers them to these services. Programs may have one or more such divisions. The study included 92 divisions.

[2] The HPOG 1.0 Impact Study used this definition to differentiate among programs operated by the same grantee.
[3] The PRS was the management information system used by all HPOG 1.0 programs to collect administrative data.
[4] The HPOG National Implementation Evaluation assessed the program implementation, systems change, and participant outcomes of the 27 non-tribal HPOG 1.0 programs.

- HPOG management/staff survey, collected by the NIE
- HPOG and PACE study participant follow-up surveys, initiated 15 months after randomization [5]
- Employment and earnings data from the National Directory of New Hires (NDNH)

The NDNH administrative data are available for the full sample. The PACE and HPOG participant follow-up surveys, which together had a 76 percent response rate, cover 10,450 members of the study sample, including 6,801 treatment group members and 3,649 control group members.

In addition to the administrative and survey data sources that describe individuals and programs in the sample, we draw on the following administrative (federal) data sources for information about the context in which these programs operate:

- American Community Survey (ACS) conducted by the Census Bureau
- Bureau of Labor Statistics (BLS) Unemployment Statistics for States and Metropolitan Statistical Areas (MSAs)
- BLS Occupational and Employment Statistics for MSAs

Measures

This section details the measures we use to capture both program characteristics and outcomes.

Program Characteristics Measures

HPOG programs vary across multiple dimensions. We distinguish among the following types of program characteristics:

- ***Program components*** describe the services available to HPOG participants. These data are measured at the program level based on responses to the NIE grantee survey.
- ***Implementation features*** describe how programs delivered services to HPOG participants. These data are measured at the administrative division level based on responses to the NIE management/staff survey.
- ***Local context variables*** measure the economic environment of a particular HPOG program. Local context measures are based on the MSA served by each program and are constructed from the ACS and BLS data sources.[6]

[5] Members of the study sample were first approached to complete the survey in the 15th month following their random assignment date; the median length of time for survey completion was 18 months, and the range was 13 to 27 months.

[6] MSAs are defined by the Office of Management and Budget and used by various federal statistical agencies—including the Census Bureau and Bureau of Labor Statistics—as geographic reporting areas. For programs that are located outside of a metropolitan area, we apply data from the corresponding nonmetropolitan area, which are also published by the federal statistical agencies.

- ***Participant composition measures*** are division-level aggregations of individual-level baseline characteristics.

The first two types of measures are the key channels through which a program seeks to improve participant outcomes. For this reason, we focus our discussion on program components and implementation features. Exhibit 1 lists the program components and implementation features that we hypothesize might be related to program impact.[7] The table lists the name of each measure, the data elements used to construct the measure, and the range of values observed in the data, the mean, and the standard deviation of the measure. Additional details on the construction of these measures are available in Appendix A.

As the details in Exhibit 1 make clear, these measures are indicators of the presence of certain program components or the presence of some type of implementation feature. Although we have aimed to be thoughtful about these measures, making the most of available data, the measures have limitations. For example, the measures ignore the intensity and quality of services. As sums of multiple items, the measures also weight items equally, which ignores the potential relative importance of certain items in contributing to programs' overall impacts. In other words, these measures may lack some nuance that might be helpful to better understand how these program characteristics associate with variation in program impacts. This is a challenge that research in this arena typically faces: it is limited by the quality of the data, and it is difficult and expensive to collect and analyze nuanced measures of programs across a wide variety of locations.

Exhibit 1: Program Components and Implementation Features

Measure	Description	Range	
Program Components		Min	Max
Presence of career pathways principles	Number of career pathways framework components implemented by program	0	8
Average caseload for case managers [a]	Average estimated caseload for full-time case managers	0	233
Services case managers deliver [b]	Number of services case managers/counselors deliver directly	0	7
Access to social and other services	Measure of access to social and other services—such as mentoring, substance abuse services, temporary housing assistance, etc.	0	21
Tuition and other financial assistance	Measure of access to tuition and other financial assistance	0	2
Childcare and transportation	Measures of access to public transportation, transportation assistance, or childcare assistance	2	7
Co-location of services	Number of services physically co-located with the healthcare training	0	6
Employment supports	Measure of access to employment support services	0	30
Non-cash incentives	Indicator of whether the program offers non-cash incentives to participants	0	1
Facilitated peer support	Measure of access to facilitated peer support	0	3
Emergency assistance	Number of emergency services that the program provides to participants	0	7

[7] Harvill et al. (2015) first listed these program components and implementation features and discussed the motivation for these hypotheses.

Measure	Description	Range	
Implementation Features		Min	Max
Education is primary focus of program [c]	The percentage of management/staff that indicate education is the primary goal of the program	0	57
Employment is primary focus of program [d]	The percentage of management/staff that indicate employment is the primary goal of the program	0	100
Share of staff with at least five years of experience [e]	The percentage of staff that indicate they have greater than five years of experience (range 0 to 1)	0	67
Staff perception of autonomy [f]	Measure of the degree to which staff perceive autonomy	3	5

Sources: HPOG grantee survey (n=42); HPOG management/staff survey (n=320).
[a] Average caseload is zero for programs that reported having case managers, but did not report an average caseload and did not report any program enrollment prior to the date of the grantee survey.
[b] This measure is set to zero for programs that did not report having any case managers.
[c] This measure has a theoretical range of 0-100, but the maximum observed value is 57. The measure is missing for four divisions due to non-response to the management/staff survey.
[d] This measure is missing for four divisions due to non-response to the management/staff survey.
[e] This measure has a theoretical range of 0-100, but the maximum observed value is 67. The measure is missing for two divisions due to non-response to the management/staff survey.
[f] This measure has a theoretical range of 0-5, but the minimum observed value is 3. The measure is missing for four divisions due to non-response to the management/staff survey.

In addition to the program components and implementation features detailed in Exhibit 1, we also define measures of local context and participant composition. *Local context* refers to features of the local population and labor market that might affect participants' employment prospects. For instance, participants in an HPOG program operating in an area with low unemployment and high demand for healthcare workers may be more likely to find a healthcare job after completing their program. *Participant composition* refers to aggregate baseline characteristics of individuals enrolled in each HPOG program. The measures come from the HPOG and PACE baseline surveys and represent the composition of those individuals recruited into HPOG. If HPOG has different impacts for different populations, then the impact at each program might vary due to composition of participants at each program. Exhibit 2 presents details of the local context and participant composition measures.

Exhibit 2: Local Context and Participant Composition

Measure and Operationalization	Range	
Local Context [a]	Min	Max
Total population (millions)	0.2	19.9
Share of adult population age 25 and older with some college (%)	49.0	70.7
Share of households that received cash public assistance or SNAP in previous 12 months (%) [b]	7.0	16.9
Share of adult population age 25 and older enrolled in school (%)	2.5	4.7
Unemployment rate (%)	3.8	9.1
Median wage of healthcare support occupations ($, thousands)	20.2	33.9
Share of jobs that are in healthcare (%)	6.9	11.1
Participant Composition (at baseline)	Min	Max
Male (%)	0.0	29.7
Married (%)	8.2	47.5
Any dependent children (%)	39.0	90.2
Number of dependent children	0.7	2.0

Measure and Operationalization	Range	
Race/ethnicity - Hispanic of any race (%)	0.4	97.3
Race/ethnicity - non-Hispanic black (%)	0.0	84.7
Race/ethnicity - non-Hispanic white or other (%)	2.7	88.7
Average age (years)	27.3	39.6
Under age 25 (%)	14.4	55.2
Born outside U.S. (%)	0.0	51.9
Highest education - less than high school (%) [c]	0.0	52.3
Highest education - high school diploma or equivalent (%)	6.0	64.7
Highest education - some college (%)	8.7	56.4
Highest education - associate's degree or higher (%)	3.2	33.3
Postsecondary degree (%)	3.1	32.9
Occupational skills license (%)	0.0	51.2
Postsecondary degree or occupational skills license (%)	9.1	70.7
Ever attended adult basic education (%)	2.4	55.6
Ever attended ESL classes (%) [d]	0.0	27.6
Ever attended school success course (%)	2.4	55.6
Ever attended vocational, technical, or trade school (%)	14.1	56.0
Ever attended work success course (%)	3.1	29.9
Household income in past 12 months - $0 (%)	0.0	100.0
Household income in past 12 months - $1 to $9,999 (%)	0.0	100.0
Household income in past 12 months - $10,000 to $19,999 (%)	0.0	100.0
Household income in past 12 months - $20,000 to $29,999 (%)	0.0	100.0
Household income in past 12 months - $30,000 or more (%)	0.0	100.0
Received TANF in past month (%) [e]	0.0	41.0
Received WIC or SNAP in past month (%) [f]	24.4	100.0
Employed at enrollment (%)	13.5	63.5
Current weekly hours	13.4	31.5
Limited English (%)	0.0	11.1
Barriers to education or employment - childcare (%) [g]	6.8	30.4
Barriers to education or employment - transportation (%) [g]	7.4	35.1
Barriers to education or employment - illness or health condition (%) [g]	6.2	20.3
Barriers to education or employment - alcohol or drug use (%) [g]	0.0	2.7
Total number of barriers (sum of previous four)	0.2	0.8

Sources: HPOG grantee survey; HPOG management/staff survey; HPOG PRS; American Community Survey; Bureau of Labor Statistics.

[a] Local context measures are based on the geographic area served by each program. These areas (MSAs and nonmetropolitan areas) are defined by the Office of Management and Budget and used by various federal statistical agencies—including the Census Bureau and Bureau of Labor Statistics—as geographic reporting areas.

[b] SNAP is the Supplemental Nutrition Assistance Program.

[c] Baseline educational attainment is missing for one division.

[d] ESL stands for English as a Second Language.

[e] TANF is Temporary Assistance for Needy Families.

[f] WIC is the Women, Infants and Children supplemental nutrition program.

[g] Percentage reporting that the barrier interfered with school, work, job search, or family responsibilities "fairly often" or "very often."

As mentioned above, we are primarily interested in program components and implementation features because these are the key mechanisms programs use to improve participant outcomes.[8] We consider local context and participant composition measures primarily as control variables.

[8] Although the program can set eligibility requirements that will influence participant composition, the program has a greater degree of control over program components and implementation features.

In addition to understanding how each of the program characteristics varies, it is important to understand whether and how the program characteristics are associated with one another. The main reason for this is that program design and implementation arise in response to local conditions and the characteristics of program targets. To understand whether particular combinations of characteristics are especially common, we undertook a *cluster analysis* and report the results in the Findings section. Cluster analysis is data-driven and identifies groups of programs that are similar to one another and are dissimilar to programs in other clusters. The resulting grouping within three clusters suggests profiles of three main types of programs among the 42 programs we analyzed.

Outcome Measures

The HPOG 1.0 Impact Study defined a set of preferred outcomes to measure progress toward goals of high-quality, high-paying healthcare jobs, pre-specifying these measures before analyzing data (Harvill, Moulton, and Peck, 2015). In this paper, we use the following four measures, as defined by the HPOG 1.0 Impact Study:[9]

- ***Educational progress*** measures whether, at the time of the follow-up survey, the participant (1) had earned a professional, state, or industry certificate, license, or credential; (2) had completed a degree; (3) was currently taking classes for college credit; or (4) was currently enrolled in non-credit training.
- ***Employment*** measures whether the participant was employed in the fifth quarter after the quarter of randomization, using data from the NDNH.[10]
- ***Employment in healthcare*** measures whether the participant was employed in a job in the healthcare sector at the time of the follow-up survey, or (if not employed) whether the participant's most recent job was in the healthcare sector.
- ***Earnings*** measures NDNH-reported earnings in the fifth quarter after the quarter of randomization.

The HPOG logic model hypothesizes that HPOG training and supportive services will enable low-income adults to make educational progress, which in turn will lead to improved labor market outcomes. If educational progress is the sole channel through which HPOG influences labor market outcomes, then we would expect to see that the same program characteristics are associated with impacts on both educational progress and labor market outcomes. Alternatively, if HPOG influences labor market outcomes directly as well as indirectly through educational progress, then we might expect to see that different program components are associated with labor market outcomes versus educational progress.

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[9] Among the six key outcomes analyzed in the HPOG Interim Report, this report focuses on the four measures with statistically-significant variation in impact magnitude across programs. We do not analyze individual receipt of TANF or job quality (whether the participant's current or most recent job offers health insurance) because Interim Report analyses did not find evidence of variation in impact for these outcomes. Without variation in impacts across programs, it is unlikely that we would find evidence that program characteristics are related to impact.

[10] We measured employment and earnings in the fifth quarter because it represents the study's plan for analyzing "short-term" impacts, and it also corresponds to the timing of the follow-up survey, which was fielded to study participants beginning at 15 months after they had enrolled in the study.

