A META-ANALYSIS OF

46 Career Pathways Impact Evaluations

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Abstract

This report summarizes 46 impact evaluations that focus on programs that embed elements of the career pathways approach. In the past decade, the career pathways approach to workforce development emerged as a promising strategy to promote long-term earnings advancement and self-sufficiency by helping workers attain in-demand postsecondary credentials (Fein, 2012). The approach involves a combination of rigorous and high-quality education, training, and other services to support participant success (WIOA, 2014). The programs that are at the center of the 46 evaluations in this meta-analysis are diverse across a wide variety of dimensions—including what they offer, how they provide those offerings, who they serve, and their local contexts. Based on robust evidence, the meta-analysis reports the average impacts from these 46 evaluations, revealing that the career pathways approach leads to large educational progress gains, large gains in industry-specific employment, small gains in general employment, small gains in short-term earnings, and no meaningful gains in medium/longer-term earnings. Additional, exploratory analyses identify some factors that appear to associate with smaller or larger impacts in the evaluated programs.

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Executive Summary

Over the last 30 years, adults in the United States with a high school education or less have experienced stagnating wages and relatively high unemployment, whereas those with postsecondary credentials enjoyed economic gains (Autor, 2015; Carnevale et al., 2016). The career pathways approach to workforce development (see box) emerged to help less educated workers advance to better paying jobs by earning in-demand postsecondary credentials. State and local interest in the career pathways approach has expanded in recent years, in part due to a focus on it in the 2014 Workforce Innovation and Opportunity Act (WIOA).

The Career Pathways Approach in Brief

The career pathways approach involves a combination of rigorous and high-quality education, training, and other services (WIOA, 2014) and includes the following (Fein, 2012). Career pathways varyingly…

- offer _**articulated steps**_ in an industry sector, offering multiple places to enter and exit training;

- result in _**recognized credentials**_ that intend to lead to better jobs with higher pay;

- use _**support services**_ and provide _**flexibility**_ to help non-traditional students succeed; and

- rely on _**employer connections**_ and partnerships.

To respond to the need for more career pathways information and evidence, the U.S. Department of Labor (DOL)'s Chief Evaluation Office, in collaboration with the Employment and Training Administration, contracted with Abt Associates to conduct the **Descriptive & Analytical Career Pathways Project (D&A CP Project)**. The project's purpose is to advance the evidence base in the career pathways field by addressing key research gaps, drawing on existing data. The knowledge generated is intended to inform career pathways systems and program development to help meet the needs of both participants and employers. The D&A CP Project aims to analyze the evidence in a systematic way to account for differences in research design and quality across studies, by leveraging existing evaluation data to conduct a formal meta-analysis, reported here.

The meta-analysis is designed to answer two research questions (1) What is the overall impact of the career pathways approach on participants' educational progress and labor market outcomes? (2) Which characteristics of career pathways programs most closely associate with impacts?

Summary of Findings

The report details findings related to these two research questions about the overall impact of the career pathways approach, and about the characteristics of career pathways programs that associate with impacts. We have a high degree of confidence in our answer to the first research question about overall impacts. Indeed, because that analysis is based on 46 impact evaluations, which themselves supported causal conclusions, we use causal language in discussing this set of findings. In comparison, we have less confidence in the analysis of the characteristics that associate with impacts, simply by virtue of the analytic methods used in the individual studies on which these findings rely. Those analyses are

correlational, and not causal, implying that we interpret those findings accordingly, as descriptive of some possible relationships.

OVERALL IMPACTS OF THE CAREER PATHWAYS APPROACH

The meta-analysis first examined the average impact of the career pathways approach on educational progress and labor market outcomes, as reported in the evaluations. We used a Bayesian analytic approach and the findings that we report are those in which we have a high degree of confidence and are comfortable using causal language. Because the evaluations on which this meta-analysis is based all reach causal conclusions about program impacts, this set of findings does so as well. When we reference the "control/comparison" group, this refers to the aggregate across the evaluations; likewise, when we reference the "program" group, it is across the evaluations. As elaborated in this report's Chapter 2, the analysis revealed that, as represented in the 46 evaluations in our dataset, on average the career pathways approach led to favorable impacts on educational progress and some labor market outcomes as follows:

> **Interpretation of Findings**
>
> We report three types of evidence, which we flag with the icons on the left and color code throughout the report to aid the reader in understanding how to interpret the findings:
>
> **H** We have a high level of confidence in the overall meta-analysis findings, and they can support *causal* conclusions.
>
> **M** We have a medium level of confidence in the meta-regression findings, and they provide evidence that is *suggestive* of possible causal relationships.
>
> **L** We have a low level of confidence in the block analyses and correlation matrix, which provide *exploratory* evidence that is not causal.

H The career pathways approach *increased educational progress* (measured as credential receipt) by a relatively large amount, corresponding to a 155 percent relative gain (based on 33 evaluations), an increase from 18 percent in the control/comparison group to 45 percent in the program group.

H The career pathways approach *increased employment in the industry trained for* by much more than it increased general employment, a 72 percent relative increase, an increase from 26 percent in the control/comparison group to 45 percent in the program group (based on 24 evaluations).

H The career pathways approach *increased short-term earnings* (i.e., earnings up through 35 months) by a very small amount, a 6 percent relative increase, corresponding to about $260 per quarter, from an average of $4,081 in the control/comparison group to $4,342 in the program group (based on 37 evaluations).

H The career pathways approach *did not meaningfully increase medium/long-term earnings* (i.e., earnings measured 36 or more months out; based on 16 evaluations), meaning that the program and control/comparison groups' earnings were quite similar (just over $10,000 in both groups).

CHARACTERISTICS OF CAREER PATHWAYS PROGRAMS THAT ASSOCIATE WITH IMPACTS

The second part of the analysis used a "meta-regression" to control for some characteristics while identifying how certain other characteristics were associated with program impacts. Whereas the results from the overall meta-analysis can be interpreted as causal (they are based on impact evaluations, all of which make causal claims), the results from the meta-regression analysis are not causal. As such, they indicate associations between the characteristics and impacts.

As elaborated in this report's Chapter 3, the analysis involved examining the direction and strength of many relationships between program characteristics and impacts. The analysis found several characteristics that have stronger and larger relationships with impacts, making them possibilities for the career pathways field to consider as elements of a successful program. Specifically, the analysis found the following:

> **Program Characteristics**
>
> The following types of characteristics were included in the meta-analysis:
>
> - Program components, such as:
>   - Administrative arrangements
>   - Basic skills instruction
>   - Flexible instruction
>   - Training offerings
>   - Employer engagement and roles
>   - Support services
>   - One-on-one assistance
> - Local Context, specifically unemployment rate
> - Participant characteristics, such as:
>   - Gender
>   - Race/Ethnicity
>   - Age
>   - Educational background

- **M** Larger educational progress impacts were associated with a *staffing agency* serving as a partner, or when employer engagement activities involved *employer input on curricula or program design.*

- **M** Those programs that had a *community or technical college* as the lead or partner all had favorable educational progress impacts, but those impacts were smaller in size, on average.

- **M** Larger labor market impacts were associated with programs that had a larger share of *Black participants*.

- **M** Smaller labor market impacts were associated with programs that offered *flexible sequencing* of courses or offered *tuition or other financial assistance*.

A third set of findings that this study reports stem from the "building blocks" that led to these meta-regressions. Those block analyses include exploratory analyses of the associations between various evaluation characteristics and impacts, and one-by-one correlations between those characteristics. This kind of evidence is weak, but people may still find it interesting for descriptive purposes, and to consider what research might focus on in the future.

In considering findings from the meta-regressions, it is important to acknowledge some technical limitations, which imply being cautious about interpreting results. First, we are limited by what the authors of evaluation reports chose to report; some potentially important characteristics were not reported consistently or at all by enough evaluations to include in our analyses. Second, because none of these characteristics were randomized to programs, they very well may be correlated with other characteristics, including those that we did not or could not measure. Moreover, when it came to selecting characteristics that appeared useful in explaining educational progress impacts specifically, a larger number of

characteristics appeared relevant than the final meta-regression could accommodate. Therefore, these results are not causal but correlational, indicating possible associations between the characteristics and impacts, which would warrant further research to understand their implications for practice.

With those caveats in mind, the results of our meta-regressions suggest a pattern of larger impacts associated with characteristics more commonly found in sectoral training programs led by private nonprofit entities (sometimes in partnership with community colleges and sometimes not). It is not obvious how to interpret these findings. It is possible, for example, the larger educational progress impacts for programs with a staffing agency partner and the smaller impacts for those with community college partners may reflect program characteristics not controlled for in the meta-regressions, given the very small number of evaluations that did include staffing agencies (3) or did not include community colleges (5). These program characteristics could include such factors as program selectivity, funding levels, occupations trained for, or strength of employer relationships.

The community college finding may also reflect that those evaluations had a smaller contrast between what the program and control/comparison groups experienced, leading to smaller impacts. Even when programs achieve favorable outcomes for their participants, evaluation impacts may be smaller if control/comparison group members are easily able to access similar services on their own. This could be especially true for community college career pathways programs where participants are typically receiving the same occupational training as others at the college—meaning the primary contrast may be about the additional services and supports that programs provide or other contextual elements. By contrast, a private nonprofit program that delivers its own specialized training that only program participants can access implies a much greater service contrast in an evaluation relative to the control/comparison group.

Implications of Findings for Programs and Policy and for Future Research

PROGRAM AND POLICY IMPLICATIONS

Considering **overall impact** findings from 46 evaluations, we found that the career pathways approach achieved large educational progress gains, on average, compared to "business-as-usual." We also found that the approach generated large impacts on industry-specific employment, but small impacts on overall employment rates and short-term earnings. Impacts on medium/long-term (36+ months) earnings were not meaningfully different from zero. It is worth noting that 16 evaluations reported medium/long-term (three+ years) earnings impacts, and fewer still reported impacts over more than five years. More research, including longer follow-up periods, is needed to better understand earnings outcomes over time. These overall impact findings suggest that program efforts should focus on turning strong impacts on educational progress and industry-specific employment into larger and more sustained earnings gains.

To better translate education achievements into higher earnings, policymakers and practitioners might consider targeting higher level credentials from the outset. Currently much of the training in career pathways programs is short term and for relatively low paid, entry-level jobs, and evidence to date suggests the majority of participants do not continue on in a pathway to higher-level training and jobs. Some programs that target longer-term, more advanced training from the outset, such as Project Quest, have had larger and more sustained impacts on earnings. Programs might also improve earnings results by using labor market information to target occupations and industries that have high potential for advancement. Some programs that target sectors other than healthcare, such as information technology

(IT) or financial services, have had large and sustained impacts on earnings. These include Year Up and Per Scholas. Policymakers and practitioners must, of course, balance multiple objectives and tradeoffs in making choices about career pathways implementation, including the target population, local labor market conditions, and available program resources. Tradeoffs to targeting initial training to better paying occupations may include, for example, higher attrition if training requires more time to complete or curtailed access if it involves unrealistically high training entry requirements for a program targeting a population with lower literacy or numeracy skills.

Career pathways policy and practice must also balance dual goals of improving labor market outcomes for participants while also addressing employer workforce needs. Our analysis suggests the career pathways approach on average has been more successful at responding to employer needs (connecting people to in-demand jobs for which they trained) than advancing workers, as evidenced by weak earnings impacts. Going forward policymakers and practitioners might consider ways to better target career pathways training to occupations and industries that can strike a better balance, those that allow programs to meet employer workforce needs while also offering participants a chance to significantly boost earnings. A separate study for this project focuses on exploring career trajectories and occupational transitions in the wider labor market with an eye toward identifying promising occupational steps (see Clarkwest et al., 2020).

In examining **effectiveness factors**, our analysis used meta-regression to explore a number of program characteristics and observed some suggestive relationships. Policymakers and programs may be especially interested in our finding that a community college as the lead agency or a partner in a pathways program is associated with smaller—although on average positive—impacts on educational attainment. It is important to note that our educational attainment finding does not imply that community or technical colleges should not operate career pathways programs. Community colleges are an integral part of the workforce development system and career pathways programs run by community colleges serve much larger numbers of participants overall than programs led by other types of organizations. Given that, policymakers might need to recognize that community college impacts on educational progress should not be compared directly to programs that have a different scale and administrative structure, and possibly, different target populations and resources available.

Alternatively, the community college finding may mean that these institutions face additional challenges—not faced by small, private nonprofit programs—to ensuring that participants can move forward with their goals. They may face a tradeoff between being more selective and/or providing more intensive services in order to produce larger impacts but at a smaller scale than usual vs. prioritizing serving more individuals and/or more disadvantaged individuals with smaller impacts but benefiting more people. To the extent community college career pathway services are publicly funded, such tradeoffs involve policy choices about the goals of a particular program or grant initiative. Nevertheless, there may also be aspects of successful sectoral training programs that community colleges could usefully replicate while accommodating their broader missions, such as providing participants with a more structured experience, targeting more promising occupations, or building stronger relationships with employers.

In general, our findings should be treated as informative for policy and programs but not prescriptive. The overall meta-analysis results can be interpreted as causal; whereas the meta-regression (effectiveness factor) results offer suggestive evidence, and the initial block analyses on which those are based should be interpreted as exploratory. All things being equal, programs might consider implementing or emphasizing those characteristics found to be associated with larger impacts, while keeping in mind that evidence of a clear causal relationship does not yet exist. It is worth considering the diverse settings,

populations, and goals of various programs. This analysis does not offer evidence to suggest that programs should prioritize or abandon any particular characteristic, especially given the relatively small number of evaluations that contributed data on some of the characteristics we analyzed. Rather, programs may want to consider these findings alongside information they have about the population they serve and the resources they have available.

CHALLENGES AND FUTURE RESEARCH

Our findings and experience conducting the meta-analysis reveal challenges to this type of analysis, suggest possible solutions, and indicate several areas for future research that builds on this study.

The key challenges we faced in selecting and coding evaluations for this meta-analysis concern variation in programs studied, evaluation design quality, and incomplete and inconsistent reporting on the impact findings and on the characteristics of programs and participants included in the evaluations. One solution to the challenge of gaps in program component and characteristics reporting would be for the workforce development field to embrace the practice of establishing "core components" (e.g., Hoffman, 2020) as has been done in other fields Once core components are identified, practitioners and researchers can report on those components consistently. This report makes detailed recommendations for ways to improve workforce development evaluation reporting. An alternative or complement to having core components and characteristics readily and consistently available from a program evaluation is to consider pooling individual-level data across multiple evaluations in order to do participant-level meta-analysis.