3. Description of HPOG Program Characteristics

Building on the general description of HPOG in the Introduction, this section describes the overall goals of the HPOG Program and some common features. It then details distinct program characteristics, including how they vary among programs. It also presents findings from the *Impacts Report*, which studied the effect of the overall HPOG Program on training and education, service receipt, and employment and earnings.

HPOG 1.0 Program Goals and Design

The HPOG Program aims to provide education and training to TANF recipients and other low-income individuals for occupations in the healthcare field that pay well and are expected to either experience labor shortages or be in high demand. Guided by the Funding Opportunity Announcement (HHS, 2010),[11] HPOG 1.0 grantees were expected to meet the following criteria:

- Target skills and competencies demanded by the healthcare industry
- Support "career pathways"—clearly defined routes that enable participants to build a career, rather than simply getting training for a job, by advancing through successively higher levels of education and training, exiting into employment at multiple possible points
- Provide training that results in employer- or industry-recognized, portable education credentials (e.g., certificates or degrees) and professional certifications and licenses (e.g., a credential awarded by a Registered Apprenticeship program)
- Combine support services with occupational training to help participants overcome barriers to succeeding in training and in finding and keeping a job
- Provide training at times and locations easily accessible to targeted populations

All HPOG programs recruited and served TANF recipients and other low-income individuals, with that precise definition left to each grantee's discretion.

HPOG programs varied in the size of their service areas, from single counties to an entire state. Programs most frequently served multiple counties in a state. Programs served a variety of urban, suburban, and rural areas. The type of program operators also varied, including institutions of higher education, workforce agencies, other state government agencies, and nonprofit organizations.

Nearly all programs offered training for select entry-level positions, including nursing aides, orderlies, and attendants. Other commonly offered training courses included those for medical assistants and pharmacy technicians. HPOG programs also offered longer-term training courses for higher-wage jobs, such as licensed vocational and registered nurses.

[11] The HPOG 1.0 announcement solicited applications for grants to implement HPOG and described program requirements. Available at http://www.federalgrants.com/Opportunity-HHS-2010-ACF-OFA-FX-0126-24963.html

To meet the needs of their distinct target populations, HPOG programs implemented a wide array of participant support services, including case management, academic and career counseling, personal and family supports, and financial assistance.

Treatment-Control Contrast

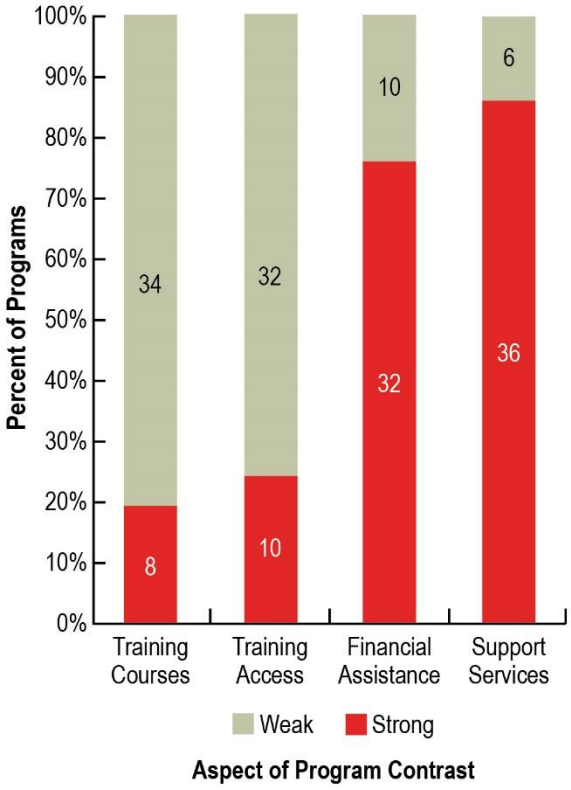
To have an impact on outcomes, the HPOG program available to the treatment group must differ from the control conditions—that is, what the treatment group would have been exposed to in the absence of HPOG. The program components and implementation features described above characterize the services available to treatment group members through HPOG. In this section, we describe the differences in services available to treatment and control group members.

We characterize programs as having strong or weak contrast in four areas of program services based on the following questions:

- To what extent did the treatment group have access to specific occupational ***training courses*** not available to the control group?
- To what extent did the treatment group have preferred ***access*** to available occupational training courses in the community?
- To what extent did the treatment group have access to more ***financial assistance*** than the control group?
- To what extent did the treatment group have access to more ***support services*** than the control group?

Relatively few HPOG programs (fewer than one-quarter) offered treatment group members access to training courses that were very different from the courses available to control group members (Exhibit 3). However, treatment group members in most HPOG programs (more than three-quarters) had access to more financial assistance and support services than did the control group.

Exhibit 3: Contrasts between Treatment and Control Conditions

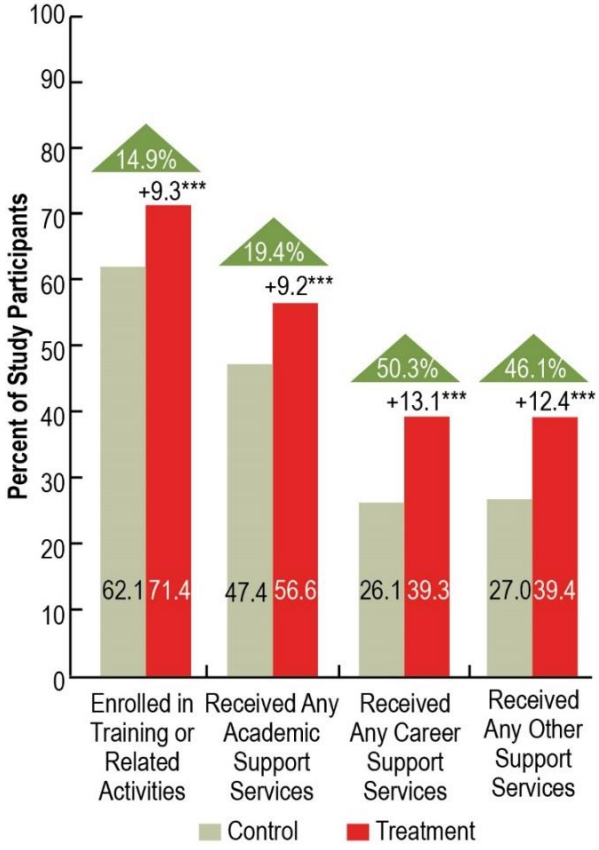


Source: Impacts Report (Peck et al., 2018).

This pattern of contrasts is reflected in HPOG's impacts on participation in training and services (Exhibit 4). These impacts are based on responses to items about training and service receipt that were asked of all HPOG study participants in the follow-up survey. As

such, they represent the training and services that study participants reported having received, rather than what was offered by programs.

Exhibit 4: Summary of HPOG's Impacts on Participation in Training and Services



Source: Impacts Report (Peck et al., 2018).
Notes: Statistical significance levels for two-sided tests are indicated with asterisks, as follows: *** = 1 percent; ** = 5 percent; * = 10 percent. For statistically significant results, relative impact magnitudes are shown in triangles.

HPOG increased enrollment in training by 9 percentage points; receipt of academic support services by 9 percentage points; career support services by 13 percentage points; and other support services (such as emergency assistance) by 12 percentage points.[12] Although these impacts are similar to one another in absolute magnitude terms, the relative impacts differ somewhat: increases in career support services (50.3 percent increase) and other support services (46.1 percent increase) are larger relative to the levels of the control group than the increases in enrollment or academic support services (14.9 and 19.4 percent, respectively).

The treatment-control differences are greatest in the area of supportive services rather than training. These findings help to motivate our examination of program characteristics related to the provision of services, because they represent how HPOG differentiates the treatment group experience from the control group experience.

[12] "Enrollment in training" includes enrollment in classes providing regular college credit; classes providing occupational training; classes to learn English as a second language; or basic skills classes. "Academic support services" including financial aid advising services; academic advising (e.g., help choosing courses); assessments of skill sets (e.g., using ACT's WorkKeys and Compass, or Tests of Adult Basic Education); tutoring; or peer support services. "Career support services" including career counseling or job search or placement assistance. "Other support services" including help arranging supports to manage school or work (e.g., childcare, transportation); personal counseling; non-cash incentives (e.g., a gift card for completing a course); or emergency assistance or funds to cover the costs of an unexpected personal crisis (e.g., utility shutoff or car repair).

4. Findings

Our analysis finds that a number of program characteristics are associated with the size of a program's short-term impact on individual outcomes. Further, we find that different characteristics matter for different outcomes: the characteristics that are related to the impact on educational progress, for example, differ from the characteristics that are related to the impact on earnings. This section provides detailed results.

Exhibit 5 presents estimates of the influence of program characteristics on impact magnitude for the four outcomes, which are shown in the exhibit's four columns. Because the estimates are identified by the naturally occurring (i.e., non-randomized) variation in program components, implementation features, local context, and participant composition, these estimates are considered non-experimental and do not allow us to make causal claims. That is, the association between program characteristics and impacts is non-experimental even though the program impacts rely on a treatment-control difference that *is* experimental. The associations between program characteristics and impacts yield hypotheses regarding possible causal associations that merit further research.

Exhibit 5: Influence of Program Characteristics on HPOG's Impact

Program Characteristic	Educational Progress (%)	Employment (%)	Employment in Healthcare (%)	Earnings ($)
Program Components				
Tuition and other financial assistance (range is 0-2)	9.3***			
Childcare and transportation (range is 0-8)	2.1***	−1.5**		
Employment supports (range is 0-30)	0.5***		0.5***	26.5**
Access to social and other services (range is 0-33)			0.5***	
Emergency assistance (range is 0-7)	0.9**			
Non-cash incentives (range is 0-1)		−0.1**		−5.6***
Implementation Features				
Employment is primary focus of program (%)			0.1**	
Share of staff with at least five years of experience (%)		−0.1**		
Staff perception of autonomy (range is 1-4)		−4.5**		
Local Context				
Unemployment rate (%)	3.2***			
Share receiving cash public assistance or SNAP (%)	−0.7*			
Share of adults age 25+ enrolled in school (%)				−266.8*
Participant Composition (at baseline)				
Less than high school diploma (%)			−0.2**	−20.4***
High school diploma or equivalent (%)		0.1***		
Degree or license (%)			−0.3***	
Receiving TANF (%)			0.2**	13.3**
Childcare barrier (%)		0.2*		
Under age 25 (%)				10.5*

Program Characteristic	Educational Progress (%)	Employment (%)	Employment in Healthcare (%)	Earnings ($)
Sample Size				
Individuals	10,450	12,981	10,318	13,414
Divisions	92	85 [a]	87 [b]	91 [c]
Programs	42	41	42	42

Sources: HPOG and PACE follow-up surveys; National Directory of New Hires.
Notes: All program characteristics are grand mean centered. Statistical significance levels for two-sided tests are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent
[a] The sample excludes four divisions due to missing data for "staff perception of autonomy," two divisions and one program due to missing data for "share of staff with at least five years of experience," and one division due to missing data for baseline educational attainment.
[b] The sample excludes four divisions due to missing data for "employment is primary focus of program" and one division due to missing data for baseline educational attainment.
[c] The sample excludes four divisions due to missing data for "employment is primary focus of program" and one division due to missing data for baseline educational attainment.

Educational Progress

- **HPOG programs that offer greater access to tuition and other financial assistance, childcare, transportation, employment supports, and emergency assistance are associated with larger short-term impacts on educational progress.**

Enrollees of HPOG programs that offer greater access to tuition and financial assistance, childcare, transportation, employment supports, and emergency assistance were more likely to have completed or still be enrolled in training as of follow-up.[13] For example, a one-unit increase in access to tuition and other financial assistance (equivalent to moving from the lowest score on the scale to an average score) is associated with a 9.3 percentage point increase in HPOG's impact on educational progress.

Several of the program components associated with larger impacts seem to have a direct relationship with educational progress. For example, it might be that access to ***tuition and other financial assistance*** directly enabled participants to pay for their program and complete their training. Other components—such as ***employment supports***—might not have a direct relationship with educational progress; instead, they are consistent with a resource-rich program environment in which a variety of services are available for students. As will be shown later, many programs offer a combination of services. These together, rather than any one service in particular, may lead to larger impacts on educational progress. We investigate this possibility further in an exploratory cluster analysis later in this section.

Among the program characteristics related to impacts on educational progress, access to ***childcare*** is unique in that we can identify the individuals in the sample who are likely to benefit from this service. Access to childcare might be expected to benefit only those with

[13] Experimental tests of ***emergency assistance*** during the short-term impact study found no evidence that that program component increased the impacts of HPOG. The current analysis, however, includes a wider range of programs than previously, and some of those programs might have implemented emergency assistance more effectively than did the programs that earlier were explicitly testing the component. We urge caution when interpreting the non-experimental findings regarding the association between emergency assistance and program impacts on educational progress.

children and have no effect on those without children (or perhaps a negative effect if it crowds out other services). Therefore, we conducted an exploratory analysis that includes only individuals who did not have children (see Appendix C). Our analysis of impacts on individuals who did not have children finds that for them, access to childcare is still associated with a larger impact on educational progress. This might support the idea that reported provision of such services is an indicator of program quality, in addition to or instead of having direct effects on impacts. This finding suggests that we interpret the relationship between program characteristics and impact magnitudes cautiously.

Two local context measures also associate with impacts on educational progress. These measures of local context capture the general socio-economic condition in each program's geographic area. First, programs operating in areas with higher ***unemployment rates*** tend to have larger impacts on educational progress. This suggests that program services are more effective when participants have fewer opportunities to take a job before completing their training. Participants might also be more motivated to access program services, complete their training, and earn a certificate or degree to stand out in a more competitive job market. Second, programs in areas with a higher ***share of adults receiving public assistance or benefits from SNAP*** (Supplemental Nutrition Assistance Program) tend to have smaller impacts on educational progress. Because the ACS measure of SNAP participation averages over multiple years, it captures persistent levels of poverty rather than short-term responses to economic cycles. Areas with a higher proportion of adults who receive SNAP may offer fewer employment opportunities for individuals once they complete training, and therefore persistence in training is lower in those areas.

Employment

- **No program components or implementation features are associated with either larger or smaller overall short-term impacts on employment.**

The *Impacts Report* found that HPOG did not increase employment levels in the short-term: about 70 percent of all study participants (treatment or control group) were employed in the fifth quarter after random assignment. That said, HPOG did increase rates of employment in the healthcare sector.

The lack of an overall employment impact might limit the ability for us to determine which program characteristics matter for employment. Because HPOG focuses on education and training, we might expect employment impacts to appear more fully over the intermediate- and long-terms; as noted earlier, about 20 percent of HPOG participants were still enrolled in training at the time of the short-term follow-up survey. Future research will examine employment over longer time periods.

Until then, this paper's analysis identifies the program characteristics that are associated with the varying impacts HPOG programs had on overall employment and employment in healthcare. We find that no program components or implementation features are associated with a larger impact on employment. Instead, some appear associated with a smaller impact on employment. In particular, programs that offer more ***childcare***, ***transportation***, and ***non-cash incentives***; have more ***experienced staff***; and report more ***staff autonomy*** tend to

have relatively smaller impacts on employment than programs with fewer of these components or features.

It is unclear why there is a negative association between these program characteristics and short-term employment impacts. We can conjecture several possible explanations. Consider the negative association between access to childcare and transportation and the short-term impact on employment. One possible explanation is that losing access to these services after completing or leaving the programs makes becoming employed more difficult for participants, who had used these services while engaged in the program. Another is that these services may be an incentive for individuals to stay in training longer, thereby delaying employment, but potentially increasing future earnings if the individuals are enrolled in longer training programs that lead to better labor market outcomes—for example, a licensed vocational or practical nursing program vs. a nursing assistant program.

In contrast to the program components described above, two participant composition measures are associated with larger impacts on employment: those programs with a greater share of participants with a ***high school diploma or less***, and those programs with a greater share of participants reporting a ***childcare barrier***. This stands in contrast to subgroup results reported in Chapter 5 of the *Impacts Report*, which found that for individual participants, those with more education and fewer barriers at baseline experienced more favorable impacts. It appears that programs that serve participants with more barriers may increase employment more in the short-term (relative to the control group) than programs serving those with fewer barriers. Programs serving more disadvantaged participants may have tailored their services to emphasize moving their students into employment quickly, or those students may not have had the academic skills required to gain entry to more advanced, longer training programs. By contrast, programs serving more advantaged participants might have focused on longer-term training or degree programs, and those participants may have been more likely to qualify for such programs.

Employment in Healthcare

- **Programs providing greater access to employment supports and social services are associated with larger increases in healthcare sector employment.**

In contrast to the results for employment overall, as noted above, the *Impacts Report* found that HPOG increased employment in the healthcare sector: 53 percent of the treatment group was employed in healthcare as of the follow-up survey, compared to 41 percent of the control group, producing a relatively large 12 percentage point impact.

Our analysis found that several program components and implementation features are associated with increased healthcare employment. In particular, enrollees in programs with greater access to employment supports and social services had greater rates of employment in the healthcare sector. Access to employment supports—such as ***job search assistance*** and ***employment readiness workshops***—might be successful in helping participants find and keep jobs in healthcare. Access to social services—such as ***mentoring, family preservation,*** or ***legal assistance services***—might help students manage other life challenges so they can find and maintain a job in their chosen field. Many HPOG services, including mentoring, focused on healthcare occupations. We hypothesize

that this is why we see a relationship between these services and employment in healthcare and not with employment overall. Further, programs that emphasize ***employment as a primary goal*** of the program tend to have slightly larger impacts on employment in healthcare.

Several participant composition measures also associate with changes in healthcare employment. Programs with more participants ***receiving TANF*** at program entry had larger favorable, short-term impacts; programs with a greater share of participants ***without a high school diploma*** had smaller impacts; and programs with a greater share of participants ***with a degree or license at program entry*** had smaller impacts.

These latter two findings signal that HPOG programs tend to be less effective in serving individuals with these particular characteristics. A possible explanation is that individuals without a high school diploma, for example, may need extra support beyond HPOG to obtain the skills necessary for employment in healthcare.

Although we observe a statistically significant relationship between these participant composition measures and employment in healthcare, the relationships may not necessarily be due to the programs' composition of participants with these characteristics. Instead, there may be some other program characteristic that correlates with the participant composition measure that is also associated with impacts on employment in healthcare. To explore the relationship between the share of participants receiving TANF and the impact on employment in healthcare, we conducted an exploratory analysis that includes only individuals who were *not* receiving TANF at program entry (see Appendix C). If the observed relationship was due only to HPOG programs producing larger impacts for TANF recipients, then an increase in the share of participants receiving TANF should not be associated with larger impacts among non-TANF recipients. However, our analysis finds a similar relationship for non-TANF recipients: an increase in the share of participants receiving TANF is associated with a larger impact on employment in healthcare. This suggests that programs' serving a relatively greater share of TANF recipients does not directly lead to an increase in employment in healthcare, but instead it is associated with some other (presumably unmeasured) characteristic that leads to the larger impact.[14]

Earnings

- **Greater access to employment supports is associated with larger earnings impacts.**

Finally, we consider the influence of program characteristics on average earnings impacts. Notably, we find that greater access to ***employment supports*** is associated with a larger increase in earnings in the short term. A one-unit increase in access to employment supports (such as job search assistance and employment readiness workshops) is associated with an increase in fifth quarter earnings of about $26 for HPOG participants relative to the control group. Given that the *Impacts Report* found an overall impact of $137 in the fifth quarter, this $26 additional boost represents a relatively large 19 percent

[14] TANF eligibility and rules to remain on TANF vary widely by state. We control for this variability by including program-level dummies, which is a close proxy for state.

improvement, reflecting the potential importance of employment supports among the factors producing favorable earnings impacts. Programs that offer ***non-cash incentives*** tend to increase earnings by less than programs that do not offer such incentives; nevertheless, that effect is small (lowering the increase in earnings to just $6 in the fifth quarter).

Certain local context and participant composition measures are also associated with average short-term earnings impacts, in both favorable and unfavorable ways. For instance, the current analysis finds that earnings impacts are smaller for programs operating in areas with a greater share of ***adults age 25+ enrolled in school*** than for programs in areas with a smaller share of adults age 25+ enrolled in school. In these areas with greater adult school enrollment, HPOG participants may face competition for high-paying jobs from a more highly educated population. As described in the *Impacts Report*, programs with a greater share of participants ***receiving TANF*** tended to have larger impacts on earnings than programs with a smaller share of their participants receiving TANF. These results imply that programs that serve a more disadvantaged population may achieve larger impacts in the short term, a finding that stands in opposition to the *Impacts Report*'s (Chapter 5) subgroup analysis, which revealed that more advantaged participants experienced larger impacts than did less advantaged participants.

Program Typologies

The analytic approach that produced the findings above treats each program characteristic separately, ignoring any potential relationships among the characteristics. Specific program components, implementation features, local context variables, and participant composition measures may group together, which would affect how we interpret results from the preceding sections. Indeed, we expect program designers to consider the local context and participant composition when choosing program components. For example, programs in which many participants have children might be more likely to offer childcare assistance. Further, certain programs might choose to offer a broad set of services, whereas others might decide to offer fewer services, perhaps with greater emphasis on education and training. To understand variation in these characteristics among programs, we conducted a *cluster analysis*, a machine-learning technique that does not impose a model or theory on patterns in the data.

From the cluster analysis's results, we identified three groups of programs: ***service-rich programs, education-focused programs,*** and ***employment-focused programs***. We used program components and implementation features to define the clusters, key channels through which a program seeks to improve participant outcomes. The results of this analysis appear in Exhibit 6 below. The exhibit shows the average characteristics of each cluster. Stars indicate whether the cluster mean is statistically significantly different from the mean of the programs in the two other clusters, to illustrate what distinguishes one cluster from the others. The exhibit includes only program characteristics that differ among the groups. An exhibit in Appendix D reports the other characteristics, as well.

Exhibit 6: Characteristics of Clusters of Programs

	Service-Rich Programs (n=8)	Education-Focused Programs (n=14)	Employment-Focused Programs (n=20)
Program Components			
Average caseload for case managers	58.3	89.5**	51.1**
Services delivered by case managers	6.0**	4.2	4.2
Social and other services	9.0**	6.2	3.2**
Tuition and other financial assistance	1.6*	1.1**	1.4
Employment supports	22.3	20.9	17.1**
Non-cash incentives	0.9***	0.0**	0.0**
Facilitated peer support	1.9*	0.9*	1.3
Emergency assistance	3.1**	1.4	0.9*
Implementation Features			
Education is primary focus of program	2.4*	32.1***	3.0***
Employment is primary focus of program	26.8	10.6***	41.0***
Local Context			
Share of adults age 25+ enrolled in school (%)	6.1	3.7**	11.1**
Participant Composition (at baseline)			
Average age (years)	31.3	31.3**	33.9**
Under age 25 (%)	35.6	35.2*	27.5**
Highest education - less than high school diploma (%)	4.9	15.2**	6.5
Highest education - HS diploma or equivalent (%)	46.1**	33.7	34.4
Highest education - associate's degree or higher (%)	17.4	15.3**	22.7**
Postsecondary degree (%)	16.7	14.9**	21.7**
Ever attended work success course (%)	17.6	16.6	12.3**
Current weekly hours	25.1	26.3*	23.9*
Limited English (%)	0.4	1.7*	0.9

Sources: HPOG Grantee Survey; HPOG Management and Staff Survey; HPOG PRS; American Community Survey.
Note: Statistical significance levels for two-sided tests are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

Compared with the programs in the two other cluster groups, the eight "service-rich" programs had more services that case managers provided directly. They provided a higher level of social supports and other services, were more likely to offer non-cash incentives that they perceived to be effective, and were more likely to provide facilitated peer support. The service-rich programs tended to provide higher levels of tuition and other financial assistance and were more likely to provide emergency assistance. Managers and other staff members in service-rich programs were less likely to identify education as the primary goal of the program. Programs in this cluster tended to identify education and employment as equally important program goals—the majority did not identify either education or employment as the primary focus. Local context and participant composition largely did not distinguish this cluster from the other two.

There are 14 "education-focused" programs. As with the service-rich cluster, the majority of staff members identified education and employment as equally important goals of the program; however, this cluster of programs had the highest proportion of staff members who identify education as the primary goal of the program: on average, 32 percent of staff members in this group identified education as the primary goal of the program, compared with 3 percent in the other clusters. Programs in this group tended to offer fewer supportive services than the other groups. They had higher average caseloads (90 participants per full-time case manager), offered lower levels of tuition and other financial assistance, did not

report offering non-cash incentives, and were less likely to provide facilitated peer support. Programs in this cluster tended to operate in areas where a lower proportion of adults age 25+ were enrolled in school. Participants tended to enter these programs with lower levels of education.

We refer to the remaining 20 programs as "employment-focused." As in the other two clusters, the majority of staff viewed education and employment as equally important goals. Nevertheless, this cluster had the highest proportion of staff members identifying employment as the primary goal of the program: on average, 41 percent of staff members in this cluster identified employment as the primary goal of the program, compared with 27 and 11 percent in other clusters, respectively. Although the group had lower average caseloads than the other clusters, programs in this group offered fewer social and other services, employment supports, and non-cash incentives perceived to be effective, and offered lower levels of emergency assistance. These programs tended to operate in areas where a higher proportion of adults age 25+ were enrolled in school. Participants tended to enter these programs with higher levels of education.