To the extent that reporting and quality issues are addressed, future meta-analyses of workforce development programs could synthesize findings across more studies—so, a larger sample size to aggregate across—and also potentially analyze data within similar subgroups of programs. More consistent and complete reporting in evaluations could facilitate the grouping of programs along key dimensions and allow future meta-analyses to examine more characteristics that may associate with impacts. Alternatively, the program characteristics that this study identified as suggestively related to program impacts, including types of partnerships, employer input on program curricula or design, and financial assistance, could be directly tested in well-designed impact evaluations. For example, a new evaluation might randomize—across two or more treatment groups—the extent or type of tuition or other financial assistance to which participants have access. Doing so would shed light on that assistance as a mechanism for impacts. Although such approaches would likely only be able to focus on a small number of characteristics at a time, they would offer the greatest confidence that implementing a certain characteristic would lead to greater or lesser impacts.

Our findings suggest two other areas, beyond career pathways evaluations, in which future research could build the evidence base further to improve workforce development programs. First, future research could closely compare attributes of private, nonprofit sectoral training programs with those of programs led by other entities, including community colleges and workforce agencies, to dig deeper into key ways in which program and participant characteristics differ. This could potentially clarify the most important factors behind disparities in impacts and suggest whether elements of sectoral training could usefully be adapted to different settings and populations to improve results. That could be followed by pilots to test this kind of replication and scaling of promising program elements.

Second, the role that targeted industry sectors, occupations, and occupational steps may play in different program results deserves more attention, especially given the disconnect found in our analysis of overall impacts between programs producing strong education gains but weak earnings gains. There has been

surprisingly little labor market research on the different paths individual workers take to higher wages, and what can be learned from that for workforce development programs focused on advancement. To that end, another study under this project, the Career Trajectories and Occupational Transitions Study, is exploring workers' experiences after beginning mid-level jobs to determine which jobs tend to be launchpads for wage growth as well as other factors (such as participant skills and other characteristics) that are associated with wage growth. This research could provide programs and policymakers with insights into promising occupations and industries for training. In addition, analyses of labor market disparities in wage growth, such as along racial/ethnic or gender lines, could reveal subgroups that programs should especially seek to support to advance.

Glossary

Control group and/or comparison group — the group of participants in an evaluation that does not receive the access to the program. In a randomized experiment this group called a "control" group, and in quasi-experimental evaluations this group is called a "comparison" group.

Composite outcome — an outcome that combines across multiple similar outcomes to represent a single measure of the indicator of interest that the program aims to improve (for parsimony, sometimes we use just ***outcome***).

Effect size — the evaluation's reported impact in a standardized unit (also: ***standardized effect size***). Each evaluation has a single "composite" effect size that is a weighted average of all the relevant effect sizes reported in that evaluation (e.g., year 1, year 2, and year 3 earnings are averaged to produce a single composite earnings effect size).

Effectiveness factors — those program characteristics that have the potential to associate with impacts.

Evaluation — the unit of analysis for the meta-analysis. An evaluation represents the estimate of a program's impact on a unique group of study participants (synonym: ***study***).

Evaluation data — characteristics of a given evaluation (e.g., research design, sample size) (synonym: ***meta-data***).

Experimental evaluation design — an evaluation design that randomizes eligible people into program and control groups such that the difference in the two groups' outcomes can be interpreted as the causal impact of the program (synonym: ***randomized controlled trial***).

Impact — the difference in outcomes that a program generates; for example, that a program increases the number of participants earning a credential by 10 percent is one of that program's impacts (synonym: ***effect***).

Meta-regression — an analysis that explores how multiple characteristics simultaneously associate with impacts.

Outcome — the specific indicator that the program aims to improve (e.g., *credentials received*, within the educational progress domain, or *quarterly earnings*, within the labor market domain; synonyms: ***measure, variable***).

Outcome domain — a grouping of outcomes that relate to one another (e.g., educational progress outcomes, labor market outcomes).

Program — a set of well-defined activities (i.e., education and training offerings, support services, employer partnerships) targeted at a specific set of participants. Many evaluations in our dataset studied only a single program, but others studied multiple programs (e.g., an evaluation of a funding stream), and we refer to either as the "program" that is the focus of the evaluation.

Program characteristic — aspects unique to a given program (e.g., local context, participant characteristics, program design, program implementation).

Quasi-experimental evaluation design — an evaluation design that uses a non-random process for identifying a comparison group such that the resulting estimated impact (difference in the program group's and comparison group's outcomes) carries caveats to its interpretation as causal.

Chapter 1. Introduction

Over the last 30 years, adults with a high school education or less have experienced stagnating wages and relatively high unemployment while those with postsecondary credentials enjoyed economic gains (Autor, 2015; Carnevale et al., 2016). The career pathways approach to workforce development emerged to help less educated workers advance to better paying jobs by earning in-demand postsecondary credentials. The approach involves articulated steps of education, training, and jobs within an industry sector or occupational cluster, combined with other services to support participant success (WIOA, 2014).

State and local interest in the career pathways approach has expanded in recent years, in part due to a focus on it in the 2014 Workforce Innovation and Opportunity Act (WIOA) (Sarna & Strawn, 2018; Schwartz et al., 2018). To respond to the need for greater information and evidence on the career pathways approach, U.S. Department of Labor's (DOL's) Chief Evaluation Office, in collaboration with the Employment and Training Administration, contracted with Abt Associates to conduct the **Descriptive & Analytical Career Pathways Project** (D&A CP Project). The project's purpose is to advance the evidence base in the career pathways field by addressing key research gaps, drawing primarily on existing data, to inform career pathways systems and program development to help meet the needs of both participants and employers. The project builds on earlier work Abt conducted for DOL under the **Career Pathways Design Study** (CP Design Study; Sarna & Strawn, 2018; Schwartz et al., 2018), which scanned career pathways research and practice, interviewed stakeholders, and pointed to ways to fill evidence gaps (Peck et al., 2018).[1]

As part of this work, Abt summarized findings from a relatively large[2] and growing body of evidence on the effectiveness of career pathways programs. Considering not just DOL's projects but also projects funded by the U.S. Departments of Health and Human Services and Education as well as others, these tallies of the average career pathway program impacts across evaluations suggest an encouraging picture, although one that is more consistently positive for education outcomes than for labor market ones (Sarna & Adam, 2020; Strawn & Schwartz, 2018). These scans (conducted under the CP Design Study and as part of the knowledge development phase of this project), however, do not analyze the evidence either empirically or in a way that accounts for differences in research design across studies. The D&A CP Project aims to do that by leveraging existing evaluation data to conduct a formal meta-analysis, reported here. Because the meta-analysis is based on impact evaluations that themselves lead to causal conclusions, it allows us to determine with high confidence whether career pathways programs have an impact on educational progress and labor market outcomes. It also permits us to describe the magnitude of those impacts, as an empirically computed average across the evaluations included in the meta-analysis.

Further, this meta-analysis seeks to not only determine what *overall impact* the career pathways approach to workforce development has, but also to understand which *particular characteristics* of career pathways programs contribute to those impacts. This second part of the analysis draws on patterns in the data. As such, it leads to suggestive but not causal conclusions. Regardless, we believe that these observations will be relevant to policymakers and practitioners who might seek to continuously improve

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[1] These scans and the report outlining evaluation design options are available on CEO's completed reports page: https://www.dol.gov/agencies/oasp/evaluation/completedstudies

[2] The scans included a review of 52 research studies and information on 128 career pathways initiatives.

program operations. They might selectively adopt—to the extent feasible—the characteristics identified to make the career pathways approach more effective in helping people improve their educational progress and labor market outcomes.

In sum, this study contributes to the evidence base by (1) documenting the characteristics of 46 impact evaluations and the career pathways programs on which they focus; (2) descriptively analyzing how those characteristics relate to one another and to program impacts; and (3) empirically aggregating the impact results to support causal conclusions about the impacts of the career pathways approach (as represented in this study's 46 evaluations).

1.1 Meta-Analysis Research Questions & General Approach

The D&A CP Project's meta-analysis is designed to answer two research questions:

(H) **Overall impact (RQ1):** What is the overall impact of the career pathways approach on participants' educational progress and labor market outcomes?

(H) **Effectiveness factors (RQ2):** Which characteristics of career pathways programs most closely associate with impacts?

Exhibit 1-1 summarizes how the study approaches each research question and describes the levels of confidence for each type of analysis (high, medium or low as indicated by the H, M, L icons and the color coding). Both lines of analysis involve aggregating across existing evaluations of career pathways programs. To that end, the project team first identified 46 evaluations from among those included in the CP Design Study and the D&A CP Project scans. These evaluations focused on a diverse set of career pathways programs with varying characteristics and impacts. Next, we coded information from each evaluation into a single dataset for analysis.

To address the first research question, the meta-analysis estimates **overall impacts** (i.e., averages across all 46 evaluations[3]) within two outcome domains: *educational progress* and *labor market*. We label the educational progress domain's single outcome as "credential receipt," which includes several specific, similar outcomes (e.g., degree attainment, industry-recognized credential received) that we harmonized into a single outcome, as needed for the meta-analysis. The labor market domain has four outcomes, again, each of which is aggregated and harmonized from across the evaluations: (1) employment, (2) employment in industry trained for, (3) short-term earnings, and (4) medium/long-term earnings. This part of the meta-analysis yields a single estimate of the average impact for each of these outcomes that we examine, with additional outcomes reported in Appendix D. We have high confidence in these results in terms of their ability to support causal conclusions. In addition to an average impact, we also consider the cross-evaluation variation in impacts for each outcome, which motivates analysis of the second research question.

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[3] These 46 evaluations cover more than 46 programs because multiple programs were sometimes included in the same evaluation. The study team coded at the smallest unit for which impacts were reported.

To address the second research question, we use a "meta-regression" to assess the contributions of selected characteristics of career pathways programs that are associated with smaller or larger, favorable or unfavorable impacts. These characteristics we term potential "**effectiveness factors**"—that is, program characteristics that might make some career pathways programs more effective than others. We have a medium level of confidence in these results. This part of the meta-analysis involves first coding the specific characteristics of each program, and then analyzing how the variation in those characteristics is associated with variation in overall impacts. As with the analysis of overall impacts, the educational progress domain's single outcome is credential receipt. For this research question, in the labor market domain, we analyze only a single outcome, which is a composite of overall employment and earnings.

Understanding the relationship between these program characteristics and impacts yields information that has the potential to inform future program design and implementation choices.

1.2 How to Interpret Study Findings

We place varying levels of confidence in these three main types of results, a point that we elaborate briefly here and in Exhibit 1-1 to aid readers in their interpretation of this study's results. We use the term "confidence" in the results to mean *confidence in our ability to draw causal conclusions* from those results. As Exhibit 1-1 summarizes, we have high confidence in results from the meta-analysis of overall impacts; they lead us to draw causal conclusions. The meta-regression of potential effectiveness factors has a medium level of confidence; the results are *suggestive* of possible causal relationships but should be interpreted with consideration of other confounding factors. We have a low level of confidence in the findings that feed into the meta-regression (the block analyses and the correlation matrix). They should not be used to support causal conclusions, but instead are exploratory and potentially useful as descriptive evidence.

Exhibit 1-1. Levels of Confidence for Evidence Presented in Report

Confidence	Source of Evidence & Explanation		Interpretation Guidance
High (H)	**Meta-analysis** of overall impacts. The meta-analysis is based on 46 high-quality impact evaluations, each of which used a design that supports causal claims.	**Causal**	The findings can be interpreted as causal. The findings apply to the evaluations included in the meta-analysis and generalizability beyond the included evaluations should be limited to the kinds of (diverse) programs that the evaluations focus on.
Medium (M)	**Meta-regression** of potential effectiveness factors. Because the meta-regression analyzes variables that the block analyses identified as potentially influential, and controls for those factors together in one model, the evidence—while still only associational and not causal—is stronger than the evidence from the block analyses alone.	**Suggestive**	The findings can be interpreted as suggestive of which factors seem to influence impacts. Although stronger evidence than "exploratory" alone, these findings should not be used to support causal conclusions but should be used to inform future questions about what to examine further.
Low (L)	**Block analyses** used to identify variables to be included in the meta-regression. This analysis is purely exploratory, analyzing 3-5 variables at a time to identify which seem to have a stronger relationship to impacts. **Correlation matrix** identifies one-at-a-time correlations between two variables.	**Exploratory**	The findings can be interpreted as exploratory: Readers can consider, one at a time, how the characteristics relate to one another (correlation matrix) and to impacts (block analyses). These findings should not be used to support causal conclusions but should be used to inform future questions about what to examine further.

Throughout this report we will use the icons and coloring used in Exhibit 1-1 to flag the level of confidence associated with conclusions from the various findings.

1.3 Outline for the Report

The rest of the report proceeds as follows:

Chapter 2: Overall Impact Findings reports the overall impacts on the outcomes of interest (RQ1). These results provide strong, **causal evidence** of the effectiveness of the career pathways approach.

Chapter 3: Potential Effectiveness Factors Findings describes the analysis process and then reports the results of the exploratory analysis of potential effectiveness factors (RQ2) and discusses what these findings mean in the context of existing evidence and program practice. It reports two sets of results: **suggestive evidence** (stronger but still non-causal) from the meta-regression and **exploratory evidence** from the initial block analyses.

Chapter 4: Discussion & Conclusion discusses what the findings imply for program design, program implementation, public policy, and future research.

Appendices cover technical material as well as supplemental and additional findings:

> **Building Blocks of the Meta-Regression**
>
> To conduct the meta-regression, we began by examining a large number of relationships between characteristics (e.g. program components, local context and participant characteristics) and impacts; these initial analyses formed the building blocks of the meta-regression. Although they do not address a specific research question, the building blocks of our analyses yielded interesting information on their own. In the process of deciding which small number of characteristics should be part of the potential effectiveness factors analysis, we explored a very large number of characteristics. We examined their correlations to each other and their correlations to impacts. These results do not support causal conclusions. That said, these are critical, descriptive analyses that yielded results during the research process, and so we share them as a means of spurring discussion around how career pathways programs are designed and operated and what might be a focus of future

- *Appendix A: Data Collection & Preparation* provides summary information about how we collected and coded the data.