The program components offered by the education-focused and the employment-focused clusters do not seem to follow an internally consistent program logic model. We might expect that education-focused programs would offer higher levels of tuition and other financial assistance and that the employment-focused programs would offer higher levels of employment supports. Instead, we see the opposite. This inconsistency is not a problem of labeling: the cluster of programs with the highest proportion of staff members identifying education as the primary focus of the program is the same cluster that offers the lowest level of tuition and financial assistance supports.[15]

More generally, the results of the cluster analysis are not entirely what we expected when we undertook this exercise. We expected to find that one cluster focused on some services and another cluster focused on other services. If we had seen that certain program components tended to appear together, then we would need to adjust the analytic model, the process for selecting variables to include in that model, and/or our interpretation of findings in light of this observation. Instead, we found that only the eight service-rich programs were distinguished from the others by offering *more* supportive services, and not necessarily certain *types* of services. The other two groups offered lower levels of support. The clusters are distinguished by the level of services in a relatively consistent way across multiple measures.

This cluster analysis does not suggest that any particular combination of program components is more important than another, which is consistent with our current methodological approach to specification and analysis of impact variation.

[15] We also examined how the type of institution operating the program (i.e., workforce agency, institution of higher education, or a government or nonprofit organization) varied across the clusters. Institutions of higher education are the most common program type in the service-rich and employment-focused clusters, and workforce agencies are the most common program type in the education-focused cluster. That said, the distribution of program type is not statistically different across clusters.

- **Caveat: all of these findings should be interpreted as suggestive and not causal, in part because the program characteristics measures that we use may capture other aspects of programs that are not included in the analysis.**

This analysis does not establish a causal relationship between program characteristics and impacts. Instead, it associates variation in impact estimates with variation in program characteristics. The program characteristics were not randomly assigned; they stem from selection processes and natural variation across HPOG programs. Therefore, the findings should be interpreted as exploratory, suggesting that some relationship might exist between program characteristics and the impacts. Moreover, these results serve as a motivation for future research that could test for evidence of a causal relationship between certain program characteristics and impact magnitude.

5. Discussion and Conclusion

This section first discusses implications of our findings for program operations and then turns to implications for future research and evaluation.

Implications for Program Operations

This paper's results provide evidence that various program characteristics—program components, implementation features, local context variables, and participant composition measures—may be important factors in generating favorable short-term impacts on educational progress, employment, employment in healthcare, and earnings. The particular characteristics associated with impacts vary by outcome; those that promote one outcome are not necessarily associated with promoting others.

- **Certain program components and implementation features are associated with larger impacts educational progress, employment in healthcare, and earnings.**

A variety of program components and implementation features were found to be associated with impacts on several key outcomes. In some cases, the program characteristics and implementation features that might be expected to be linked to improvements in certain outcomes are indeed associated with positive impacts on those outcomes. For example, access to tuition and other financial assistance, childcare, transportation, and emergency assistance are all related to increases in measures of educational progress, such as earning a certificate or degree. In addition, access to employment supports is associated with larger improvements in employment in healthcare and earnings. Some relationships are less clear. Programs that offer non-cash incentives had smaller impacts on employment and on earnings than did programs without those incentives.

- **Local context matters: programs that operate in certain settings are associated with more and less favorable impacts.**

The findings for local context and participant composition are somewhat more challenging to interpret. Across several outcomes, HPOG programs that serve a slightly more disadvantaged population—those who are younger, receiving TANF, or report a childcare barrier—might have larger favorable impacts than programs serving individuals with fewer challenges. In addition, programs operating in areas with higher rates of unemployment tend to have larger impacts on educational progress.

- **The set of program characteristics linked to impacts differs across outcomes.**

This paper includes some findings that are similar to and some that are different from those described in the *Impacts Report* (Peck et al., 2018). Similar to this paper, the *Impacts Report* found that access to childcare assistance, transportation assistance, and tuition and other financial assistance are associated with larger improvements in educational progress. However, the *Impacts Report* did not identify an association between employment supports or emergency assistance and improved educational progress, which this paper did find. The model for selecting program characteristics used in this paper was more flexible than the approach used in the *Impacts Report*: our analysis here allowed for a different set of

program characteristics for each outcome, whereas the *Impacts Report* used the same set of program characteristics for all outcomes. This is the main reason for the substantive differences in findings.

We also explored whether certain program components might affect certain sub-populations more than others. For instance, access to childcare might be expected to benefit only those participants with children and have no effect on those without children (or perhaps a negative effect if it crowds out other services). However, our exploratory analysis found that access to childcare is still associated with larger improvements in educational progress even for participants without children (see Appendix C). This might support the idea that providing more services is an indicator of program quality, apart from the direct effects that the services themselves have on impacts. Access to childcare might just be one component of a service-rich environment. The analysis of the relationship between access to childcare and impacts for participants who do not have children serves as an important reminder that we must be cautious in our interpretation of all the findings relating program characteristics to impacts.

- **A cluster analysis revealed service-rich, education-focused, employment-focused types of programs, rather than groups of programs that offer certain kinds of services.**

We use a cluster analytic approach to investigate patterns among program characteristics, motivated by the hypothesis that there might be some program "typologies" that more generally associate with more favorable program impacts. Instead, the revealed clusters (*service-rich, education-focused, employment-focused*) do not identify certain bundles of services that frequently appear together. The eight service-rich programs distinguish themselves from the others by offering *more types* of supportive services, and not necessarily *certain types* of services. The other two cluster groups offered lower levels of support. Further, the program characteristics of the other two clusters do not seem to capture an internally consistent program logic. The cluster of programs with the highest proportion of staff members identifying education as the primary focus of the program (an implementation-related measure) is the same cluster that offers the lowest level of tuition and financial supports (a program-design measure).

The cluster analysis does not highlight particular associations among measured program characteristics. We still caution readers to consider relationships between program characteristics included in the model and program characteristics that are not included in the model as a potential source of bias when interpreting findings.

Finally, we note that all of the findings in this analysis are based on short-term outcomes that were measured about 15 to 18 months after program entry. Future research will explore impacts after three years and after six years, as part of the ACF-funded Career Pathways Intermediate Outcomes and Long-term Outcomes research projects, respectively.

Implications for Future Research

In addition to having implications for program operations, this analysis also has implications for future research, which we discuss after making some methodological observations.

This type of analysis—though using *experimental* evaluation data—is non-experimental and does not establish a causal relationship between program characteristics and impacts. Instead, it associates variation in the given experimental impact estimates with variation in the various program characteristics. So although the impact estimates are experimental, the association of program characteristics with those impacts should be interpreted as suggestive rather than causal. The various program characteristics we measured stem from selection processes and natural variation across HPOG programs and not from random assignment. That is, grantees *chose* how to configure their programs and how to implement them. Although we control for contextual and participant compositional measures that might have informed those choices, there remain unmeasured factors that might associate with variation in program impacts. As a result, the findings—both here and in the *Impacts Report*'s Chapter 7—should be interpreted as exploratory, suggesting that some relationship might be possible between the program characteristic and the impact. Absent an experiment that can control for such confounding factors, each independent evaluation of a job training program that finds that similar characteristics are associated with impacts would build our confidence in these links.

The program characteristics measures that we use may be capturing other aspects of the programs that are not included in the model, just as access to childcare appears to be capturing something about program quality in the analysis of impacts for people without children. Given that the model can include only a certain, limited number of program characteristics, the model excludes many possible characteristics, both measured and unmeasurable. This limitation could be a source of omitted variable bias.[16]

- **This paper provides a model for future analyses of the link between program characteristics and impacts.**

Despite these cautions, we also believe that this line of analysis is useful. It is often not practical, feasible, or even desirable to randomize all the program characteristics that one might want to learn about. In that case, controlling for as many characteristics as possible enables the analyst to isolate at least some program characteristics that might enhance or suppress overall impacts. These observations can, in turn, be important for future evaluation and program practice.

This paper in particular—in conjunction with the *Impacts Report*'s thoughtful implementation of multi-level modeling for this analytic purpose—advances the analytic toolkit. The study's *Impacts Report* had established the use of a variable selection process, which blended theoretical, empirical, and policy relevance as criteria. This paper uses an entirely empirical

[16] In this model, omitted variable bias would occur when a characteristic is associated with impact and is correlated with other program characteristics in the model. In this case, the coefficients of the program characteristics in the model will reflect the influence of the omitted characteristics, rather than solely capturing the influence of the characteristic itself.

variable selection process and allows the variables selected for inclusion in the model to vary across outcomes. It is our hope that implementation of these related, though slightly different, approaches will inform future research on options for how to select measures for inclusion in these kinds of analyses (where variation in experimental impacts is explained by various program characteristics measures).

- **Future research should pay explicit attention to measures: whether they capture program-level characteristics or individual-level treatment-control differences. Both have potential value, yet distinct implications.**

Another point to consider, which we believe has been under-examined in prior, related research, pertains to the *measures* of program characteristics. In this paper, our main analysis includes program characteristic measures that derive from program-level data collection and, as such, represent the programs' offerings and context. To clarify, for example, our measure of childcare assistance reflects whether a program *offered* that assistance but neither the extent to which those students randomized into treatment took up that assistance nor the extent to which those students randomized out of treatment had access to and took up comparable assistance. An analysis of alternative measures that capture the treatment-control contrast at the individual level appears in Appendix E.

The foundational work of Bloom, Hill, and Riccio (2003), for example, distinguishes between "program practices," which are measured strictly at the program level (in the same manner as the program characteristics used in this analysis), and "participation in activities," which are reports of the participation of study participants in both the treatment and control groups in certain activities. The participation in activities measures reflect the treatment-control contrast in services received. Seven of that work's 10 variables were program characteristics and the remaining three were participant-reported, treatment-control differences in participation in activities. It is our contention that each kind of measure—program characteristics versus reported treatment-control differences—has relevance. Neither kind is necessarily the better measure. Both measures hold value in answering distinct questions. Program characteristics measures reflect the availability of services, and therefore are relevant to administrators' decisions about how to configure their programs. In comparison, the participant-reported, treatment-control contrast measures reflect actual receipt of services. As such, they are relevant to how study participants' experiences associate with program impacts. To a certain extent, this distinction is akin to the difference between a study's "intent-to-treat" impact and a study's "treatment-on-the-treated" impact, where the first is about the experience of an offer and the second is about the experience of taking up that offer.

As elaborated in this paper's Appendix E, we prefer the program characteristics measures for this analysis. Our preference stems from the measures' reliability. We contend that the program characteristics measures accurately reflect what the programs offered and how programs offered them. Treatment-control measures, by contrast, embed two important types of error: recall error and differences in how treatment and control groups interpret survey items. Recall error is self-evident: people are likely not to remember precisely their program experiences that might have taken place at least a year earlier. Similarly, if a program offered a service, but the individual did not take it up, there is error in the self-report

of service availability. With respect to interpretation of survey items, consider the following examples: Programs that offer non-cash incentives must explain these incentives to treatment group members; therefore, treatment group members are likely to have a concrete understanding when they answer the corresponding follow-up survey items asking whether they have received non-cash incentives. In contrast, control group members, who have intentionally not been exposed to the component, respond to that same survey question without, we assume, the same concrete understanding. Moreover, self-reported measures of service participation may not capture the difference in quality of the services received by the treatment and control groups. For example, the emergency assistance offered to the treatment group might be more available and more generous than the assistance offered to the control group. A follow-up survey cannot capture that difference if the survey item simply asks whether respondents received emergency assistance.

We encourage future research (1) to be explicit about which type of measure it is using (program characteristics or treatment-control differences); and (2) to explore empirically the possible differences in results based on differences in the type of measure.

Finally, we assert that what might advance the usefulness of this kind of analysis in future applications is to invest in the measurement of program components and implementation features. Implementation studies in the context of large-scale impact evaluations ought to focus on the quality and intensity of program components and implementation strategies that are hypothesized to be important impact drivers, not their presence or absence alone. Another opportunity exists: researchers might use machine learning-based text analytics to extract program characteristics information from across more evaluations of career pathways programs than we have examined here, to first create a consistent set of measures and then pool and analyze data with a larger sample. This would involve letting a computer program “read” implementation reports and, with help from human analysts, code the information contained therein to allow for the analysis of a set of program characteristics consistently across a larger pool of studies.

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Appendix A: Details of Program Characteristics Measures

Exhibit A.1 contains a detailed description of the program components and implementation features described in Exhibit 1.

Exhibit A.1: Details of Program Components and Implementation Features

Measure	Operationalization Details	Range	Mean (SD)
Program Components			
Presence of career pathways principles	Counts the number of elements of the career pathways framework that the program implements. Assigns one point for each of the following elements that are available or readily available: • emphasis on career pathways • opportunities targeting individuals with significant skill, education, and work experience deficits • curricula that accommodate multiple learning modes and capabilities • opportunities designed to accommodate non-traditional student populations • opportunities to orient and acclimate non-traditional student populations to health professions • training options that provide credentials that are "stackable" with other available training • training options that support multiple career pathways • health or vocational education/training activities designed (or redesigned/ compressed) for accelerated completion	0-8	4.1 (2.1)
Average caseload for case managers [a]	Average estimated caseload for full-time case managers	0-233	65.3 (44.4)
Services case managers deliver [b]	Number of services case managers/counselors deliver directly. Services include: • participant monitoring • academic counseling • career counseling • counseling to identify personal and supportive service needs • financial counseling • job search/placement assistance • job retention services	0-7	4.5 (1.9)
Access to social and other services	Measure includes two points for each service a program directly delivers and one point for each service for which the program delivers a referral (three points possible per service). A point is deducted from this sum for each of these services that the program does not agree or strongly agree meets their participants' needs. Services include: • mentoring activities • cultural programming • driver's license assistance • food assistance other than SNAP • addiction or substance abuse services • family preservation services • family engagement services • legal assistance • primary or medical care • short-term/temporary housing • other housing assistance	0-21	5.3 (5.3)

APPENDIX A: DETAILS OF PROGRAM CHARACTERISTICS MEASURES

Measure	Operationalization Details	Range	Mean (SD)
Tuition and other financial assistance	Measure of access to tuition assistance and other financial services. Ranges from 0 to 2, calculated as follows: • Tuition coverage: Up to one point for programs that fully cover tuition. Partial points assigned for partial tuition coverage (0.25, 0.5, or 0.75, respectively). • Financial services: Three points for each service provided to all participants, two for those provided upon request or with a course, one for those provided with no other specifics. A point is deducted from this sum for each of these services that the program does not agree or strongly agree meets their participants' needs. This sum is divided by 15 (the maximum possible) to create a 0-1 score. Possible financial services include: - book costs - licensing and certification fees - exam/exam preparation fees - work/training uniforms, supplies, tools - computer/technology equipment	0-2	1.3 (0.4)
Childcare and transportation	Measures percentage of service area with access to public transportation, whether the program provides transportation assistance, and whether the program provides childcare assistance. Calculated as follows: • Two points assigned if entire service area has access to public transportation, one point if 75% has access, zero otherwise • Two points if a program directly delivers transportation assistance, one point if the program delivers a referral (three points possible). A point is deducted if the program does not agree or strongly agree that the service meets their participants' needs. • Two points if program directly delivers childcare assistance, one point if the program delivers a referral (three points possible). A point is deducted if the program does not agree or strongly agree that the service meets its participants' needs.	2-7	4.1 (1.3)
Co-location of services	Number of services physically co-located with the healthcare training most or all of the time. Possible services include: • academic advising/counseling • financial aid advising/counseling • advising/counseling about support services • career advising/counseling • job placement services • basic skills instruction, General Equivalency Diploma preparation, English as a Second Language, or other training activities	0-6	3.7 (2.2)

APPENDIX A: DETAILS OF PROGRAM CHARACTERISTICS MEASURES

Measure	Operationalization Details	Range	Mean (SD)
Employment supports	Measure of access to employment support services, calculated by assigning two points for each employment support service a program directly delivers and one point for each service for which the program delivers a referral (three points possible per service). A point is deducted from this sum for each of these services that the program does not agree or strongly agree meets its participants' needs. Possible services include: • job-readiness workshops • job search skills workshops • identifying job openings for program graduates • meeting with employers to identify job openings for graduates • one-on-one job search assistance • advising on career and job choices • operating or referrals to job fairs • providing participants with job listings • job screening • post-placement services	0-30	19.3 (6.1)
Non-cash incentives	Indicator that takes on a value of one if staff perceive non-cash incentives to be effective in encouraging participants to achieve the desired program milestones and zero otherwise.	0-1	0.2 (0.4)
Facilitated peer support	Measure of access to facilitated peer support: assigns two points if the program directly delivers peer-support activities and one point if the program delivers a referral (three points possible). A point is deducted if the program does not agree or strongly agree that it is able to meet its participants' needs for peer support.	0-3	1.3 (1.1)
Emergency assistance	Number of emergency services that the program agrees or strongly agrees meet its participants' needs: • car repair costs • car insurance costs • utilities (e.g., heating, electricity, water bills) • food assistance (non-SNAP) • security deposit • rent • housing program fees	0-7	1.5 (2.1)
Implementation Features			
Education is primary focus of program [c]	The percentage of management/staff that indicate education is the primary goal of the program. (Management/staff that believe education and employment are equally important program goals are not included in either percentage)	0-57	12.6 (17.2)
Employment is primary focus of program [d]	The percentage of management/staff that indicate employment is the primary goal of the program. (Management/staff that believe education and employment are equally important program goals are not included in either percentage)	0-100	28.2 (24.3)
Share of staff with at least five years of experience [e]	The percentage of staff that indicate they have greater than five years of experience (range 0 to 1).	0-67	12.7 (19.2)

APPENDIX A: DETAILS OF PROGRAM CHARACTERISTICS MEASURES

Measure	Operationalization Details	Range	Mean (SD)
Staff perception of autonomy [f]	Average of staff agreement with the following statements, each on a scale from 1 (strongly disagree) to 5 (strongly agree): • Staff in your program are given broad authority in carrying out their responsibilities • Staff in your program can try out different techniques to improve their effectiveness • Staff members are given too many rules in your program (reverse-coded) • Management fully trusts the professional judgments of staff in your program	3-5	4.1 (0.4)

Sources: HPOG grantee survey (n=42); HPOG management/staff survey (n=320).

[a] Average caseload is zero for programs that reported having case managers, but did not report an average caseload and did not report any program enrollment prior to the date of the grantee survey.

[b] This measure is set to zero for programs that did not report having any case managers.

[c] This measure has a theoretical range of 0-100, but the maximum observed value is 57. The measure is missing for four divisions due to non-response to the management/staff survey.

[d] This measure is missing for four divisions due to non-response to the management/staff survey.

[e] This measure has a theoretical range of 0-100, but the maximum observed value is 67. The measure is missing for two divisions due to non-response to the management/staff survey.

[f] This measure has a theoretical range of 0-5, but the minimum observed value is 3. The measure is missing for four divisions due to non-response to the management/staff survey.

Appendix B: Analytic Model

To assess the overall impact of HPOG on outcomes, we use the model defined in the *Impacts Report* (Peck et al., 2018). This model estimates intention-to-treat (ITT) impacts of *being given access* to the basic HPOG program using a multi-level regression model that adjusts the impact (i.e., the difference between average outcomes for treatment and control group members) by controlling for exogenous characteristics measured at baseline.

Model Specification

We estimate a three-level model, where the unit of analysis for level one is the individual sample member (indexed by i); the unit of analysis for level two is the division [17] (indexed by j); and the unit of analysis for level three is the program (indexed by k). The main *Impacts Report* model is as follows:

$$Y_{kji} = \alpha_0 + \beta_0 TE_{kji} + \sum_c \delta_c IC_{ckji} + \gamma R_k + \{\varepsilon_{kji} + v_k + v_{kj} + u_k T_{kji} + u_{kj} T_{kji}\} \quad \text{(eq. 1)}$$

The treatment indicator, T_{kji}, is defined at the individual level to take on a value of 1 if the individual was assigned to the HPOG group and 0 if the individual was assigned to the control group. The primary coefficient of interest, β_0, captures the average impact of being offered access to HPOG relative to the control condition of no access to HPOG.

The model controls for the following individual characteristics (IC_{ckji}), the construction of which is described by Harvill, Moulton, and Peck (2015):

- Average quarterly earnings in the year prior to intake
- Number of quarters employed in the year prior to intake
- Attainment of a postsecondary degree or certificate prior to intake
- Attainment of occupational skills license or credential prior to intake
- Race/ethnicity
- Foreign birth
- Parent of one or more dependent children
- Participation in either the special supplemental nutrition program for Women, Infants, and Children (WIC) or the Supplemental Nutrition Assistance Program (SNAP)

The indicator R_k in equation 1 identifies programs participating in the PACE study. The coefficient γ accounts for the two ways the PACE programs differ from the other HPOG

[17] An administrative division is a set of program intake locations with a dedicated case management and/or counseling staff that advises participants, connects them to education and training services, and provides participants with support services or refers them to these services. Programs may have one or more such divisions. The programs' implementation features are measured at this level.

programs in the sample: slight differences in data collection instruments and different probabilities of assignment to treatment.[18]

The error term includes elements that capture variation in impacts across divisions and programs (u_k, u_{kj}) and variation in the level of outcomes across divisions and programs (v_k, v_{kj}). We use maximum likelihood procedures (which assume a joint normal distribution for the random components) to estimate the model.

To relate program characteristics to impact magnitude, we extend the multi-level model presented in equation 1 by interacting (multiplying) the treatment indicator with measures of program characteristics. This method enables us to assess the relationship between program characteristics and the size of program impact (Bloom, Hill, and Riccio, 2003; Greenberg, Meyer, and Wiseman, 1994). This interaction produces the following three-level model:

$$Y_{kji} = \alpha_0 + \beta_0 T_{kji} + \sum_c \delta_c IC_{ckji} + \sum_m \pi_m P_{mk} T_{kji} + \sum_g \varphi_g I_{gkj} T_{kji} + \sum_q \kappa_q LC_{qk} +$$

$$\sum_q \zeta_q LC_{qk} T_{kji} + \sum_d \tau_d PC_{dkj} T_{kji} + \{\varepsilon_{kji} + v_k + v_{kj} + u_k T_{kji} + u_{kj} T_{kji}\} \quad \text{(eq. 2)}$$

In this equation, the program components (P_{mk}), implementation features (I_{gkj}), local context (LC_{qk}), and participant composition (PC_{dkj}) are all interacted with the treatment indicator. These interaction terms capture the influence of these measures on impact magnitude. Model terms are defined in Exhibit B.1.

Exhibit B.1: Definitions of Model Terms

Name	Definition
Outcome and Covariates	
Y_{kji}	The outcome measure for individual *i* from division *j* and program *k*
T_{kji}	The HPOG program treatment group indicator (1 for those individuals assigned to the HPOG treatment group; 0 for the control group individuals)
IC_{ckji}	Individual baseline characteristic c for individual *i* from division *j* and program *k* (grand mean centered), *c* = 1, . . ., C (this is labelled "IC" for "individual characteristics")
P_{mk}	Program component *m* for program *k*, *m* = 1, …, M
I_{gkj}	Implementation feature *g* for division *j* and program *k*, *g* = 1, …, G
LC_{qk}	Local context measure *q* for program *k*, *q* = 1, …, Q
PC_{dkj}	Participant composition measure *d* for division *j* and program *k*, *d* = 1, …, D
Model Coefficients	
α_0	The grand mean control group outcome in non-PACE programs
β_0	The grand mean impact of HPOG
δ_c	The effect of individual characteristic *c* on the mean outcome, *c* = 1, . . ., C
π_m	The influence of program component *m* on impact magnitude, *m* = 1, …, M
φ_g	The influence of implementation feature *g* on impact magnitude, *g* = 1, …, G
κ_q	The effect of local context measure *q* on the mean outcome, *q* = 1, . . ., Q
ζ_q	The influence of local context measure *q* on impact magnitude, *q* = 1, …, Q
τ_d	The influence of participant composition measure *d* on impact magnitude, *d* = 1,…, D

[18] For programs in the PACE study, half of the sample was assigned to treatment and half to control; in the HPOG-only programs, two-thirds were assigned to treatment and one-third to control.

Name	Definition
Error Terms	
ε_{kji}	A random component of the outcome for each individual
v_{kj}	A random component of control group mean outcome for each division
v_k	A random component of control group mean outcome for each program
u_{kj}	A random component of the impact for each division
u_k	A random component of the impact for each program

Method of Selecting Program Characteristics

As described in Harvill, Moulton, and Peck (2017), the HPOG 1.0 Impact Study first identified lists of characteristics based on our expectations regarding their relationship to the effectiveness of the program. In this paper, we use a fully empirical approach to select which program components, implementation features, participation composition measures, and local context measures to include in the model relating those measures to impact magnitude.

For this empirical selection approach, we estimated a series of possible impact models, one for each potential program characteristic. We then compared the p-values for each program characteristic, and identified the characteristic with the lowest p-value (and therefore the strongest relationship with impact magnitude). We repeated this six times, iteratively selecting the most significant remaining characteristic at each stage. This essentially limits each model to having six explanatory variables (which is at the limit of our degrees of freedom) and results in having six models to choose from. We then used the Akaike Information Criterion (AIC) to determine which of the candidate models to use as the specification of the model to report findings. Among the candidate models, the one with the smallest AIC is considered the best (although the AIC value itself is not meaningful). The AIC rewards goodness of fit, but it also includes a penalty that is an increasing function of the number of estimated parameters, which discourages overfitting. We chose the model that achieved the best (lowest) AIC value as the specification for that particular outcome.