- *Appendix B: Analytic Methods* provides details on the analytic methods we use for both the analysis of overall impact findings and the analysis of potential effectiveness factors.

- *Appendix C: Characteristics of the Evaluations and their Programs* summarizes the data we have on the career pathways programs that were the focus of the 46 evaluations included in this meta-analysis.

- *Appendix D: Expanded Results from Chapter 2* presents supplementary results for the impact analysis, including effect sizes for each included evaluation, and results for specific outcomes

- *Appendix E: Approach to Selecting Covariates and Expanded Results from Chapter 3* provides full results for the meta-regression.

- *Appendix F: Frequentist Results* reports findings using an alternative, frequentist, analytic approach, which might be more familiar to some readers.

- *Appendix G: Results of Sensitivity Analyses* summarizes results of the study's analyses to assess whether the results from the meta-analysis are sensitive to alternate specifications of key assumptions.

Chapter 2. Overall Impact Findings

H **Chapter 2 Key Findings: Overall Impacts**

Analysis of the overall impacts of the career pathways approach—as represented in the 46 evaluations that are part of this meta-analysis—finds that the approach...

- *increases educational progress* by a large amount (a 155 percent relative increase)

- *increases employment in the industry or occupation trained for* by a large amount (a 72 percent relative increase), much more than it *increases employment* in general (a 9 percent relative increase)

- *increases short-term earnings* (earnings through 35 months) by a very small amount (a 6 percent relative increase)

- *does not meaningfully increase medium/long-term earnings* (earnings of 36+ months); that is, there is a high probability that the impact is no different from zero

- *varies substantially* in its impacts, for both educational progress and labor market outcomes

Because this analysis is based on high-quality impact evaluations, which by their nature support causal conclusions, we have high confidence in the findings from this analysis.

This chapter presents the overall impacts of the career pathways approach on educational progress and labor market outcomes to address the first research question—*What is the overall impact of the career pathways approach on participants' educational progress and labor market outcomes?*

Appendix A elaborates on the sample selection, data collection and coding, and measures construction. Appendix B details our analytic methods, which distill as follows: within the educational progress domain, the outcome we analyze captures *credential receipt,* and within the labor market domain, the outcomes we analyze capture *employment* (at any time point), *industry-specific employment* (at any time point), *short-term earnings* (follow-up at <36 months), and *medium/long-term earnings* (follow-up at 36+ months). Then we average all of the evaluations' impacts that are reported for the outcome. Although we analyze impacts in standardized effect sizes (as necessitated by the varied outcomes that evaluations use), we

translate each impact into "natural" units—such as percentages for credential receipt or employment and dollars for earnings—to aid in interpretation.[4,5]

The next two subsections report the results from these analyses, first on educational progress and then on labor market outcomes. Appendix D provides additional results for more detailed outcomes and outcome domains beyond what we report here. Those results are also based on high-quality impact evaluations, which allow for high confidence in the findings.

2.1 Overall Impact of the Career Pathways Approach on Educational Progress

H **The impact of the career pathways approach on educational progress—as measured by credential receipt—is large.**

The top portion of Exhibit 2-1 shows the impact of the career pathways approach on educational progress, in effect size units alongside the conversion to natural units. In our data, the control/comparison group average level is about 18 percent; that is, in the absence of a career pathways program, about 18 percent of people earn a credential. Among those in the program group, about 45 percent earn a credential. This 28 percentage point gain in the program group over the control/comparison group represents a 155 percent relative increase.[6,7] An impact of this size exceeds our threshold for the magnitude of the impact to be considered "large" (see Appendix Section B.1.2 for details on determining thresholds).[8]

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[4] Technically, we compute a "standardized effect size" as detailed in Appendix A, Section A.2.2; but for ease of exposition, we refer to these throughout as the "impact" of the career pathways approach.

[5] The conversion from standardized effect size to natural units (1) requires using the observed control/comparison group mean and standard deviation, and (2) applies just to the average standardized effect size (as opposed to impacts that are larger or smaller than the average). Upon reporting each result, we footnote the standardized effect size and standard deviation that we use in making the conversion to natural units, as reported.

[6] These natural units are accurate for an effect size of 0.55 and a standard deviation of 0.50.

[7] The figures in Exhibit 2-1, and throughout the report, are rounded; however, all calculations are based on the unrounded figures. Although this can make the numbers appear inconsistent, it ensures that all data presented are both accurate and comprehensible. For example, in Exhibit 2-1 the control and program group means for educational progress are 17.71 and 45.21 (rounded to 18 and 45) percent, respectively. The rounded figures would suggest an impact of 27 percent and a relative impact of 150 percent; however, the true figures give the displayed impact of 28 percent and a relative impact of 155 percent.

[8] Although we see a large impact on this outcome, credential receipt is a higher bar than simply participating in education or training. An alternative measure of educational progress, *participation in training*, shows an average impact that is larger in magnitude still (Appendix Exhibit D-7), as might be expected.

2.2 Overall Impacts of the Career Pathways Approach on Labor Market Outcomes

Next, we turn to labor market outcomes, the impacts on which are also reported in Exhibit 2-1, for easy comparison to the educational progress impact.

> **H** The career pathways approach, as represented in the evaluations that are part of this meta-analysis, increased *any employment* by a small amount and increased *industry-specific employment* by a large amount.

The average impact on employment is positive but small, on the order of about 5 percentage points. The difference between the program group (66 percent employed) and the control/comparison group (60 percent employed) represents a 10 percent relative increase in employment.[9]

When we focus on employment in the industry trained for, however, the impact is much larger. On this outcome, the average control/comparison group level of employment was about 26 percent compared to the program group's level of about 45 percent (reported on by 24 evaluations).[10] This 19 percentage point increase represents a 72 percent relative increase in industry-specific employment. This impact is nearly four times the size of the *any employment* impact, indicating that the career pathways approach is quite successful at increasing employment in the industry trained for among its participants.

Exhibit 2-1. Overall Impacts on Educational Progress and Labor Market Outcomes

Educational Progress: 18%, 45%, 28 p.p., 155% [ES=0.55]

Employment: 60%, 66%, 5 p.p., 9% [ES=0.11]

Industry-Specific Employment: 26%, 45%, 19 p.p., 72% [ES=0.42]

Short-term Earnings: $4,081, $4,342, $260, 6% [ES=0.07]

Medium/Long-term Earnings: $10,608, $10,765, $157, 1% [ES=0.04]

● Control/Comparison ● Treatment
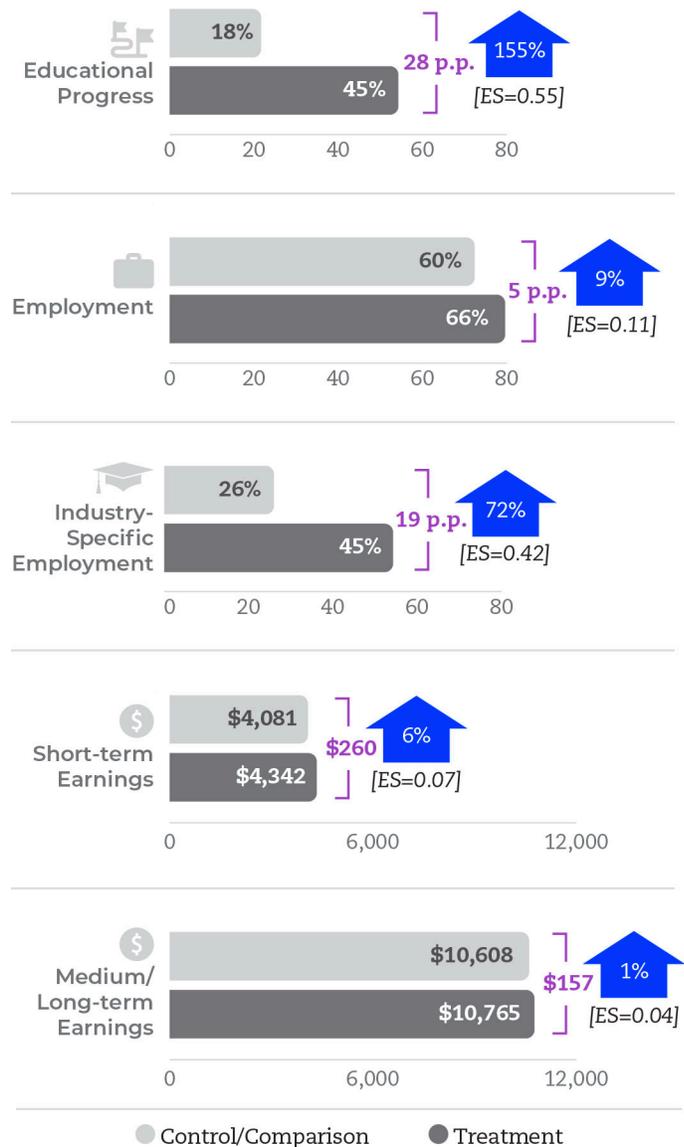
Notes: Sample includes 46 evaluations: 33 contribute to educational progress; 37 contribute to employment; 24 contribute to industry-specific employment; 37 contribute to short-term earnings; 16 contribute to medium/long-term earnings. ES refers to the standardized effect size from which the exhibit's natural units are derived for presentation. We report whole numbers, and some may not appear to add up, due to rounding at greater levels of precision. As defined in Appendix section B.1.2, the effect size thresholds are: 0.10 is "small," 0.20 is "medium" and 0.30 is "large."
Source: Authors' computations from D&A CP Project meta-analysis dataset.

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[9] These natural units are accurate for an effect size of 0.11 and a standard deviation of 0.46.
[10] These natural units are accurate for an effect size of 0.42 and a standard deviation of 0.44.

> **H** The career pathways approach, as represented in the evaluations that are part of this meta-analysis, does not result in meaningful earnings gains, whether in the short- or medium/long-term.

The average impact of the career pathways approach on short-term earnings is detectably greater than zero. The impact represents an increase of about $260 (a 6 percent relative gain), from an average of $4,081 per quarter in the control/comparison group to $4,342 in the program group.[11] Our analysis leads to the conclusion that there is a high probability that the average impact on short-term earnings is greater than zero, but a low probability that the average impact meets even our threshold for "small" as we defined it in Section B.1.2. On medium/long-term earnings, the average impact of the career pathways approach is likely to be near zero (based on 16 evaluations for which we have outcomes beyond 36 months).[12]

In addition to these labor market impacts, our analysis included other outcomes as well. As shown in Appendix Exhibit D-7, there is a high probability of there being impacts on career knowledge, job quality, and well-being, but the magnitude of these impacts is likely to be near zero.

> **H** The average impact of the career pathways approach varies substantially across evaluations for outcomes in both the educational progress and labor market domains.

Detailed results in Appendix D indicate that a large share of the variability in impact estimates is across evaluations (as opposed to stemming from within-evaluation sampling error). In other words, there is substantial variability in these average impacts. In the next chapter, we examine how evaluation and program characteristics (including program components, local context, and participant characteristics) might contribute to variation in impacts across evaluations. To include additional characteristics, however, two conditions are needed: relative consistency in the measurement of characteristics across evaluations, and a large number of evaluations (to provide the "degrees of freedom" needed for this type of analysis). The next chapter summarizes how we chose the characteristics to include and then reports the results of the analyses of these potential effectiveness factors.

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[11] These natural units are accurate for an effect size of 0.07 and a standard deviation of $3,500 in quarterly earnings.

[12] The number of evaluations reporting medium/long-term earnings is smaller than the number reporting educational progress and short-term labor market outcomes. As more evaluations that include medium and long-term earnings release findings, these estimates may shift.

Chapter 3. Potential Effectiveness Factors Findings

M

Chapter 3 Key Findings: Effectiveness Factors

Analysis of potential effectiveness factors (the various program characteristics, including program components, participant characteristics, and local context) shows suggestive (rather than causal) evidence that—across the 46 evaluations—some factors associate with smaller or larger impacts, as follows:

- ***Educational progress impacts are smaller*** (though either positive or at least not negative) when
  – a community or technical college is the lead agency or a partner agency

- ***Educational progress impacts are larger*** when
  – a staffing agency is a partner
  – employers provide input on curriculum or other aspects of program design

- ***Labor market impacts are smaller*** (though either positive or at least not negative) when
  – programs offer flexible sequencing of coursework
  – programs offer tuition or other financial assistance

- ***Labor market impacts are larger*** when
  – programs have a larger share of Black participants

Given the medium level of confidence and therefore suggestive interpretation of these findings, we do not interpret the precise magnitude of each association, instead focusing only on direction. Any intervention characteristics not listed here* were not strongly associated with variation in program impacts.

> * Other characteristics might influence impacts, but this analysis could control only a small number of characteristics due to data reporting consistency and technical limitations.

This chapter presents results from our analysis of how program characteristics (including program components, participant characteristics, and local context) associate with impacts. Indeed, a distinctive aspect of this meta-analysis is that it not only quantitatively summarizes the rigorous evidence to date from evaluations of career pathways programs' impacts, but it also aims to analyze which characteristics might contribute to those impacts. Some characteristics might be associated with *larger* average impacts, whereas others might be associated with *smaller* average impacts. Both directions of findings hold potential value: knowing what characteristics generate larger, more favorable impacts can help programs understand what they should do more often, at least to the extent the characteristic is something

programs can control. For example, the local unemployment rate is not something a program can control, but the industries it targets or matters of curriculum are. Conversely, knowing what characteristics generate smaller, less favorable impacts may suggest to programs that such characteristics are not as essential a part of a strong career pathways approach. In this meta-regression analysis, we call program characteristics that are associated with impacts potential "effectiveness factors."

Because the association of any single potential effectiveness factor with impacts could be influenced by other characteristics, it is important to include as many characteristics as possible in the meta-regression analysis. For example, if men are a large proportion of the population served in programs with certain industry focuses, gender and industry focus might both appear to associate with impacts, when in fact only one has an association. By including both characteristics in a single regression, we can see their associations with impacts independent from each other. Analyzing multiple characteristics together reduces, at least to a certain degree, the possible alternative explanations for impacts we observe, but it does not eliminate alternate explanations altogether.