There are several important differences between the approach this paper used and the one the *Impacts Report* used. The models in the *Impacts Report* used a combination of theory and an empirical approach to decide which variables to include. The *Impacts Report* included certain program characteristics in every candidate model based on their theorized relationship with impact magnitude, while it selected fewer measures empirically. Further, the *Impacts Report* used only the educational progress outcome for empirically-selected program components and used the same components to estimate models for the three other outcomes (employment, employment in healthcare, and earnings). This meant that the report used the same model for all four outcomes.

In comparison, in the current analysis, we used an empirical selection method separately for each outcome because the set of characteristics associated with impacts on certain outcomes might not necessarily be the same characteristics associated with impacts on other outcomes. By using a fully empirical approach and enabling model selection to vary by outcome, this paper provides a more flexible analysis of the impact of program characteristics on impact magnitude than was the case in the *Impacts Report*.

APPENDIX B: ANALYTIC MODEL

This analysis is non-experimental and does not allow us to make causal inferences. Instead, the analysis associates variation in impacts with variation in program characteristics. It is possible that these characteristics did indeed lead to the observed variation in impacts. However, it is also possible that the relationship between the characteristic and impact is due to omitted variables that are not measured. For this reason, we urge caution in interpreting these relationships and suggest that they are best understood as hypotheses that might merit further investigation.

Appendix C: Additional Analyses of Access to Childcare and Share of Participants Receiving TANF

In this appendix, we more closely examine two program characteristics—access to childcare and the share of participants receiving TANF at program entry. These are two program characteristics that have observed associations with impacts, but those associations are not easily interpreted. In response, these explorations are intended to help better understand the mechanisms by which the program characteristics associate with impacts.

Access to Childcare

This additional analysis is motivated by the main analysis finding that access to childcare and transportation is associated with a larger impact on educational progress. If access to childcare directly influences impact magnitude only for those who access the service, then we might expect that it would benefit only those with children, and have no effect on those without children (or perhaps a negative effect if it crowds out other services).

To explore this, we start with the set of six program characteristics associated with the impact on educational progress. To isolate the effect of access to childcare, we replace "access to childcare and transportation" with "access to childcare," defined on a scale from 0 to 3 (two points if childcare assistance is directly delivered by a program, one additional point if the program delivers a referral; one point deducted if the program does not agree or strongly agree that the service meets its participants' needs). We then estimate the model separately on the full sample of participants, and on the subset of participants with no dependent children.

For the full sample of participants, we find that access to childcare is associated with a larger impact on educational progress (Exhibit C.1). Specifically, a one-unit increase in access is associated with a 2.9 percentage point increase in the impact on educational progress. We find a similar relationship for the subsample of participants with no dependent children: a one-unit increase in access to childcare is associated with a 2.5 percentage point increase in the impact on educational progress.

APPENDIX C: ADDITIONAL ANALYSES OF ACCESS TO CHILDCARE AND SHARE OF PARTICIPANTS RECEIVING TANF

Exhibit C.1: Influence of Program Characteristics on HPOG's Impact on Educational Progress

Program Characteristic	Educational Progress (%), All Participants	Educational Progress (%), Participants with No Dependent Children
Program Components		
Tuition and other financial services (range is 0-2)	9.5***	9.6**
Access to childcare (range is 0-3)	2.9***	2.5**
Employment supports (range is 0-30)	0.5***	0.5**
Emergency assistance (range is 0-7)	0.6*	1.5**
Local Context		
Unemployment rate (%)	3.1***	3.6***
Share receiving cash public assistance or SNAP (%)	−0.7*	−1.0*
Sample Size		
Individuals	10,450	3,735
Divisions	92	92
Programs	42	42

Sources: HPOG and PACE follow-up surveys.

Notes: All program characteristics are grand mean centered.

Statistical significance levels for two-sided tests are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

These results suggest that childcare assistance does not just affect impact magnitude directly, by assisting only those who access the service. Instead, provision of childcare assistance might also be an indicator of general program quality. Access to childcare appears to be just one component of a service-rich environment that enables students to achieve educational progress, regardless of whether they actually use the childcare assistance.

Share of Participants Receiving TANF

The main analysis found that programs with a greater share of their participants receiving TANF at program entry had larger favorable short-term impacts on employment in healthcare. One possible explanation is that HPOG might be more effective for TANF recipients, in which case programs with a larger share of TANF participants would have larger impacts on employment in healthcare. Alternatively, the observed relationship may not necessarily be due to programs' larger impacts for individuals receiving TANF; instead, there may be some other program characteristic that correlates with the participant composition measure that is also associated with an increase in employment in healthcare.

To explore this latter possibility, we conduct an exploratory analysis that includes only individuals who were *not* receiving TANF at program entry. If the observed relationship was due only to HPOG programs producing larger impacts for TANF recipients, then an increase in the share of participants receiving TANF should not be associated with larger impacts among non-TANF recipients.

Our analysis finds that the relationship between the share of participants receiving TANF and the impact on employment in healthcare is similar for the full sample and for non-TANF participants (Exhibit C.2). For both the full sample and non-TANF participants, a one

percentage point increase in the share of participants receiving TANF at program entry is associated with a 0.2 percentage point increase in the impact on employment in healthcare.

Exhibit C.2: Influence of Program Characteristics on HPOG's Impact on Employment in Healthcare

Program Characteristic	Employment in Healthcare (%), All Participants	Employment in Healthcare (%), Participants Not Receiving TANF at Program Entry
Program Components		
Employment supports (range is 0-30)	0.5***	0.6***
Access to social and other services (range is 0-33)	0.5***	0.5**
Implementation Features		
Employment is primary focus of program (%)	0.1***	0.1***
Participant Composition (at baseline)		
Less than high school diploma (%)	-0.2**	-0.2***
Degree or license (%)	-0.3***	-0.3***
Receiving TANF	0.2**	0.2**
Sample Size		
Individuals	10,318	8,969
Divisions	87	87
Programs	42	42

Sources: HPOG and PACE follow-up surveys.

Notes: All program characteristics are grand mean centered.

Statistical significance levels for two-sided tests are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

These results suggest the relationship between the share of TANF recipients and the impact on employment in healthcare is not due to HPOG's effectiveness for TANF recipients alone. Instead, some other program characteristic—one that is effective for both TANF and non-TANF recipients—is driving the larger impact. This underscores the importance of exercising caution in interpreting the relationship between participant composition measures and impact magnitude.

Appendix D: Details of Cluster Analysis

Cluster analysis is a data-driven, analytic procedure that uses a set of algorithms to classify observations into distinct groups. Cluster analysis is a key machine-learning tool. The algorithms seek to identify groups of observations that, within each group, are similar to one another, and between groups are dissimilar. This appendix contains details of the cluster analysis that we conducted, including the approach to identifying clusters and a set of expanded results beyond what we report in the main text. These expanded results provide a full description of the clusters using all the measures we have available.

Approach to Identifying Clusters

To define the clusters, we use a *k*-means approach. Before running the k-means algorithm, the analyst must make the following decisions.

- *What variables should the algorithm use to define the clusters?* We used program components and implementation features to define the clusters, because these are the measures of primary interest. That is, we aim to group programs according to the content of their programs (program components) and their implementation practices (features).
- *How should the algorithm measure how similar two observations are?* The *k*-means algorithm seeks to define clusters so that programs in the same cluster are similar to one another and different than programs in other clusters. The challenge is that we need a single measure of similarity between two programs that takes into account multiple program characteristics. We use the Euclidian distance metric, which calculates the distance between program x with characteristics $(x_1, \dots, x_n)$ and program y with characteristics $(y_1, \dots, y_n)$ as $\sqrt{(x_1 - y_1)^2 + \cdots + (x_n - y_n)^2}$. This is a commonly used distance metric in cluster analyses.[19]
- *How many clusters should the algorithm identify?* This is the *k* in the name of the approach. Initially, we were not sure how many clusters would be appropriate. We considered using three, four, or five clusters. This is an appropriate range because we have 42 programs, across which we expect some variation and clustering but expect a relatively small number of groupings; we do not expect many groupings of a small number of programs each because we do not conceptualize a large number of distinctive program typologies.
- *What should the algorithm use for the starting point of the cluster analysis?* Analysts can instruct the algorithm either to use a random starting point or to define starting points that would nudge the algorithm towards particularly relevant clusters. We considered both options.

[19] To make sure that this measure of similarity does not give more weight to program characteristics with a wider range of values, we transform the characteristics into z-scores to place them on a common scale. This transformation is performed separately for each characteristic and involves subtracting off the sample mean value and then dividing by the sample standard deviation.

Then, the algorithm divides the sample into a certain number (*k*) of clusters through the following iterative process.

0. Assign programs to initial clusters based on a starting point.

The analyst can select either a random starting point or define a starting point.

- *Random starting point.* The algorithm randomly selects k programs. These programs are automatically assigned to their own cluster: the first program is assigned to cluster 1, the second program is assigned to cluster 2, and the k^{th} program is assigned to cluster k. For each of the remaining programs, the algorithm determines which of the k selected programs it is most similar to and assigns the program to that cluster.
- *Analyst-defined starting point.* The analyst defines the initial clusters. For example, we considered using the program-level impacts on earnings to define the initial clusters. In this case, we created a variable that identified four groups of programs based on the quartiles of the distribution of program-level impacts on earnings. The algorithm took those groups as the initial clusters.

1. Based on the current cluster assignments, calculate cluster centers.

At the start of this step, programs are in clusters, but these clusters are not final. For each cluster, the algorithm calculates the average characteristics of the programs in the cluster. These are the new cluster centers.

2. Based on the cluster centers, reassign programs to clusters.

At the start of this step, new cluster centers have been calculated. For each program, the algorithm calculates the similarity between the program and each of the new cluster centers. The algorithm reassigns the programs to the closest cluster based on these measures of similarity.

3. Repeat steps 1 and 2 until clusters are stable.

Clusters are stable when the centers of the clusters at the end of step 1 are the same as the previous centers and the cluster assignment at the end of step 2 is the same as the previous cluster assignment.

To choose the number of clusters and the starting point for the cluster analysis, we considered five "candidates" and selected the option that identified clusters with the largest number of statistically significant differences in characteristics between clusters. Our goal was to select the set of clusters that was most distinct with respect to the six program components and two implementation features that were included in one or more of the main impact models. For each set of clusters, we tested whether each cluster was distinct from the programs in the other clusters on the eight selected features: we conducted $8n$ tests, where n is the number of clusters. To avoid giving preference to candidates with more clusters, we focused on the proportion of tests with significant differences to select the clusters. Exhibit D.1 summarizes the candidates and number of statistically significant differences between the clusters.

Exhibit D.1: Starting Points and Possible Cluster Solutions

Number of Clusters	Starting Point	Statistically Significant Differences (N)	Tests (N)	Statistically Significant Differences (%)
3	Random	12	24	50.0
4	Random	8	32	25.0
5	Random	9	40	22.5
4	Analyst-defined based on the distribution of impacts on earnings. We created a variable that identified four initial clusters based on the quartiles of the distribution of program-level impacts on earnings.	10	32	31.3
5	Analyst-defined based on the distribution of impacts on educational progress, employment, employment in healthcare, and earnings. For each of the four outcomes, we created a variable that indicated whether the program was in the top half of the distribution of impacts. To create the initial clusters, we summed these four measures. The resulting measure captures the number of outcomes for which the program had impacts above the median program impact and ranges in value from 0 outcomes to 4 outcomes. This defines 5 groups of programs.	11	40	27.5

This process resulted in us choosing the first candidate set of clusters—generated with randomly selected starting points and three clusters—as the final cluster solution that we would use.

Expanded Cluster Results

Although the clusters were defined based on program components and implementation features—which is what we focus on in the main body of the paper—this appendix reports additional characteristics. This is relevant because, in sync with the spirit of this paper's analysis, we expect that some other program characteristics might be correlated with the presence of certain program components and implementation features. Indeed, in the main analysis we control for the programs' local context and participant composition; but in the expanded cluster analysis results, we see little statistically significant cross-cluster variation in those measures.

Exhibits D.2 through D.4 contain expanded results of the clusters described in the paper's main findings, for each of the clusters, respectively. The results in the tables below include the following additional characteristics: program component and implementation features with no significant differences between clusters; local context; participant composition; and program-level measures of contrast in training and service receipt. Because only program components and implementation features were used to define the clusters, if there are statistically significant differences in any of these other measures, then they are due either to chance or to correlation between the measure and the characteristics used to define the clusters.