We use a meta-regression—an analysis that explores how multiple characteristics simultaneously associate with impacts—to identify the characteristics (summarized later in this chapter) with the strongest relationships with impacts. Technical considerations limit how many characteristics we can control for in the meta-regression. First, as noted earlier, some potentially important program characteristics were not reported by enough evaluations or not reported with enough consistency to be included in our analysis. Second, the large number of potential effectiveness factors relative to the number of evaluations means we can include only very few of these characteristics in a single analysis model.[13] In response, we use an empirical process to select which program characteristics to include in the meta-

Exhibit 3-1. Illustration of Process for Selecting Characteristics for Effectiveness Factors Analysis
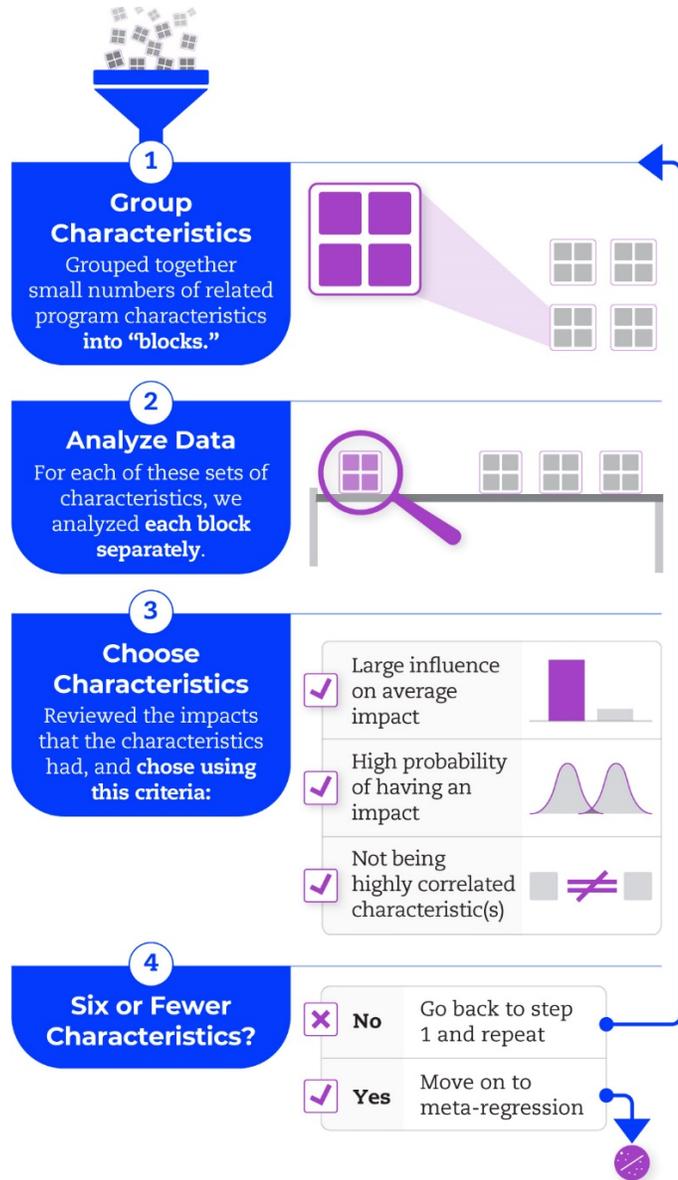
[13] Using Green's (1991) rule of thumb, we target one covariate for every eight observations (evaluations). We had 46 total evaluations forming our data, and only some of those contributing effect sizes to our analysis, leaving us with a sample size in the high 30s. Knowing that we would be including *evaluation design* as one required covariate, we aimed to include approximately four to five intervention characteristics in the meta-regression.

regression. The meta-regression analyzes the contribution to average impacts of each characteristic across the evaluations *along with* other variables.

Appendix E details the selection process, and we summarize it briefly here and illustrate the process in Exhibit 3-1. Because a different set of program characteristics might explain educational progress impacts versus labor market impacts, we undertook this selection process separately for the two outcome domains. To reduce the number of distinct characteristics from 77 (and some additional interactions between characteristics) to six (the target maximum number we could include due to data reporting consistency and technical limitations), we took the following steps:

1. *Group characteristics*. First, we grouped together small numbers of (about four) related program characteristics into what we call "blocks."

2. *Analyze data*. Then, we analyzed each block separately.

3. *Choose characteristics*. Then, we reviewed the characteristics' impacts, selecting those that:

   - had a relatively large influence on average impact (as indicated by the characteristic's effect size coefficient being at least 0.10 and larger than other characteristics' effect size coefficients)[14];

   - had a high probability of having an impact (as indicated by having a 90 percent or greater probability); and,

   - were not highly correlated with other characteristic(s) that could explain the relationship.[15]

Beyond these clearly delineated criteria, we also considered broader theoretical and empirical justifications for choosing some variables. This resulted, for example, in our including the unemployment rate in the labor market meta-analysis on the basis that theory and prior research suggest it is an essential indicator for the analysis.[16] The selection process led us to choose six program characteristics to include in the meta-regression for the labor market outcome. Because the initial block analysis resulted in too many potential effectiveness factors for the educational progress outcome, we repeated the process with a set of 12 potential characteristics, grouping them into blocks, conducting the analysis, and considering the results. That repetition led us to choose five program characteristics to be included in the meta-regression for the educational progress outcome.[17]

The remainder of this chapter summarizes the results of the block analyses (steps 1 and 2), describes the selection of program characteristics (step 3), and reports the results from the final meta-regressions for both educational progress and labor market outcomes.

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[14] For the meta-analysis of overall impacts, we used thresholds of 0.10, 0.20, and 0.30 for small, medium, and large impacts *overall*. For the *contribution* of these characteristics to impacts, we use a threshold of 0.10, which—*for the contribution*—we deem to be relatively large.

[15] A full correlation matrix appears in Appendix E.

[16] Beyond basic economic theory, other research has found a link between unemployment rate and training program effectiveness (e.g., Card, Kluve, & Weber, 2018; Lechner & Wunsch, 2009), thereby justifying our choice to include it as a covariate in the meta-regression.

[17] Both the labor market and educational progress meta-regressions include an indicator for the *evaluation design type* (whether an experimental design or not) because experimental evaluations tend to have smaller impacts and smaller sample sizes, and some factors might be correlated with design type. The educational progress meta-regression also includes a binary variable indicating missing race data.

3.1 Exploratory Results from Initial Block Analyses

Appendix E reports the results from the block analyses in their entirety; Exhibits 3-2 through 3-4 summarize the results more generally, identifying which of the potential effectiveness factors—be they program design and implementation characteristics, participant composition, or local context—seem to indicate some association with program impacts. The exhibits categorize the results into three groups: (1) characteristics that associate with larger impacts, (2) characteristics that associate with smaller impacts, and (3) characteristics that do not associate with impacts.

It is important to note that these associations are identified *without* controlling for other program characteristics. For example, when we see that having a greater proportion of male participants is associated with larger educational progress impacts, we should not conclude that serving higher proportions of men increases program effectiveness. Instead, we should consider that something about programs that serve greater proportions of men might also be associated with those programs' impacts on educational progress. For example, are programs that serve greater proportions of men less likely to offer training in healthcare? These correlations of programs that serve greater proportions of men could be the reason for larger educational progress impacts.

As a result, these must be interpreted cautiously and as they are intended: none of the results of the block analyses proves that particular characteristics *cause* larger or smaller impacts; indeed, they are not even *suggestive* of causality. Instead, the characteristics are simply *associated with* impacts. As such, we have low confidence in these findings in terms of their ability to support causal claims (see Exhibit 1-1); these findings are **exploratory** and do not indicate a causal relationship.

Exhibit 3-2 shows the results of the initial block analysis, placing *all* of the characteristics in one of three columns: those that associate with larger impacts, those that associate with smaller impacts, and those that have no apparent association with impacts. The left half of Exhibit 3-2 shows these three columns for educational progress, and the right half does so for labor market outcomes.

Section 3.2 explains how we selected characteristics from the block analyses for inclusion in the meta-regressions. From that analysis, we produce findings with a medium level of evidence that are somewhat more **suggestive** of a causal relationship because of our ability to control for slightly more characteristics than we do in these initial block analyses.

Exhibit 3-2. Block Analysis: Characteristics That Do or Do Not Associate with the Educational Progress and Labor Market Outcomes, _Not_ Controlling for Other Characteristics

Educational Progress			Characteristics	Labor Market		
Larger Impacts	**Smaller Impacts**	**Not Associated**		**Not Associated**	**Smaller Impacts**	**Larger Impacts**
• Community organization (lead or partner) • Staffing agency (partner)	• Community or technical college (lead or partner) • Government agency (partner)	• Workforce agency (lead or partner) • School or school district (partner) • Labor union (partner) • Any other agency type	ADMINISTRATIVE ARRANGEMENTS	• School or school district (partner) • Labor union (partner) • Any other agency type	• Community or technical college (lead or partner) • Government agency (partner) • University (partner) • Other (partner)	• Workforce agency (lead) • Community organization (lead) • Trade association (partner)
		• Any eligibility criteria	ELIGIBILITY	• Any other eligibility criteria		• Program has income requirements
	• Offers basic skills training	• Offers basic/secondary education, English language acquisition, developmental or remedial education • Offers flexible sequencing, hybrid instruction, online courses, alternative times/places	INSTRUCTIONAL OFFERINGS	• Offers basic skills training • Offers basic/secondary education, English language acquisition, developmental or remedial education • Offers alternative times/places	• Offers flexible sequencing, hybrid instruction, online courses	
	• Offers multiple steps of training	• Offers three or more pathways of training • Offers training above entry-level	PATHWAYS AND TRAINING			• Offers training above entry-level
• Certification developed by an employer or industry association	• Occupational certificate or technical diploma	• College degree • State or local licensure	CREDENTIAL TYPES	• State or local licensure • Certification developed by an employer or industry association	• Occupational certificate or technical diploma • College degree (associate's, bachelor's)	
		• All training durations	TRAINING DURATION	• All training durations		
	• Healthcare	• Manufacturing or construction • Information technology • Education	TRAINING INDUSTRY	• Healthcare • Manufacturing or construction • Information technology • Education		
• Curricula adapted for employers' needs • Presence of job development staff		• Program convenes an employer advisory council • Formal employer partnership • Offers incumbent worker training	EMPLOYER ENGAGEMENT ACTIVITIES	• Formal employer partnership	• Program convenes an employer advisory council	• Offers incumbent worker training
• Provide input on preferred type of applicants • Provide input on curriculum or program development • Commitment to hire graduates	• Offers work-based learning (paid or unpaid)	• Employer provides resources • Employer provides labor market information • Employer delivers instruction • Employer delivers career awareness services	EMPLOYER ROLE	• Offers work-based learning (paid or unpaid) • Employer provides resources • Employer delivers instruction • Employer provides labor market information	• Employers deliver career awareness services	• Provide input on curriculum or program development
	• Academic advising	• Case management • Career or college navigation • One on one staff assistance is mandatory/required	ONE-ON-ONE SUPPORT	• Case management • Career or college navigation • Staff assistance mandatory/required	• Academic advising	
	• Tuition, training cost, other financial assistance • Emergency assistance • Child/dependent care assistance • Tutoring	• Food assistance • Internet • Transportation assistance • Connection with benefits and social services • Job search and placement	SUPPORT SERVICES	• Emergency assistance • Food assistance • Internet • Tutoring • Child/dependent care assistance • Transportation assistance • Connection with benefits and social services • Job search and placement	• Tuition, training cost, other financial assistance	
• Greater share male		• Race/ethnicity • Education levels	PARTICIPANT COMPOSITION	• Gender • Education levels • Race/ethnicity		
		• Unemployment rate	LOCAL CONTEXT	• Unemployment rate		

Notes: Characteristics listed as having larger impacts have a coefficient of |0.10| or larger and a 90 percent or greater probability of having any effect.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

3.2 Process for Selecting Characteristics from Block Analyses

Because we have limited degrees of freedom—that is, we have many covariates we want to analyze but only 46 evaluations on which to analyze them—we undertook a selection process to identify the covariates that will be part of our final analysis. The approach to selecting covariates is akin to a swimming competition: there are only 8 to 10 lanes in a pool, but more than 1,200 U.S. swimmers qualified for the 2020 U.S. Olympic Trials. The process of using "heats" to narrow the field to the select few that will advance to the Olympics mirrors the process we used to determine which characteristics will be part of the final meta-regression. Our process considered several factors, as summarized in this chapter's introduction (and Exhibit 3-1). The results are summarized in Exhibit 3-3 and provided in full in Appendix E.

Exhibit 3-3. Results of the Block Analyses: Characteristics Selected for the Meta-Regressions

	🎓 Educational Progress	💼 Labor Market
1 Group characteristics into "blocks."	**Start with:** **20** distinct blocks covering **78** variables **6** blocks that consider interactions from among selected variables	
2 Analyze data within each block separately.	**For Complete Results:** ▶Exhibit E-2	**For Complete Results:** ▶Exhibit E-5

3 Choose characteristics from among block results based on:

☑ *High probability of having an impact*

☑ *Influence (as indicated by size of coefficients)*

☑ *Not highly correlated with other variables of interest*

☑ *Theory*

Educational Progress

Probabilities and Coefficients:

Partner Agency

98% C 0.55   Staffing agency
96% C -0.34   Government agency

Types of Credential Offered

98% C -0.35   Occupational certificate or technical diploma
98% C 0.33   Employer/Industry Developed Certification

Employer Engagement and Roles

97% C 0.31   Presence of job development staff

Employer Roles

100% C 0.53   Provide input on curriculum or program development

Training Industry

96% C -0.33   Healthcare

Participant composition

100% C 0.76   Percent male

Probabilities and Coefficients in Multiple Blocks:

Administrative Arrangements

Lead or partner is community college

Lead or partner is community organization

Services

Tuition, training cost, other financial assistance

Results for the Other Characteristics in its Block:

Training Length

6   6 months or less (reference category)

Labor Market

Probabilities and Coefficients:

Flexible Instruction Type

97% C -0.21   Flexible sequencing type

Participant Composition

87% C 0.15   Black [plus a binary indicator for missing race]

Probabilities and Coefficients in Multiple Blocks:

Administrative Arrangements

Lead or partner is community college

Services

Tuition, training cost, other financial assistance

Results for the Other Characteristics in its Block:

Training Length

6   6 months or less (reference category)

Theoretical Reasons

Training Length

Unemployment rate

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4 Six or fewer characteristics?