In brief, we observe few differences between the clusters in measures of local context. The employment-focused programs tend to operate in areas with greater population, and

education-focused programs tend to operate in areas with smaller population. Otherwise, no statistically significant differences were observed.

Participant composition measures also did not distinguish service-rich programs from the other two clusters. Sample members in education-focused programs tended to be slightly younger, had lower levels of education, were more likely to have limited proficiency in English, and worked more hours at program entry. Sample members at employment-focused programs tended to be older, had high levels of education, were less likely to have had a course on work success, and worked fewer hours at program entry.

Next, we consider the extent to which the clusters vary in terms of their overall program impacts on training participation and service receipt. Service-rich programs have larger treatment-control differences in training and service participation than the other clusters. This pattern indicates that higher values on the measures of program services offered by the program are associated with larger differences between treatment and control group receipt of services.

Exhibit D.2: Characteristics of Service-Rich Programs

Measure and Operationalization	Cluster Mean	Mean of Other Clusters	Difference	Standard Error
Program Components				
Presence of career pathways principles	3.4	4.3	−0.9	0.8
Average caseload for case managers	58.3	66.9	−8.6	17.6
Services delivered by case managers	6.0	4.2	1.8**	0.7
Social and other services	9.0	4.4	4.6**	2.0
Tuition and other financial assistance	1.6	1.3	0.3*	0.2
Childcare and transportation	4.0	4.1	−0.1	0.5
Location of services	2.9	3.9	−1.0	0.9
Employment supports	22.3	18.6	3.6	2.4
Non-cash incentives	0.9	0.0	0.9***	0.1
Facilitated peer support	1.9	1.1	0.8*	0.4
Emergency assistance	3.1	1.1	2.1**	0.7
Implementation Features				
Education is primary focus of program	2.4	15.0	−12.6*	6.5
Employment is primary focus of program	26.8	28.5	−1.7	9.7
Share of staff with at least five years of experience	12.5	12.9	−0.4	8.3
Staff perception of autonomy	4.1	4.1	0.0	0.1
Local Context				
Total population (millions)	6.1	8.1	−1.9	3.1
Share of adult population age 25 and older with some college (%)	59.7	61.5	−1.8	1.9
Share of households that received cash public assistance or SNAP in previous 12 months (%)	13.3	12.6	0.7	1.0
Share of adult population age 25 enrolled in school (%)	3.3	3.5	−0.2	0.2
Unemployment rate (%)	7.1	7.3	−0.2	0.5
Median wage of healthcare support occupations (thousands)	26.2	26.8	−0.6	1.2
Share of jobs that are in healthcare (%)	9.0	9.0	0.1	0.4
Participant Composition				
Male (%)	10.8	10.1	0.7	2.1
Married (%)	15.4	17.3	−2.0	2.7
Number of dependent children	1.3	1.3	0.1	0.1
Any dependent children (%)	65.9	63.5	2.4	4.0
Race/ethnicity - Hispanic (%)	20.5	23.5	−3.0	8.3
Race/ethnicity - non-Hispanic black (%)	29.1	35.9	−6.8	9.4
Race/ethnicity - non-Hispanic white or other (%)	50.4	40.6	9.8	10.4
Average age (years)	31.3	32.8	−1.6	1.1
Under age 25 (%)	35.6	30.7	5.0	3.5
Born outside U.S. (%)	10.3	18.9	−8.6	5.3
Highest education - less than high school (%)	4.9	10.1	−5.2	4.8
Highest education - HS diploma or equivalent (%)	46.1	34.1	12.0**	5.6
Highest education - some college (%)	31.6	36.1	−4.6	4.0
Highest education - Associate's degree or higher (%)	17.4	19.7	−2.3	3.3
Post-secondary degree (%)	16.7	18.9	−2.3	3.2
Occupational skills license (%)	20.8	21.1	−0.2	5.4
Post−secondary degree or occupational skill license (%)	32.4	35.1	−2.8	5.2
Ever attended adult basic education (%)	18.7	15.2	3.6	3.6
Ever attended ESL classes (%)	4.7	8.1	−3.4	2.3

APPENDIX D: DETAILS OF CLUSTER ANALYSIS

Measure and Operationalization	Cluster Mean	Mean of Other Clusters	Difference	Standard Error
Ever attended school success course (%)	17.6	14.5	3.1	2.9
Ever attended vocational, technical, or trade school (%)	33.3	30.6	2.8	3.5
Ever attended work success course (%)	17.6	14.1	3.5	2.6
Household income category	3.7	3.6	0.1	0.3
Received TANF in past month (%)	13.3	10.4	2.9	3.3
Received WIC or SNAP in past month (%)	62.9	55.6	7.3	7.1
Employed at enrollment (%)	44.2	43.6	0.5	4.3
Current weekly hours	25.1	24.9	0.2	1.4
Limited English (%)	0.4	1.2	−0.8	0.7
Barriers to education/employment - childcare (%)	15.6	16.7	−1.1	2.2
Barriers to education/employment - transportation (%)	13.6	17.5	−3.9	2.3
Barriers to education/employment - illness or health condition (%)	10.9	11.9	−1.0	1.2
Barriers to education/employment - alcohol/drug use (%)	0.5	0.6	−0.1	0.3
Total number of barriers (sum of previous four)	39.2	44.9	−5.8	4.8
Training and Service Receipt Contrast				
Receipt of training	13.5	8.8	4.8	3.9
Received any academic support services	19.0	9.5	9.6*	5.6
Financial aid advising	5.2	3.7	1.5	3.2
Academic advising	11.2	5.7	5.5	4.4
Assessment	16.2	6.8	9.4	5.8
Tutoring	3.2	3.8	−0.6	3.3
Peer support	9.8	2.6	7.2**	3.2
Received any career support services	23.5	12.2	11.2**	4.2
Career counseling	19.5	9.4	10.2**	4.1
Job search	19.1	10.7	8.4**	2.9
Received any other support services	24.3	9.3	15.0**	6.5
Help arranging supports	14.1	6.9	7.2	4.8
Counseling	3.4	2.5	0.9	2.3
Non-cash incentives	16.6	5.7	10.9**	3.7
Emergency assistance	10.3	1.6	8.7**	3.9
Measures of Program Contrast				
Low contrast in training content (%)	25.0	17.6	7.4	15.8
Low contrast in training access (%)	75.0	82.4	−7.4	15.8
Low contrast in financial assistance (%)	87.5	73.5	14.0	17.0
Low contrast in supports (%)	25.0	23.5	1.5	17.1
Low contrast in three or four areas (%)	12.5	14.7	−2.2	14.1

Sources: HPOG grantee survey; HPOG management/staff survey; HPOG PRS; American Community Survey; Bureau of Labor Statistics.
Notes: Statistical significance levels for two-sided tests are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

Exhibit D.3: Characteristics of Education-Focused Programs

Measure and Operationalization	Cluster Mean	Mean of Other Clusters	Difference	Standard Error
Program Components				
Presence of career pathways principles	4.0	4.2	−0.2	0.7
Average caseload for case managers	89.5	53.2	36.3**	13.6
Services delivered by case managers	4.2	4.7	−0.5	0.6
Social and other services	6.2	4.8	1.4	1.7
Tuition and other financial assistance	1.1	1.4	−0.3**	0.1
Childcare and transportation	4.6	3.9	0.7	0.4
Location of services	3.7	3.6	0.1	0.7
Employment supports	20.9	18.5	2.4	2.0
Non-cash incentives	0.0	0.3	−0.3**	0.1
Facilitated peer support	0.9	1.5	−0.6*	0.3
Emergency assistance	1.4	1.5	−0.1	0.7
Implementation Features				
Education is primary focus of program	32.1	2.8	29.3***	3.3
Employment is primary focus of program	10.6	37.0	−26.4***	6.9
Share of staff with at least five years of experience	9.5	14.4	−4.9	7.0
Staff perception of autonomy	4.1	4.0	0.1	0.1
Local Context				
Total population (millions)	3.7	9.7	−6.0**	2.4
Share of adult population age 25 and older with some college (%)	62.0	60.7	1.2	1.6
Share of households that received cash public assistance or SNAP in previous 12 months (%)	12.0	13.1	−1.1	0.8
Share of adult population age 25 enrolled in school (%)	3.6	3.4	0.2	0.2
Unemployment rate (%)	6.9	7.4	−0.5	0.4
Median wage of healthcare support occupations (thousands)	26.2	26.9	−0.7	1.0
Share of jobs that are in healthcare (%)	9.0	9.0	0.0	0.3
Participant Composition				
Male (%)	10.1	10.3	−0.2	1.7
Married (%)	18.3	16.2	2.1	2.2
Number of dependent children	1.3	1.3	0.1	0.1
Any dependent children (%)	64.0	63.9	0.1	3.4
Race/ethnicity - Hispanic (%)	27.3	20.8	6.6	6.8
Race/ethnicity - non-Hispanic black (%)	34.5	34.6	−0.2	7.9
Race/ethnicity - non-Hispanic white or other (%)	38.2	44.6	−6.4	8.7
Average age	31.3	33.2	−1.9**	0.9
Under age 25 (%)	35.2	29.8	5.4*	2.9
Born outside U.S. (%)	16.7	17.6	−1.0	4.5
Highest education - less than high school (%)	15.2	6.1	9.1**	3.8
Highest education - HS diploma or equivalent (%)	33.7	37.7	−4.0	4.9
Highest education - some college (%)	35.8	35.0	0.8	3.4
Highest education - Associate's degree or higher (%)	15.3	21.2	−5.9**	2.6
Post-secondary degree (%)	14.9	20.3	−5.4**	2.6
Occupational skills license (%)	21.1	21.0	0.0	4.5
Post-secondary degree or occupational skill license (%)	32.7	35.6	−2.9	4.3
Ever attended adult basic education (%)	15.3	16.1	−0.8	3.1
Ever attended ESL classes (%)	7.1	7.6	−0.5	2.0

APPENDIX D: DETAILS OF CLUSTER ANALYSIS

Measure and Operationalization	Cluster Mean	Mean of Other Clusters	Difference	Standard Error
Ever attended school success course (%)	16.5	14.4	2.1	2.5
Ever attended vocational, technical, trade school (%)	31.6	30.9	0.7	2.9
Ever attended work success course (%)	16.6	13.8	2.8	2.1
Household income category	3.6	3.7	−0.1	0.2
Received TANF in past month (%)	9.8	11.6	−1.8	2.8
Received WIC or SNAP in past month (%)	56.9	57.1	−0.3	6.0
Employed at enrollment (%)	46.0	42.6	3.3	3.5
Current weekly hours	26.3	24.3	2.0*	1.1
Limited English (%)	1.7	0.7	1.0*	0.6
Barriers to education/employment - childcare (%)	16.3	16.6	−0.4	1.8
Barriers to education/employment - transportation (%)	17.7	16.3	1.4	2.0
Barriers to education/employment - illness or health condition (%)	11.9	11.6	0.3	1.0
Barriers to education/employment - alcohol/drug use (%)	0.7	0.6	0.2	0.2
Total number of barriers (sum of previous four)	44.7	43.4	1.3	4.1
Training and Service Receipt Contrast				
Receipt of training	10.3	9.4	0.9	3.3
Received any academic support services	5.5	13.9	−8.4	5.2
Financial aid advising	2.8	4.6	−1.9	2.7
Academic advising	5.0	7.6	−2.6	3.7
Assessment	3.5	11.0	−7.5	5.4
Tutoring	3.2	3.9	−0.6	2.7
Peer support	3.8	4.3	−0.5	3.2
Received any career support services	10.7	16.2	−5.5	3.7
Career counseling	7.7	13.1	−5.4	3.6
Job search	8.5	14.2	−5.7**	2.5
Received any other support services	10.2	13.5	−3.3	6.5
Help arranging supports	6.1	9.4	−3.3	4.1
Counseling	2.4	2.8	−0.4	2.1
Non-cash incentives	8.9	7.8	1.1	3.8
Emergency assistance	−0.7	5.1	−5.8	3.7
Measures of Program Contrast				
Low contrast in training content (%)	7.1	25.0	−17.9	12.9
Low contrast in training access (%)	85.7	78.6	7.1	13.1
Low contrast in financial assistance (%)	57.1	85.7	−28.6**	13.6
Low contrast in supports (%)	14.3	28.6	−14.3	14.1
Low contrast in three or four areas (%)	7.1	17.9	−10.7	11.6

Sources: HPOG grantee survey; HPOG management/staff survey; HPOG PRS; American Community Survey; Bureau of Labor Statistics.
Notes: Statistical significance levels for two-sided tests are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