No
❌ Redo steps 1–3   ▲

Yes
☑ Move on to meta-regression   ▼

Exhibit 3-3. Results of the Block Analyses: Characteristics Selected for the Meta-Regressions (continued)

Educational Progress

1 Group characteristics into "blocks."

Start with: **3** **distinct blocks** covering **12** variables

2 Analyze data within each block separately.

For Complete Results:
▶ Exhibit **E-4**

3 Choose characteristics from among block results based on:
☑ High probability
☑ Influence
☑ Low correlation
☑ Theory

Probabilities and Coefficients

Administrative Arrangement
98% C -0.35 Lead or Partner is Community College

Partner Agency Type
98% C 0.42 Staffing Agency or Company
97% C -0.22 Government Agency (other than Workforce Board/ One-Stop/AJC)

Employer Role
99% C 0.32 Provide Input on Curriculum or Program Development

Participant Composition
88% C 0.55 Percent Male

4 Six or fewer characteristics?

Yes
☑ **Move on to meta-regression** ▼

Notes: The purple percent refers to the probability that the effect is greater than zero. C is the coefficient magnitude in effect size units.
Source: Summary of results of authors' computations from D&A CP Project meta-analysis dataset.

In summary, Exhibit 3-3 shows that we selected five program characteristics—in addition to *evaluation design*—to include in the meta-regression for the educational progress outcome:
1. whether a community college is either the lead agency or a partner in the program
2. whether a staffing agency is a partner
3. whether a government agency outside of the workforce system (such as a Temporary Assistance for Needy Families (TANF) or housing agencies) is a partner
4. whether employers provide input on curriculum or program development
5. the share of program participants who are male

Likewise for labor market impacts, based on the coefficients' magnitude and probability of effects, the block approach to selecting covariates to be included in the meta-regression for the labor market outcome led to our including the following six characteristics—in addition to *evaluation design*:
1. whether a community college is either the lead agency or a partner
2. whether the training in which most participants enrolled is short (six months or less)
3. whether the program's instruction involves flexible sequencing of courses
4. whether the program supports include tuition, training costs, or other financial assistance.
5. the share of program participants that is Black
6. the unemployment rate in the program's catchment area

The next section reports the results of these meta-regressions.

3.3 Suggestive Results from Meta-Regression

We included each of the selected characteristics in a single meta-regression—one for the educational progress impacts and one for labor market impacts.[18] Rather than placing a judgment on the *magnitude* of each coefficient, we simply report on the *direction* of the contribution that each characteristic makes to overall impacts; and we do so only when the magnitude surpasses our threshold and the probability of the contribution to impact is high.

To qualitatively consider the alignment of these various program characteristics with variation in program impacts, Exhibit 3-4 uses a Graphical Overview for Evidence Reviews format—or "GOfER" diagram. This depiction aims to aid the reader in understanding various elements of our analysis sample and results, both overall and from the meta-regressions, on which we report in the next sections. The diagram groups the evaluations first by the year in which study enrollment started, then alphabetically.

The top panel lists evaluations that used an experimental design; the bottom panel lists evaluations that used a quasi-experimental design. For each evaluation, the diagram first shows the sample sizes for the program group and the control/comparison group. The next five columns show the standardized effect sizes for the educational progress and labor market outcomes (Chapter 2 translates those standardized effect sizes into natural units for easy interpretation). In those columns, the dot is the point estimate, and the line indicates the 95 percent credible interval. That line can be interpreted as there being a 95 percent probability that the true impact lies within this interval. The dashed vertical line shows the average effect size across all of the evaluations, and the very bottom row indicates the value of that average.

The remaining columns present evaluation-specific details of the various characteristics that we analyze in the meta-regression. The reader can posit, qualitatively, by visualizing the relationships among these various characteristics and impacts, what might be expected when we move these variables into a quantitative analysis. That is, given the visual pattern of these characteristics alongside the evaluations' reported effect sizes, what appears to associate with impacts? The meta-regression's results provide some suggestive evidence.

In considering these findings it is important to acknowledge one key constraint and interpret the results with some caution. We are limited by what evaluations chose to report; some potentially important characteristics were not reported consistently or at all by enough evaluations to be included in our analyses. These include some potentially important characteristics for explaining variation in impacts, such as the degree of program selectivity and the extent to which participants had low incomes or received public assistance.

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[18] As described earlier, for this analysis we combined the three labor market outcomes of *employment, short-term earnings,* and *medium/long-term earnings* into a single measure (*employment and earnings at any time point*) to increase the number of evaluations that contribute to the analysis.

Exhibit 3-4. GOfER Diagram of Evaluation-Specific Effect Sizes and Select Evaluation, Program, Participant, and Context Characteristics

EXPERIMENTAL EVALUATION DESIGN

Evaluation	Program	Control/comp.
Sectoral Employment Jewish Vocational Services	226	224
Sectoral Employment Per Scholas	221	221
Sectoral Employment Wisconson Regional Training	197	196
I-BEST Washington	1,390	6,202
Project QUEST	207	203
Career Focused Learning Communities	537	380
Year Up	135	60
Green Jobs American Indian Opportuities	271	271
Green Jobs Clean Energy Center	414	415
Green Jobs Health Matrix Grant Scholarship	555	440
Green Jobs Pathways to Prosperity	186	91
PACE Bridge to Employment	507	500
PACE Pathways to Healthcare	609	608
PACE Patient Care Academies	251	249
PACE VIDA	478	480
WorkAdvance Madison Strategies Group	353	344
WorkAdvance Per Scholas	349	341
WorkAdvance St Nick Alliance	242	237
WorkAdvance Towards Employment	349	349
YouthBuild	2,700	1,229
HPOG 1.0 Non-Tribal Grantees	8,699	5,103
PACE Carreras en Salud	402	398
PACE Health Careers for All	328	326
PACE IBEST	315	317
PACE Workforce Training Academy	470	473
Accelerated Training for Illinois Manufacturing (WIF)	369	369
PACE Year Up	1,669	875

QUASI-EXPERIMENTAL EVALUATION DESIGN

Evaluation	Program	Control/comp.
WPP Advanced Manufacturing Partnership	684	42,293
WPP Construction Sector Partnership	379	36,859
WPP Health Careers Cincinnati	992	46,701
WPP Milwaukee Area Health Alliance	306	8,666
WPP Wisconsin Construction Pathway	1,103	29,491
WPP Wisconsin Manufacturing Pathway	88	19,844
Accelerating Opportunity Illinois	867	4,129
Accelerating Opportunity Kansas	1,698	12,595
Accelerating Opportunity Kentucky	1,356	18,794
Accelerating Opportunity Louisiana	440	3,015
Making the Future (TAACCCT)	3,150	3,150
Oh-Penn Pathways Ohio (WIF)	14,912	362,903
Oh-Penn Pathways Pennsylvania (WIF)	18,740	680,322
INTERFACE (TAACCCT)	4,514	4,514
Bridging the Gap Consortium (TAACCCT)	850	961
Linn Benton iLearn Campus (TAACCCT)	259	1,159
ACT (TAACCCT)	2,297	2,289

GRAND MEAN
GRAND PREDICTION

Administrative Arrangements: 82, 7, 36 Percent (%)
Selected Additional Program Characteristics: 46, 46, 11
Participant Characteristics: 80, 77 Percent (%)

KEY
○ Lead or Partner is a Community or Technical College
○ Partner is a Staffing Agency
○ Partner is a Government Agency
↓ Most common training length is <6 mo
✛ Most common industry or sector is healthcare
⅄ Instruction includes flexible sequencing
$ Supports include tuition, cost or financial assistance
⌣ Employer provides input on curriculum or program development

3.3.1 PROGRAM CHARACTERISTICS ASSOCIATED WITH EDUCATIONAL PROGRESS IMPACTS

H Educational progress impacts are smaller when a community or technical college is the lead agency or a partner agency.

H Educational progress impacts are larger when a staffing agency is a partner or when employers provide input on curriculum or other aspects of program design.

Exhibit 3-5 reports the results of the meta-regression of the contribution of these selected program characteristics to impacts, where the outcome measure in this analysis is *credential receipt* (this is the same educational progress outcome used for the overall meta-analysis).

Exhibit 3-5. Program Characteristics Associated with Impacts on Educational Progress, Controlling for Selected Characteristics

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	95% Credible Interval	Probability of Any Contribution (%)
Admin. Arrangement: Lead or Partner is Community College	-0.40	[-0.72, -0.06]	99
Employer Role: Provide Input on Curriculum or Program Development	0.27	[-0.01, 0.56]	97
Partner Agency Type: Staffing Agency or Company	0.35	[-0.07, 0.75]	95
Partner Agency Type: Govt Agency (other than Workforce Board/One-Stop/AJC)	-0.10	[-0.31, 0.12]	83
Percent of Participants: Male	0.10	[-0.31, 0.54]	69

Notes: Intercept = 0.58. Model also includes a binary variable to control for evaluation design.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

The coefficient in Exhibit 3-5 is the average size of the characteristic's contribution to impact, while controlling for the other characteristics in the model. The exhibit also shows the 95 percent credible interval and the probability that the characteristic's contribution is greater than zero. Readers can use this information to determine which results they see as meaningful—we use an effect size threshold of 0.05 and probability of an effect of greater than 90 percent to inform our discussion. Three of the characteristics analyzed meet these criteria: administrative arrangements, staffing agency partnerships, and employers providing input on program design. We discuss each of these findings in the context of wider literature or knowledge about the field.

Administrative Arrangements and Staffing Agency Partnerships: The coefficient on the community or technical college variable has a negative sign, which implies that educational progress impacts are on average smaller when a community college is involved as either the lead agency or partner. This finding is surprising, given that community colleges generally focus on educational progress. In contrast to the community college finding, the coefficient on the staffing agency variable implies that educational progress impacts are larger when that type of partner is involved. This finding is also surprising, given that staffing agencies generally do not specifically target educational attainment.

It is not obvious how to interpret these findings. It is possible the larger educational progress impacts for programs with staffing agency partners and the smaller impacts for those with community college partners may reflect program characteristics not controlled for, given the very small number of evaluations that did include staffing agencies or did not include community colleges. Out of 33 evaluations in the educational progress meta-regression, only three included programs involving staffing agencies, and just five did not

include a community college lead or partner. Most of the programs in these eight evaluations were sectoral training programs run by private nonprofit organizations that served primarily men, targeted sectors other than healthcare, and focused on industry-recognized credentials. Our initial block analyses (Exhibit 3-2) indicate that all of these characteristics are associated with larger educational progress impacts. Of these characteristics, our final educational progress meta-regression, however, controlled only for the share of program participants that was male. It could be that a combination of characteristics of these specific sectoral training programs is a stronger contributor to impacts than any one characteristic for which we can control.

The community college finding may also reflect that those evaluations had a smaller contrast between what the program and control/comparison groups experienced, leading to smaller impacts. Even when programs achieve favorable outcomes for their participants, evaluation impacts may be small if control/comparison group members are easily able to access similar services without support from the program. This could be especially true for community college career pathways programs where participants could be receiving the same occupational training as others at the college—meaning the primary contrast is about the additional services and supports those programs provide. By contrast, a private nonprofit program, such as Per Scholas or Year Up, that delivers its own specialized training only program participants can access, implies a much greater service contrast relative to the control/comparison group.

Other factors not accounted for in our analysis could also be influencing these results. One factor is participant characteristics. It is possible that the five programs with no college involvement served participants with fewer barriers than did community college programs in our sample. Prior research shows sectoral training programs tend to be highly selective; the four evaluated WorkAdvance programs, for example, accepted just one in five applicants (Tessler et al., 2014). As noted, our analysis could not control for program selectivity nor reasonable proxies for selectivity (such as income or skill levels, or public assistance receipt).

The implications for populations served can be large. Qualitatively, 17 percent of those in the Per Scholas WorkAdvance site were receiving Supplemental Nutrition Assistance Program (SNAP) benefits at baseline, for example, versus about 55 percent in Health Profession Opportunity Grant (HPOG) 1.0 Impact study programs. Per Scholas is credited with achieving much greater impacts than the much less selective HPOG (e.g., Klerman & Litwok, 2020). That does not diminish the important success of Per Scholas for the population it serves, but it does raise the question of whether programs serving more disadvantaged populations can produce equally large impacts. Another possible factor is the level of resources available. Programs supported by large public funding streams may not be able to fund as comprehensive and intensive services as better funded, private programs. Finally, implementation fidelity could also be a contributing factor. Evaluations of broad funding streams or grant programs, such as HPOG, will necessarily capture a wider range of implementation approaches and quality than evaluations of smaller, highly structured replication efforts, such as Year Up, where implementation of a specific model is carefully developed and monitored and tightly controlled.

Employers provide input on program design: Programs where employer engagement activities involve employers in providing input on curriculum or program design also are associated with more favorable educational progress impacts. Most (26 of 33) evaluations included programs that reported using this employer engagement activity. It is unclear why employer input on program curricula would be linked to larger educational progress impacts. Most of the evaluations (25 of 33) focused on programs that solicited employers' input on curriculum. One possible explanation is that employer input on curriculum might

occur more often when programs offer industry-recognized credentials; and if these credentials are easier to earn than other credential types (which would be the case if credentials issued by educational institutions had more requirements), then we might expect to observe that employer input on curriculum is associated with larger impacts on credential receipt, the specific educational progress outcome we analyzed. That said, given that several other employer engagement activities also associated with larger education impacts in our initial block analyses (Exhibit 3-2), when analyzed independently, this finding about employer input could reflect more generally a program's strength of relationship with employers. Program-employer relationship strength might also be a proxy for some other program quality measure that associates with larger educational progress impacts.

Controlling for these three characteristics, the other two characteristics in the meta-regression—having a government agency as a partner and having a higher share of male participants—do not have a high probability of contributing to educational progress impacts. That is, government agency as a partner and share of male participants appeared to be related to educational progress impacts during the first phase of our analysis, but this relationship disappeared once we controlled for other factors.

3.3.2 PROGRAM CHARACTERISTICS ASSOCIATED WITH LABOR MARKET IMPACTS

H Labor market impacts are smaller when programs offer flexible sequencing of coursework, or programs offer financial assistance.

H Labor market impacts are larger when programs have a larger share of Black participants.

Exhibit 3-6 reports the results of the meta-regression of the contributions of the selected characteristics to labor market impacts. The outcome measure in this analysis is *employment and earnings at any time point* (the single composite of the three outcome measures shown in Exhibit A-4).

Exhibit 3-6. Program Characteristics Associated with Labor Market Impacts, Controlling for Selected Factors

Outcome: Labor Market Impacts	Contribution to Impact (Coefficient)	95% Credible Interval	Probability of Any Contribution (%)
Flexible Instruction Type: Flexible Sequencing	-0.20	[-0.38, -0.04]	99
Support Offered: Tuition, Training Cost, Other Financial Assistance	-0.24	[-0.42, -0.06]	99
Percent of Participants: Black	0.17	[-0.10, 0.44]	90
Admin. Arrangement: Lead or Partner is Community College	-0.04	[-0.20, 0.11]	72
Average Unemployment Rate	0.26	[-1.87, 2.39]	60
Length of Training: 6 Months or Less	0.01	[-0.11, 0.14]	56

Notes: Intercept = 0.26. Model also includes binary variables to control for evaluation design and missing race.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Among these, three of the characteristics meet our criteria for being contributors to program impacts. We discuss each below. The first two of these are in the direction of *smaller* program impacts, and the third is associated with *larger* impacts.

Flexible sequencing: Labor market impacts are smaller when programs offer flexible sequencing of coursework (e.g. participants are not required to take courses in a particular order) . Of the 37 evaluations that reported labor market outcomes in our sample, only five included programs with flexible sequencing,

with no obvious pattern among them. It is possible this particular result is driven by characteristics not controlled for by the small number of programs in our sample that offered flexible sequencing. As shown in Exhibit 3-4, four of the five programs focused on healthcare training and had community college leads or partners; beyond that, it is difficult to discern other patterns that could explain this finding. For example, while it is plausible that programs that offer flexible sequencing are serving non-traditional students who have a greater need for it, two of the five programs served students in their early twenties, not older adult learners, as was true for the other three programs. Similarly, three of the programs offered predominately short-term training (six months or less), but that was not true of the other two programs. One possible explanation is participants in these programs needed more structure in order to complete training and earn credentials that lead to increased employment and earnings. This would be consistent with prior research on the education and labor market benefits of more structured navigation help for individual training account participants (Perez-Johnson, Moore, & Santillano, 2011) and on improved education outcomes for key elements of guided pathways in community colleges (Bailey, Jaggars, & Jenkins 2015), though our analysis did not find an association between flexible sequencing and educational progress.

Financial assistance: Tuition, training cost, and other financial assistance is also associated with smaller labor market impacts, a finding that is somewhat puzzling. However, it may be that programs that offer financial assistance do so because they serve populations with greater need for such assistance (such as having greater barriers to employment). Most (26) of the evaluations reporting labor market outcomes included programs that offered tuition or other financial help. Prior research generally finds that the combination of financial assistance and other non-financial supports—which these career pathways programs provided—increases persistence, academic achievement, and completion (Clotfelter, Hemelt & Ladd, 2017). Our meta-analysis of the overall impact of the career pathway approach suggests that educational progress gains do not consistently translate into meaningful earnings gains; however, it is unclear why offering tuition and other financial assistance would contribute to the disconnect between these outcomes. Here too, it seems possible that other factors are at work for which our analysis cannot account. For example, more than half of the nine evaluations in which programs did not offer financial help were from the same quasi-experimental evaluation initiative, the National Fund for Workforce Solutions' Workforce Partnership Program, which focused on industry training partnerships, and three were different studies of one program, the Wisconsin Regional Training Partnership. It is also possible that the measures of tuition and financial assistance used in these evaluations were too imprecise to capture important differences. For example, Year Up provides both free training and a cash stipend to participants for the entire year they are in classroom training and internships, while some other programs (e.g., about half of HPOG programs) do not even cover full tuition costs (Werner et al., 2018).

Percentage of Black participants: Finally, programs with a larger share of Black participants appear to have larger impacts. This is potentially encouraging, given research that shows disparities in labor market success by race more broadly (Collins & Wanamaker, 2017; Lang & Lehmann, 2011). It may be that such programs are able to help address factors such as employment discrimination or other biases. However, impacts may also be related to the unobserved program characteristics. Many of the programs that serve a larger share of Black participants offer training in manufacturing and construction. Although we did not observe an association between labor market impacts and industry sector, it is possible that programs that offer greater access to certain industries might counteract employment discrimination or other factors that lead to more negative labor market outcomes. However, our analysis was at the evaluation level and could not compare impacts for Black participants specifically. To do so, researchers would need to include individual-level data in a meta-analysis framework. Such an analysis has the potential to explore

impacts by race more explicitly and could potentially illuminate specific activities or approaches that might be most beneficial to certain types of participants.

Controlling for these three characteristics, the remaining three—community college as lead or partner, training of six months of less, and local unemployment rate—do not have a high probability of contributing to labor market impacts. For example, the local unemployment rate on its own could appear to be an important contributor (see bottom panel of Appendix Exhibit E-6). Its coefficient from the meta-regression is relatively large (at 0.26 standard deviations), the 95 percent credible interval is large too; however, the probability of any impact is relatively low (60 percent)—meaning in plain terms, that there is a fairly high (40 percent) chance that the local unemployment rate is not actually associated with labor market impact.

In sum, the results of our meta-regressions suggest a pattern of larger impacts associated with characteristics more commonly found in sectoral training programs led by private nonprofit entities (sometimes in partnership with community colleges and sometimes not). Whether the specific characteristics in our meta-regressions are the most important drivers of these programs' larger impacts is more difficult to say. As discussed, it is possible these programs share other characteristics not included in our meta-regressions which may be equally or more responsible for their impacts.

It is also worth noting that our analysis, like any meta-analysis, is designed to synthesize findings across evaluations, and individual evaluations might offer insights beyond what our analysis captures. For example, Project QUEST has achieved notably large, positive impacts on long-term credential attainment and earnings and yet has characteristics, such as community college partners and financial assistance, that our analysis shows associate with smaller impacts. It could be that the program is an exception, or that the associations are different when looking at very long-term outcomes.[19] More research is needed to answer such questions.

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[19] Only two evaluations in our analysis reported outcomes for a follow-up period of five or more years.

Chapter 4. Discussion & Conclusion

This meta-analysis represents the first systematic review and analysis explicitly focused on the growing number of career pathways impact evaluations. The first section of this chapter considers how evidence from this analysis relates to and augments existing knowledge. The second section considers implications for program design and implementation, for public policy, and for future research.

4.1 Findings in Context

This section places our findings in the context of existing research on career pathways programs' impacts and implementation, first by considering the meta-analysis results and then by considering the factors that contribute to impacts.

4.1.1 OVERALL META-ANALYSIS FINDINGS

H Considering findings from 46 impact evaluations, we found that the career pathways approach achieved large educational progress gains, on average. It also generated large impacts on industry-specific employment and small impacts on employment and short-term earnings. Impacts on medium/long-term earnings were not meaningfully different from zero.

These findings add nuance to findings from a previously released project brief, which reported a count of evaluations that had statistically significant impacts (Sarna & Adam, 2020). By that count, 83 percent of programs reported favorable educational progress impacts, and about two-thirds of programs reported favorable labor market impacts. However, much of this earlier work is descriptive in nature, and did not control for variation in study quality or estimate an average impact for programs overall. Although those proportions identified in prior work might still be true (e.g., that 83 percent of programs reported favorable educational progress impacts), the research presented in this report has added important detail about the magnitude of the impacts and our confidence in that magnitude (see Exhibit 2-1). Indeed, a main purpose of this meta-analysis is to pool the findings of many evaluations and examine empirically the aggregate effects.

The meta-analysis findings we summarize here are of the average impact associated with the career pathways approach, as represented by the 46 evaluations providing data to the analysis. Examining averages may not fully address some important questions of interest to the field, which leads to our efforts to examine which program characteristics associate with impacts.

4.1.2 EFFECTIVENESS FACTORS FINDINGS

M Our analysis documented substantial variation in how programs are designed and implemented, who they serve, and program impacts, although the evidence described here is suggestive of relationships and we cannot make causal attributions. We used this variation to address questions about what specific program characteristics associate with smaller or larger impacts. It is worth noting that "smaller" impacts does not mean "negative" (or unfavorable) impacts. Indeed, smaller impacts are still positive overall, especially for educational progress. For educational progress, the overall average impact across evaluations is positive and large, and the vast majority of impacts are on the favorable side of zero. As a result, our analysis really considers what characteristics associate with positive impacts (which is what we observe); and so the results report the characteristics that associate with larger positive impacts as opposed to smaller positive impacts (because there are not negative impacts to explain).

As shown in Chapter 3, our analysis identified program characteristics that associate with smaller or larger impacts in educational progress and labor market domains:

M Some types of partnerships associate with larger educational progress impacts (staffing agencies), others with smaller ones (community colleges).

M Programs' activities to engage employers also associate with educational progress impacts. Our analysis shows that employer input on program curricula or design are associated with larger educational progress impacts.

M Tuition assistance—and other forms of financial assistance, more generally—associate with smaller labor market impacts.

These associations do not lend themselves to easy interpretations and could reflect factors for which our analysis did not control; future research efforts could tease out whether there are indeed causal relationships between these factors and smaller or larger impacts.

4.2 Implications for Programs, Policy, and Future Research

This section discusses what the findings imply for program design and implementation, public policy, and future research.

4.2.1 PROGRAM AND POLICY IMPLICATIONS

Our meta-analysis sheds light on the **overall effectiveness** of the career pathways approach, based on the 46 high-quality impact evaluations that met our criteria and had sufficient data available to include. We have high confidence in the conclusion that the career pathways approach, on average, increases educational attainment by a large amount. The career pathways approach also increases employment, especially industry-specific employment, and leads to slightly greater short-term earnings though not greater medium/long-term earnings. The main implication of this combination of findings is that programs should consider explicitly how to convert the large educational progress gains and industry-shifting employment into earnings gains across the short and long term.

To better translate education achievements into higher earnings, policymakers and practitioners might consider targeting higher level credentials from the outset. Currently much of the training in career pathways programs is short term and for relatively low paid, entry-level jobs, and evidence to date suggests the majority of participants do not continue on in a pathway from entry-level training to higher-level training and jobs (see, for example, Sick & Loprest, 2021, Exhibit 12). Some programs that target longer-term, more advanced training from the outset, such as Project Quest, have had larger and more sustained impacts on earnings. Programs might also improve earnings results by using labor market information to target occupations and industries that have high potential for advancement. Career pathways programs commonly target healthcare, for example, and within that industry, often target entry-level occupations like nursing assistants. Some programs that target other industry sectors, such as information technology (IT) or financial services, have had large and sustained impacts on earnings. These include Year Up and Per Scholas.

Policymakers and practitioners must, of course, balance multiple objectives and tradeoffs in making choices about career pathways implementation, including the target population, local labor market

conditions, and available program resources. Tradeoffs to targeting initial training to better paying occupations may include, for example, higher attrition if training requires more time to complete or curtailed access if it involves unrealistically high training entry requirements (e.g., 10th grade math) for programs targeting a population with lower literacy or numeracy skills. . Career pathways policy and practice must also balance dual goals of improving labor market outcomes for participants while also addressing employer workforce needs. Our analysis suggests the career pathways approach on average has been more successful at responding to employer needs (connecting people to in-demand jobs for which they trained) than advancing workers, as evidenced by weak earnings impacts. Going forward policymakers and practitioners might consider ways to better target career pathways training to occupations and industries that can strike a better balance, those that allow programs to meet employer workforce needs while also offering participants a chance to significantly boost earnings. A separate study for this project focuses on exploring career trajectories and occupational transitions in the wider labor market with an eye toward identifying promising occupational steps (see Clarkwest et al., 2020).

In examining **effectiveness factors**, our analysis explored a number of program characteristics—some related to aspects of program design such as the targeted industry, and some related to aspects of program implementation such as how to engage employers. As described in Chapter 3, many characteristics show associations with larger or smaller impacts, but many others have no association with impacts. For some of these findings, our analysis did not control for other factors so they must be interpreted accordingly, as the exploratory information that it is. For example, for some characteristics, once we controlled for selected factors, the association with impacts disappears.

Although we do not know with certainty what might lead to larger impacts, we observe some suggestive relationships. Perhaps the most interesting one from a policy perspective is the role of community colleges. Our analysis finds that a community college as the lead agency or a partner in a pathways program associates with smaller—although on average positive—impacts on educational attainment. We did not find any clear association between community colleges as lead or partner and labor market impacts.

Our educational attainment finding does not imply that community or technical colleges should *not* operate career pathways programs. Community colleges are an integral part of the workforce development system and career pathways programs run by community colleges serve much larger numbers of participants overall than programs led by other types of organizations. Given that, policymakers might need to recognize that their impacts on educational progress should not be compared directly to programs that have a different administrative structure, and possibly, different target populations and available resources. Moreover, there may be differences in how non-community college programs are evaluated relative to how community college programs are evaluated: research evidence may be limited on community-based organizations and nonprofit initiatives, whereby only those that appear to be successful are the subjects of impact evaluations. In comparison, many community college efforts are evaluated because they are part of a public grant program, an overarching funding stream that operates at large scale so that the evaluation is not necessarily focusing on just the highest-performing programs.

The community college finding may mean, though, that these institutions face additional challenges not faced by small, private nonprofit programs to ensuring that participants can move forward with their goals. They may face a tradeoff between being more selective and/or providing more intensive services in order to produce larger impacts—but at a smaller scale than usual—vs. prioritizing serving more individuals and/or more disadvantaged individuals with smaller impacts but benefiting more people. Moving the

average of a large swath of participants a little may be as valuable as moving the average of a small number of participants a lot. To the extent community college career pathway services are publicly funded, such tradeoffs involve policy choices about the goals of a particular program or grant initiative. As noted earlier, however, there may also be aspects of successful sectoral training programs that community colleges could usefully replicate while accommodating their broader missions, such as providing participants with a more structured experience, targeting more promising occupations, or building stronger relationships with employers.

In general, our findings should be treated as informative for policy and programs but not prescriptive. The overall meta-analysis results can be interpreted as causal; whereas the meta-regression results offer suggestive evidence, and the initial block analyses on which those are based should be interpreted as exploratory. All things being equal, programs might consider implementing or emphasizing those characteristics found to be associated with larger impacts; but evidence of a clear causal relationship does not yet exist. It is worth considering the diverse settings, populations, and goals of various programs. This analysis does not offer evidence to suggest that programs should prioritize or abandon any particular characteristic. Rather, programs may want to consider these findings alongside information they have about the population they serve and the resources they have available. For example, findings around flexible sequencing and assistance for training costs should be interpreted in light of the fact that programs that use these approaches might be doing so because their population is particularly in need of them. That said, if a characteristic is associated with smaller impacts, then it may be a sign that such a characteristic is not as necessary a component for program success. We reach this conclusion tentatively because of the relatively small number of evaluations that contributed data on some of the characteristics we analyzed.