Exhibit D.4: Characteristics of Employment-Focused Programs

Measure and Operationalization	Cluster Mean	Mean of Other Clusters	Difference	Standard Error
Program Components				
Presence of career pathways principles	4.6	3.8	0.8	0.7
Average caseload for case managers	51.1	78.1	−27.0**	13.2
Services delivered by case managers	4.2	4.9	−0.7	0.6
Social and other services	3.2	7.2	−4.1**	1.5
Tuition and other financial assistance	1.4	1.3	0.1	0.1
Childcare and transportation	3.9	4.4	−0.5	0.4
Location of services	4.0	3.4	0.5	0.7
Employment supports	17.1	21.4	−4.4**	1.8
Non-cash incentives	0.0	0.3	−0.3**	0.1
Facilitated peer support	1.3	1.2	0.1	0.3
Emergency assistance	0.9	2.0	−1.2*	0.6
Implementation Features				
Education is primary focus of program	3.0	21.3	−18.3***	4.5
Employment is primary focus of program	41.0	16.5	24.6***	6.5
Share of staff with at least five years of experience	15.1	10.6	4.5	6.5
Staff perception of autonomy	4.0	4.1	−0.1	0.1
Local Context				
Total population (millions)	11.1	4.6	6.5**	2.2
Share of adult population age 25 and older with some college (%)	61.1	61.1	0.0	1.5
Share of households that received cash public assistance or SNAP in previous 12 months (%)	13.1	12.5	0.6	0.8
Share of adult population age 25 enrolled in school (%)	3.4	3.5	−0.1	0.2
Unemployment rate (%)	7.5	7.0	0.6	0.4
Median wage of healthcare support occupations (thousands)	27.2	26.2	1.0	1.0
Share of jobs that are in healthcare (%)	8.9	9.0	−0.1	0.3
Participant Composition				
Male (%)	10.1	10.4	−0.3	1.6
Married (%)	16.6	17.3	−0.7	2.1
Number of dependent children	1.2	1.3	−0.1	0.1
Any dependent children (%)	63.1	64.7	−1.6	3.2
Race/ethnicity - Hispanic (%)	20.9	24.8	−4.0	6.5
Race/ethnicity - non-Hispanic black (%)	36.9	32.5	4.3	7.4
Race/ethnicity - non-Hispanic white or other (%)	42.3	42.7	−0.4	8.3
Average age	33.9	31.3	2.6**	0.8
Under age 25 (%)	27.5	35.3	−7.9**	2.6
Born outside U.S. (%)	20.5	14.4	6.2	4.2
Highest education - less than high school (%)	6.5	11.4	−4.9	3.7
Highest education - HS diploma or equivalent (%)	34.4	38.2	−3.9	4.6
Highest education - some college (%)	36.4	34.3	2.1	3.2
Highest education - Associate's degree or higher (%)	22.7	16.1	6.7**	2.4
Post−secondary degree (%)	21.7	15.6	6.2**	2.3
Occupational skills license (%)	21.1	21.0	0.1	4.3
Post-secondary degree or occupational skill license (%)	36.8	32.6	4.3	4.0
Ever attended adult basic education (%)	15.1	16.6	−1.5	2.9
Ever attended ESL classes (%)	8.8	6.2	2.5	1.8

Measure and Operationalization	Cluster Mean	Mean of Other Clusters	Difference	Standard Error
Ever attended school success course (%)	13.1	16.9	−3.8	2.3
Ever attended vocational, technical, trade school (%)	29.9	32.2	−2.3	2.7
Ever attended work success course (%)	12.3	17.0	−4.7**	1.9
Household income category	3.7	3.6	0.0	0.2
Received TANF in past month (%)	10.8	11.1	−0.2	2.7
Received WIC or SNAP in past month (%)	54.8	59.1	−4.3	5.6
Employed at enrollment (%)	42.0	45.3	−3.3	3.3
Current weekly hours	23.9	25.8	−1.9*	1.0
Limited English (%)	0.9	1.2	−0.4	0.6
Barriers to education/employment - childcare (%)	17.0	16.0	1.0	1.7
Barriers to education/employment - transportation (%)	17.4	16.2	1.2	1.9
Barriers to education/employment - illness or health condition (%)	11.9	11.6	0.4	1.0
Barriers to education/employment - alcohol/drug use (%)	0.6	0.6	0.0	0.2
Total number of barriers (sum of previous four)	45.1	42.7	2.4	3.8
Training and Service Receipt Contrast				
Receipt of training	7.7	11.5	−3.7	3.1
Received any academic support services	11.6	11.5	0.1	4.9
Financial aid advising	4.4	3.7	0.7	2.6
Academic advising	6.2	7.3	−1.1	3.5
Assessment	8.6	9.2	−0.5	5.0
Tutoring	4.1	3.2	0.9	2.6
Peer support	1.9	6.5	−4.6	2.7
Received any career support services	13.3	15.4	−2.1	3.6
Career counseling	10.5	12.0	−1.5	3.4
Job search	12.2	12.3	−0.1	2.5
Received any other support services	8.8	16.5	−7.7	5.7
Help arranging supports	7.5	9.0	−1.5	3.9
Counseling	2.5	2.8	−0.3	1.9
Non-cash incentives	3.9	12.3	−8.4**	3.1
Emergency assistance	2.8	4.2	−1.4	3.5
Measures of Program Contrast				
Low contrast in training content (%)	25.0	13.6	11.4	12.3
Low contrast in training access (%)	80.0	81.8	−1.8	12.4
Low contrast in financial assistance (%)	85.0	68.2	16.8	13.2
Low contrast in supports (%)	30.0	18.2	11.8	13.4
Low contrast in three or four areas (%)	20.0	9.1	10.9	10.9

Sources: HPOG grantee survey; HPOG management/staff survey; HPOG PRS; American Community Survey; Bureau of Labor Statistics.
Notes: Statistical significance levels for two-sided tests are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

In addition to the above reporting of *all* of the program-level measures that we have, we also report, in Exhibit D.5, how the clusters distribute across the type of institution operating the programs. Across all 42 programs: 12 were operated by workforce development agencies; 21 were operated by institutions of higher education; and nine were operated by other government agencies or non-profit institutions. Exhibit D.5 shows that institutions of higher education appear to be the most common program type in the service-rich and employment-focused clusters, and workforce agencies the most common program type in the education-

focused cluster; however, a formal test indicated that the distribution of program type is not statistically different across clusters.

Exhibit D.5: Number of Programs in Each Cluster, by Institution Type

Type of Institution	Number of Programs in the Service-Rich Cluster	Number of Programs in the Education-Focused Cluster	Number of Programs in the Employment-Focused Cluster	Total, All Clusters
Workforce agency	1	6	5	12
Institution of higher education	6	4	11	21
Government or nonprofit	1	4	4	9
Total, all institution types	8	14	20	42

Note: Distribution of program type is not statistically different across clusters, according to chi−square test of independence (*p*−value = 0.303)

Appendix E: Alternative Model Specification

In this paper, our main analysis includes program characteristic measures that derive from program-level data collection, and so represent the programs' offerings and context. For example, our measure of "childcare assistance" reflects whether a program *offered* that assistance; it does not reflect the extent to which those randomized into the treatment group took up that assistance or the extent to which those randomized to the control group had access to and took up comparable assistance.

In this appendix, we explore whether measures of treatment-control difference in service receipt might associate with impacts differently than program characteristics. To do so, we conduct an alternative analysis that uses treatment-control contrasts at the study participant level in addition to characteristics measured at the program level. The study's short-term follow-up survey asked participants whether they had enrolled in training or received various types of academic, career, or other support services during the study period.[20] From these participant responses, we constructed measures of differential training and service receipt contrast at the program level, by taking the difference between the share of treatment group members reporting each service and the share of control group members reporting each service. This difference reflects the extent to which the treatment group participated in training or services at a different level than the control group.

To investigate whether these measures might have influenced program impact, we estimated an alternative specification of the model described in the main text. We added these measures of training and service receipt contrast to the set of program characteristics eligible for selection in the empirical model, to see whether any of the contrast measures would be selected instead of the program characteristics. We included both the summary measures (e.g., any academic support services) and the component measures (e.g., financial aid and academic advising) as candidate measures in the empirical selection process. In some cases, the overall measure was selected for inclusion (e.g., received any academic support services) and in others the component measure was selected (e.g., non-cash incentives). As shown in the Exhibit E.1, few measures of training and service receipt contrast were selected by the model. For three outcomes—educational progress, employment, and earnings—only one measure of treatment-control difference in service receipt was selected; for employment in healthcare, no measures of treatment-control difference were selected.

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[20] "Enrollment in training" includes enrollment in classes providing regular college credit; classes providing occupational training; classes to learn English as a second language; or basic skills classes. "Academic support services" includes financial aid advising services; academic advising (e.g., help choosing courses); assessments of skill sets (e.g., using ACT's WorkKeys and Compass, or Tests of Adult Basic Education); tutoring; or peer support services. "Career support services" includes career counseling or job search or placement assistance. "Other support services" includes help arranging supports to manage school or work (e.g., childcare, transportation); personal counseling; non-cash incentives (e.g., a gift card for completing a course); or emergency assistance or funds to cover the costs of an unexpected personal crisis (e.g., utility shutoff or car repair).

APPENDIX E: ALTERNATIVE MODEL SPECIFICATION

In terms of substantive results pertaining to the treatment-control differences in training and service receipt, an increase in the treatment-control difference in receipt of academic support services is associated with a larger impact on educational progress. We also find that an increase in the treatment-control difference in receipt of other support services is associated with a smaller impact on employment, while an increase in the treatment-control difference in receipt of non-cash incentives is associated with a smaller impact on earnings. Finally, we note that the inclusion of the treatment-control differences affected the magnitude and significance of the selected program characteristics—notably, employment supports are no longer significantly associated with the earnings impact magnitude.

Exhibit E.1: Influence of Program Characteristics on HPOG's Impact (including training and service receipt contrast)

Program Characteristic	Educational Progress (%)	Employment (%)	Employment in Healthcare (%)	Earnings ($)
Program Components				
Tuition and other financial services (range 0-2)	7.2***			
Childcare and transportation (range 0-8)	1.8**			
Employment supports (range 0-30)	0.4**		0.5***	
Social and other services (range 0-33)			0.5***	
Emergency assistance (range 0-7)				1.0***
Non-cash incentives (range is 0-1)		−4.1*		−5.2***
Implementation Features				
Employment is primary focus of program (%)			0.1**	
Share of staff with five or more years of experience (%)		−0.1**		
Training and Service Receipt Contrast				
Receipt of training (%)				
Received any academic support services (%)	14.9*			
Financial aid advising				
Academic advising				
Assessment				
Tutoring				
Peer support				
Received any career support services (%)				
Career counseling				
Job search				
Received any other support services (%)		−15.6**		
Help arranging supports				
Counseling				
Non-cash incentives				−22.7***
Emergency assistance				
Local Context Features				
Unemployment rate (%)				1.2*
Participant Composition Measures				
Less than high school degree (%)			−0.2**	−20.5**
High school degree or equivalent (%)		0.1**		
Hispanic (%)	−13.3**			
Degree or license at program entry (%)			−0.3	
Receiving TANF (%)			0.2**	
Number of barriers (%)	−16.2**			
Childcare barrier (%)		0.4***		
Attended ESL at program entry (%)		−49.9***		

Under age 25 (%)				15.2***
Sample Size				
Individuals	8,090	10,112	10,318	10,369
Divisions	85 [a]	83 [b]	87 [c]	85 [d]
Programs	36	35	42	36

Sources: HPOG and PACE follow-up surveys; National Directory of New Hires.
Notes: All program characteristics are grand mean centered.
Statistical significance levels for two-sided tests are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.
[a] The sample excludes six divisions and six programs due to missing data for "received any academic support services," and one division due to missing baseline race/ethnicity.
[b] The sample excludes six divisions and six programs due to missing data for "received any other services," two divisions and one program due to missing data for ""share of staff with at least 5 years of experience," and one division due to missing data for baseline educational attainment.
[c] The sample excludes one division due to missing data for "employment is primary focus of program," and one division due to missing data for baseline educational attainment.
[d] The sample excludes six divisions and six programs due to missing data for "received non-cash incentives," and one division due to missing baseline educational attainment.

Overall, we observe limited evidence that treatment-control differences in training and service receipt are associated with impact magnitude. This suggests that in the context of HPOG 1.0, the program characteristics accurately reflect what the programs offered and how they offered them. The self-reported measures likely face recall error: participants are less likely to remember precisely their program experiences that might have taken place at least one year earlier. Further, self-reported measures of service receipt are binary responses (yes/no) and do not reflect nuances in the amount of the service received or any difficulties in obtaining access. The ease and coverage of access are important measures of this assistance but are not captured well in treatment-control contrast of self-reported service receipt. We encourage future research (1) to be explicit about which type of measure it is using (program-level or self-reported/treatment-control contrast); and (2) to explore empirically the possible differences in results based on differences in the source of measure.