4.2.2   RESEARCH CHALLENGES AND LESSONS

One of the primary contributions of meta-analyses is in empirically synthesizing information from across an array of evaluations, conducted on various programs, on various populations, in various places, at various points in time, and conducted by various researchers. Instead of descriptively synthesizing information, it uses statistical analysis to combine numeric results across multiple studies into a single number for each outcome of interest. This section summarizes some challenges and lessons from our meta-analysis that might help future meta-analyses of workforce development programs realize their fuller potential for providing evidence that is useful for policy and practice.

The key challenges we faced in selecting and coding evaluations for this meta-analysis concern variation in programs studied, evaluation design quality, and incomplete and inconsistent reporting on the impact findings and on the characteristics of programs included in the evaluations.

Wide Variation Among Programs Evaluated

Programs incorporating key elements of the career pathways approach vary widely in how they are designed and implemented. For this study, casting a broad net when choosing which evaluations to include seemed the best way to respond to research questions of interest to the field and ensure the dataset included a large enough number of studies to make meta-analysis feasible. The resulting diversity in our sample made it challenging, however, to synthesize evaluation findings across the 46 studies (some including multiple programs) and to identify characteristics associated with impacts while adequately controlling for other factors. The inherent difficulty of doing so was compounded by the measurement and reporting challenges described below. To the extent that future meta-analyses of workforce development programs have a larger number of high-quality evaluations to choose from than

were available to us, they may want to synthesize findings across more similar groups of programs. More consistent and complete reporting in evaluations, as we suggest below, could facilitate the grouping of programs along key dimensions.

Mixed Evaluation Design Quality

We excluded a number of evaluations that might otherwise have been included in this analysis on quality grounds (see Appendix A). One of the most frequent design issues for which an evaluation was excluded involved non-overlapping time periods for the program and comparison groups. This occurred, for instance, when the education and employment experiences of a cohort that participated in a career pathways program were compared with the experiences of a cohort that did not participate three years earlier. This "time confound" occurs when none of the program and control/comparison follow-up windows overlap. In that case an evaluation's conclusions are substantially weakened. Impacts from an evaluation that has a time confound cannot support causal conclusions because it is unclear whether the differences in outcomes are a function of the program or of the broader economy.

Inconsistent Impact Findings Reporting

For this project's meta-analysis, we found that evaluations commonly did not report raw, unadjusted treatment and control/comparison group means and standard deviations. Instead, they reported varyingly computed regression-adjusted values, only sometimes with standard errors, and sometimes with only *p*-value thresholds (rather than actual values), all of which posed challenges to the analysis team's ability to compute effect sizes, without relying on assumptions to execute the computation.

Incomplete reporting of statistical information around impacts, in particular, resulted in some relevant evaluations not being included in the analysis. First, raw program and control/comparison group means and standard deviations are more easily accommodated in a meta-analysis than regression-adjusted values. In comparison to fields where systematic reviews are more common, such as education, there is more variation in reporting of such data in the workforce field. We encountered many alternative ways of reporting program and control/comparison group outcomes and impacts, and in some cases we could not use this information to calculate reliable or reasonable values in our data. It is common when conducting meta-analyses to reach out to study authors—if they were even still reachable—for more information, and we did so, but this is less successful when it requires authors to conduct additional analysis.

To facilitate reporting that lends itself to evaluations' readiness for inclusion in meta-analyses, Exhibit 4-1 lists the data elements that should be included directly in an evaluation report (perhaps as an appendix). An alternative would be that the evaluation leads prepare the data elements and store them with project records so that—when faced with an author query—they will have the data on hand to respond without having to conduct additional analysis.

Inconsistent Program Characteristics Reporting

The evaluations that we included also did not report consistently on the characteristics of the programs on which they focused. We undertook substantial effort to code many characteristics about the program, including program design and implementation characteristics as well as participant composition and local context measures. This intensive data coding was necessary for our analysis of potential effectiveness factors. There was substantial variation, however, in how these characteristics were reported across evaluations. For example, evaluations used varying categories for participant characteristics: an age category of 20 to 30 in one evaluation cannot be easily combined with categories of 18 to 24 and 25 to 34

from another evaluation. This lack of consistency meant that we could not report many participant characteristics.

With respect to program design and implementation characteristics, our team took great efforts to read the detailed implementation reports. However, information on certain aspects of program operations was not always available. We initially reviewed a small number of evaluations to assess the feasibility of coding certain measures and concluded that we could not code some characteristics of interest, such as participants' baseline economic well-being or program selectivity. Of the characteristics we did code, our data are primarily complete, but there are still measures with high rates of missing data (such as the frequency and nature of one-on-one assistance) which we could not ascertain from the evaluation reports.

A related challenge is that we coded information on what programs offered (based on what was documented in the evaluation reports) as opposed to what participants actually received. Participants' receipt of services can vary even when services are offered; for example, an evaluation of the first round of HPOG grants found that 92 percent of programs offered child-care assistance, but only 11 percent of participants received it (Werner et al., 2016). Although many evaluations do report some information on service receipt, it is not reported consistently enough to compare across evaluations. Without information on the receipt of actual training or other services and assistance that any specific program participant or group of participants received—we cannot investigate the implications of variation in dosage.

4.2.3 FUTURE RESEARCH

The challenges faced by this meta-analysis lead us to recommend possible ways to strengthen future efforts to synthesize information across evaluations. We first propose the elements of an evaluation that should be reported consistently to facilitate meta-analysis. Then, we discuss the potential of pooling individual data across impact studies as a means of overcoming some of the challenges described above. Finally, we discuss several ideas for future research to build on this study, both within the career pathways field and more broadly in workforce development.

Improving the Consistency of Evaluation Reporting

This meta-analysis, and especially the analysis of potential effectiveness factors, was limited to data that evaluations reported consistently. Many characteristics of interest to the field, such as basic skills levels or program selectivity, were seldom reported. Others, such as measures of economic status or financial well-being, were frequently reported but not in a consistent manner that would allow for comparisons between evaluations.

One solution to this set of challenges around program characteristics reporting would be to embrace the practice of establishing core components (e.g., Hoffman, 2020). Federal leadership, including from DOL, the Department of Health and Human Services, the Department of Education, and other agencies that fund training, could potentially facilitate efforts to identify the core components of job training programs. Once core components are identified, practitioners and researchers can report on those components consistently. We suggest that a comprehensive effort within the workforce field is warranted, with an eye toward ensuring consistent reporting of core characteristics. Doing so would help researchers consistently document study participants/populations as well as program design and implementation characteristics, thereby facilitating meta-analyses.

Exhibit 4-1 lists the information that such efforts should prioritize. Researchers and policymakers are also increasingly interested in understanding program effectiveness for various demographic groups.

Researchers may not report this information because of smaller sample sizes and limited power. However, to the extent that studies also can consistently report on subgroup impacts—for men versus women; for people of various racial or ethnic groups, consistently defined; or for people of varying ages, again consistently defined—those impacts can be included in evidence reviews and meta-analysis to the same end and benefit as a study's overall effects. To more easily do so, the information described under "Impact Analysis Results" in Exhibit 4-1 would need to be reported for each group of interest.

Exhibit 4-1. Recommendations for Consistent Study Reporting

STUDY CHARACTERISTICS AND CONTEXT
The following are the elements that a meta-analysis would require about the program that is the focus of the study.
✓ Intervention and Comparison Conditions – What intervention (program, policy, practice, etc.) does the study evaluate? Was there any adjustment or adaptation implemented in the study? What services, if any, did the comparison group receive?
✓ Setting – Where did the study take place? What are the key characteristics of the setting (urban, suburban, or rural; State; etc.) In what years did the study take place?
✓ Study Sample – Who participated in the study? How were they selected and recruited? What were the ages of participants? What were the criteria for participation in the program or the intervention? What are their socio-demographic characteristics?

STUDY DESIGN AND ANALYSIS
The following are the elements that a meta-analysis would need to know about the program that is the focus of the study, the study's setting, and the sample of study participants.
✓ Study Design – What was the study's design (e.g., randomized experiment, quasi-experimental design, descriptive)? If an impact evaluation, how were the units (e.g., individuals, groups of individuals) assigned to the program and control/comparison condition (e.g., random assignment, matched comparison)?
✓ Measures – Identify the measurement instrument, if any, and data source (self-reports, administrative data) for the measures. Identify the timing of all measurements in the study, including any pre-tests.
✓ Baseline Equivalence – Provide information needed to assess baseline equivalence of program and comparison groups. Pre-tests are preferred, if available. Absent a pre-test measure of the outcome, alternatives such as socio-demographic characteristics are acceptable.
✓ Methods of Data Analysis – Describe the analytical models or methods used to estimate impacts. Specify the variables, if any, that were included as controls in the analysis. Specify the unit of analysis (e.g., cluster, individual) and, if applicable, how clustering was addressed.
✓ Missing Data – How did the analysis account for missing data, if any? Specify the type of data (baseline, outcome, or both) for which missing data methods were used.

IMPACT ANALYSIS RESULTS
For each outcome measure (and for each subgroup, as available), the evaluation should report the following:

✓ Sample size for the treatment group	✓ Unadjusted control/comparison group standard deviation
✓ Unadjusted treatment group mean	✓ Impact estimate (with information on how it was computed, if other than raw difference in means) and associated *p*-value
✓ Unadjusted treatment group standard deviation	
✓ Sample size for the control/comparison group	✓ Standardized difference
✓ Unadjusted control/comparison group mean	

Absent the above information (unadjusted sample sizes, group means, standard deviations), the following should be documented from a study's report:

✓ Coefficient from the impact estimation model	✓ Standard error of the impact (and, if the standard error is unavailable, the specific *p*-value associated with the impact estimate).

Appendix H offers a template for the data needed to easily calculate effect sizes in a meta-analysis, with columns A though H the most essential.

Pooling Individual-level Data

An alternative or complement to having core components and characteristics readily and consistently available from a program evaluation is to consider obtaining individual-level data from evaluations and then pooling that data in a meta-analysis (rather than simply using the evaluation-level impacts, as we did in this analysis). This has been labelled "individual participant data" (IPD) meta-analysis. An IPD meta-analysis would combine individual-level data with evaluation-level data to further explore the relationships between program impacts on individuals and the evaluation-level characteristics associated with those impacts. This approach provides opportunities to understand the relationships between individual impacts and participant characteristics to a much greater degree than our current analysis permits. Because we have coded program characteristics for the 46 evaluations included in this meta-analysis, if we had access to those evaluations' individual-level data, then we could further explore the relationship between program characteristics—and especially individual participant characteristics—and impacts.

In the future, if/when the field has established a set of core components for job training and career pathways programs, those component data may be more readily available, even better facilitating data pooling and advancing examinations of what drives program impacts.

Testing the Effectiveness of Program Characteristics

The analysis identified several factors that were suggestive of an association with impacts, including types of partnerships, employer input on program curricula or design, and tuition and other forms of financial assistance. There are two main ways that research can help generate more evidence on these characteristics.

First, a future meta-analysis could replicate what we have done here, but with a larger number of evaluations. Having a larger sample size, essentially, strengthens the analysis by providing more evidence across which to aggregate. As noted, this analysis lacked a large number of evaluations reporting long-term earnings impacts and included relatively few programs that did not have a community or technical college as part of their administrative arrangements. The more the merrier is the case in this kind of analysis, and so we look to the future when we might draw on additional evaluations to help solidify, modify, or clarify what we have found and reported here.

Alternatively, and preferably, the program characteristics that we have identified as suggestively related to program impacts could be directly tested in well-designed impact evaluations. For example, evaluations—either through a broad demonstration authority or through a smaller number of selected programs—could use a multi-armed experimental design to focus on a particular program characteristic (such as the availability or intensity of financial aid) to explicitly test its contribution to program impacts.[20] Site-level randomization might be especially fitting for generating evidence on program- or systems-wide changes.

Other Directions for Future Research

Our findings suggest two other areas in which future research could build the evidence base to improve workforce development programs, beyond just career pathways evaluation.

First, as described in Chapter 3, the meta-regression results suggest larger impacts associated with certain characteristics more commonly found in sectoral training programs led by private, nonprofit entities in our sample. Given gaps in data reported and the relatively small number of such programs in

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[20] Peck (2020) offers several design options aimed at exploring how programs drive impacts.

the sample, it is possible those characteristics are not the only or perhaps even the most important factors at work; these programs may share other characteristics for which we were not able to account in our analysis, which may be equally or more responsible for their impacts. Or, perhaps a particular combination of features drives their impacts. Future research could closely compare attributes of private, nonprofit sectoral training programs with programs led by other entities, including community colleges and workforce agencies, to dig deeper into key ways in which their program and participant characteristics differ. This could potentially clarify the most important factors behind disparities in impacts and suggest whether elements of sectoral training could usefully be adapted to different settings and populations to improve results. That could be followed by pilots to test this kind of replication and scaling of promising elements. The recent experience of the Year Up Professional Training Corps shows how incremental and iterative experimentation in close partnership with practitioners can be used to help community colleges adopt and refine sectoral training practices to meet the particular needs of their students, institutions, and local labor markets (Fein et al., 2020; Maynard et al., 2020; Britt et al., 2021).

Second, the role that targeted industry sectors, occupations, and occupational steps may play in different program results deserves more attention, especially given the disconnect found in our analysis of overall impacts between programs producing strong education gains but weak earnings gains. There has been surprisingly little labor market research on the different paths individual workers take to higher wages, and what can be learned from that for workforce development programs focused on advancement. To help inform policy and practice to improve outcomes, researchers might consider studying workers' career trajectories to understand better which occupations tend to be launchpads for future wage growth. Programs could also gain insights from better understanding which workers' characteristics, such as skills, educational attainment, prior work experience and others, are associated with future wage growth. In addition, analyses of labor market disparities in wage growth, such as along racial/ethnic or gender lines, could reveal subgroups that programs should especially seek to support to advance. As noted, this project's Career Trajectories and Occupational Transitions Study is considering these types of research questions.

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Appendix A: Data Collection and Preparation

This appendix documents the data collection and preparation procedures that we followed in carrying out the meta-analysis. It starts by describing how we identified and selected the evaluations to be included. It then details the data coding procedures, both for the evaluations' characteristics and the characteristics of the programs on which they focus, as well as for the evaluations' findings (the "outcomes" for this analysis).

A.1 Evaluations Included in the Meta-Analysis

The initial step of any meta-analysis is to define its scope, identifying possible evaluations within that scope, and setting the criteria for whether an evaluation should be included.

A.1.1 IDENTIFICATION

This meta-analysis cast a broad net in including evaluations. To identify evaluations for this meta-analysis, we started with the research and evaluation studies identified as part of the CP Design Study (Sarna & Strawn, 2018; Schwartz et al., 2018). In that prior work, we identified evaluations through a review of federally funded and other well-known projects with a career pathways focus, examined websites and other sources that compile and report on career pathways efforts, and consulted with individuals and organizations with known expertise in the career pathways approach. For this meta-analysis, we updated that scan in early 2019 with additional potentially eligible evaluations identified through a web-based literature search (Sarna & Adam, 2020). In addition, we added reports, where available, for those evaluations that had reported short-term outcomes in the original scan but had since published longer term results . A list of the sources we searched to identify evaluations for this meta-analysis appears in Exhibit A-1.

Exhibit A-1. Sources Included in Scans to Identify Evaluations

- Administration for Children and Families' Career Pathways Catalog of Toolkits, https://cptoolkitcatalog.peerta.acf.hhs.gov/
- Administration for Children and Families' Career Pathways Website, https://career-pathways.org/
- Administration for Children and Families Self-Sufficiency Research Clearinghouse, Office of Policy Research and Evaluation, https://www.opressrc.org/
- Alliance for Quality Career Pathways, https://www.clasp.org/alliance-quality-career-pathways
- American Association of Community Colleges, https://www.aacc.nche.edu/
- Aspen Institute's Workforce Strategies Initiative, https://www.aspeninstitute.org/programs/workforce-strategies-initiative/
- Career Ladders Project High Impact Pathways Initiative, http://dev.careerladdersproject.org/initiatives-programs/hip/
- Career Pathways Exchange e-mail digests, https://lincs.ed.gov/state-resources/federal-initiatives/moving-pathways/career-pathways-exchange
- Career Pathways Summary of Responses to a Request for Information, https://lincs.ed.gov/publications/pdf/CP_RFI.pdf
- Clearinghouse for Labor Evaluation and Research, Department of Labor, https://clear.dol.gov/
- Community College Research Center, Office of Community College Research and Leadership, https://ccrc.tc.columbia.edu/
- Corporation for a Skilled Workforce, https://skilledwork.org/
- Department of Labor's Career Pathways Toolkit, https://careerpathways.workforcegps.org/resources/2016/10/20/10/11/Enhanced_Career_Pathways_Toolkit

- Employment Strategies for Low Income Adults Evidence Review, Administration for Children and Families, https://www.acf.hhs.gov/opre/project/employment-strategies-low-income-adults-evidence-review-2013-2018
- Institute for Education Sciences, https://ies.ed.gov/
- Jobs for the Future's Accelerating Career and Technical Education initiative, https://www.jff.org/what-we-do/impact-stories/accelerating-cte/
- League for Innovation in the Community College, https://www.league.org/
- Making Skills Everyone's Business, https://eric.ed.gov/?id=ED558793
- National Association of Workforce Boards, https://www.nawb.org/
- National Bureau of Economic Research Monthly Digests, https://www.nber.org/papers.html
- National Council for Workforce Education, https://www.ncwe.org/
- National Governor's Association, https://www.nga.org/
- National Network of Sector Partners, https://insightcced.org/our-areas-of-focus/workforce-development/national-network-of-sector-partners-nnsp/
- National Skills Coalition, https://www.nationalskillscoalition.org/
- What Works in Job Training: A Synthesis of Evidence, https://www.dol.gov/sites/dolgov/files/OASP/legacy/files/jdt.pdf
- WorkforceGPS, Employment and Training Administration of the U.S. Department of Labor, https://www.workforcegps.org/

As shown in Exhibit A-2, we identified 123 evaluations as potentially eligible for this meta-analysis, based on our research scans and subsequent searches. This exhibit takes the form of a standard "PRISMA" flow diagram (for "preferred reporting items for systematic reviews and meta-analyses") commonly used in systematic evidence reviews and meta-analyses (Moher et al., 2009).

Exhibit A-2. Identified, Screened, Eligible, and Included Evaluations
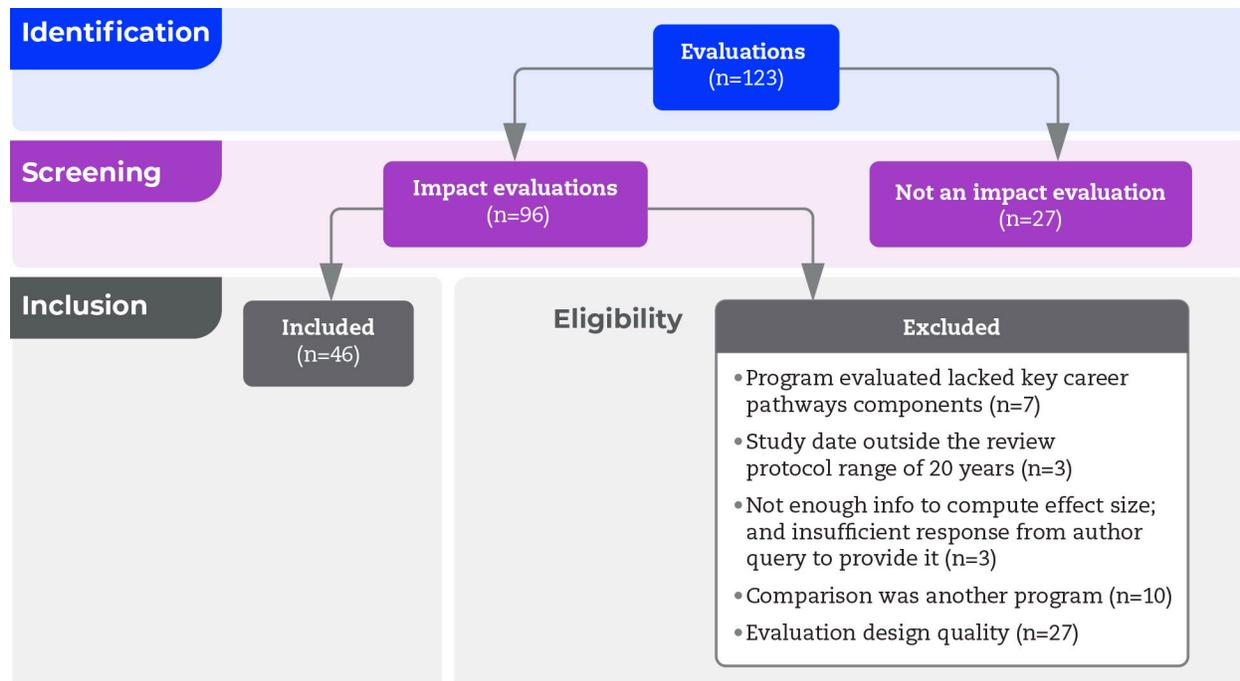
Source: Authors' computations from D&A CP Project meta-analysis dataset.

A.1.2 SCREENING

Next, we screened out 27 evaluations because they were not impact evaluations. Then we reviewed the remaining 96 impact evaluations against eligibility criteria for meta-analysis.

A.1.3 ELIGIBILITY

The specific criteria we used to identify which evaluations were eligible to include in this meta-analysis fall into three main groups—relevance, quality, and other—defined as follows.

Relevance Criteria

- **Career pathways program:** Career pathways programs can be thought of as variations on the career pathways framework; and most programs implement just some of the elements of that framework. Some programs might not even refer to themselves as "career pathways programs" although they operate some key elements of the framework. In response, and to be inclusive for this meta-analysis, we have chosen to define the term broadly. The evaluation must be of a program in the United States that involved a direct intervention to improve participants' educational, employment, or earnings outcomes via a career pathways approach, at a minimum offering (1) career pathways, sectoral training, *or* integrated basic education and training; *and* (2) occupational training.

- **Evaluation participants:** The evaluation must have focused on a program that served adults (i.e., at least 18 years of age). If the sample included study participants younger than age 18, then the evaluation was still eligible if the sample's mean age was 18 or older.

- **Outcomes:** The evaluation must have reported at least one impact related to education, employment, or earnings. There were no restrictions on the type of measures, data sources (e.g., self-report versus administrative data), or scales used for the outcome. To meet this criterion, the evaluation needed to report enough information for us to be able to calculate the program's impact in a standardized unit known as a standardized effect size.

Quality Criteria

- **Evaluation design:** The evaluation must have used an experimental design or a quasi-experimental design that controlled for selection and other sources of bias. These are both impact evaluation designs that compare study participants who had access to a program ("program group") with study participants who did not have access to that program (a "control group" or a "comparison group") where that excluded group had access to either *no* intervention or the *status quo,* but not to some alternative program. That is, the evaluation design must be sufficiently rigorous to provide a credible estimate of the program's impact.

- **Free of confounds:** To provide a credible estimate of the program's impact, the evaluation design had to be free of confounding variables. A confounding variable (or simply a "confound") is any variable other than the program that might also influence the outcome. The most frequently observed confound that made an evaluation ineligible for the meta-analysis related to time, such as a program group measured in 2013 compared with a comparison group measured in 2009. In that situation, the program's estimated impact could not be credibly disentangled from the differences between 2009 and 2013.

Other Criteria

- **Evaluation language and age:** The evaluation report must have been written in English, and the report must have been published in 2008 or later.

Two team members independently coded each evaluation identified to determine its eligibility. If both coders reached the same decision, then that was the final decision about the evaluation. If these initial

decisions differed, then the coders met to review the information to reach a consensus decision, bringing in a senior team member, if needed.

A.1.4 INCLUSION

Exhibit A-2 shows the number of evaluations excluded because they did not meet specific eligibility criteria. For example, seven were excluded because they did not offer key elements of our (fairly broadly defined) career pathways framework of offering (1) career pathways, sectoral training, *or* integrated basic education and training; *and* (2) occupational training. This generally meant that, although they might have had some components common with programs that operate in the career pathways framework, they did not offer occupational training. Three were excluded for being too old. The remaining exclusions related to evaluation design: three evaluations did not include sufficient information for us to compute an effect size,[21] 10 evaluations included a treated comparison group, and 27 of the evaluations were not experimental or highly-credible quasi-experimental research designs (according to the criteria described above).

That resulted in 46 evaluations being included in the meta-analysis.

A.2 Preparing Data for Analysis

The 46 evaluations included in the meta-analysis represent a diverse set of career pathways programs whose evaluations identified a variety of outcomes and estimated a variety of impacts. To be able to assess the overall effectiveness of the career pathways approach (RQ1) and which characteristics of that approach were effective (RQ2) requires aggregating evaluation findings into a single dataset for analysis. That single dataset brings together everything the evaluations report into a format that lends itself to quantitative analysis. The analysis team established a coding protocol that identified many details from the evaluations, including the programs on which they focused, the processes they used, and the results they reported.[22] This section details that coding process.

As with the study eligibility determination, two team members independently coded these aspects of each evaluation and program, then their decisions were confirmed, and reconciled if needed.

A.2.1 CODING PROCESS FOR EVALUATION AND PROGRAM CHARACTERISTICS

The coding team captured characteristics of the evaluations themselves as well as of the programs on which they focused. This section first defines those characteristics and then discusses the coding procedures.

Evaluation Characteristics

These data describe the evaluation itself, including:

- **Overall sample size:** the evaluation's number of participants

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[21] In nine instances, we queried authors for additional information we needed to calculate effect sizes. Six of those queries resulted in us getting the information we needed to include that evaluation in the meta-analysis dataset. We excluded from the analysis the three evaluations whose authors either did not respond or did not have the information required.

[22] A copy of the coding protocol is available upon request from the authors and will be made available in conjunction with public release of the meta-analysis dataset.

- **Evaluation group sample sizes:** those participants' grouping into a program group versus a control/comparison group

- **Evaluation group balance:** the extent to which the program and control/comparison groups are comparable (either because of randomization or because of statistical adjustments)

- **Missing data handling:** the evaluation's analytic approach to handling missing data

Program Characteristics

These data describe various characteristics of the program, including:

- **Local context:** The one local context indicator that we have is the average unemployment rate for the program's geographic area for the year during which the evaluation began enrolling study participants.

- **Program design and implementation:** These include the lead and partner agency/agencies, administrative arrangement, presence of basic skills instruction, the credentials of focus, flexibility of the instruction/training, training offering, training duration, industry/industries trained for, employer roles and levels of engagement, and various types of participant supports.

- **Participant characteristics:** Programs have varied target populations, and we capture the gender, race, ethnicity, age, and educational level of the evaluations' participants.

Coding Procedures

With these categories of the data defined, we now turn to the coding protocol, which was developed iteratively. First, the Abt team created an initial list of potential program characteristics with input from DOL staff. The list included an initial assessment of feasibility for inclusion and potential relevance based on existing evidence. Then we further assessed the feasibility of including each variable by reviewing a subset of potentially eligible evaluations to determine whether the characteristics of interest were described in sufficient detail in those evaluations. DOL shared feedback on which characteristics were of greatest interest. From that list, we developed the program characteristics section of the protocol, which we finalized in October 2019. A copy of the protocol appears in the Meta-Analysis Research Design Report (Schwartz et al., 2020) and is available in conjunction with the study's public use dataset.

We then operationalized the protocol into an interface and corresponding underlying database with FileMaker Pro® software established to allow coders to enter data from the specific evaluations they were assigned for review.[23] Each evaluation was reviewed and coded independently by two coders. If their assessments differed, then the coders discussed and reconciled the differences.

In cases where coders could not reach agreement, or when coders were uncertain how to code a specific aspect of an evaluation, coders brought their questions and issues to weekly office hours with project leadership. These meetings gave coders the opportunity to clarify their questions and helped ensure consistency and accuracy of codes across the data. Based on office hours notes, the review team established a document to record these coding decisions and related coding rules.

The unit at which to code was not always immediately clear. Sometimes the same program was included in more than one evaluation. In other cases, several programs were evaluated under a common research

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[23] FileMaker is a cross-platform relational database application from Claris International, a subsidiary of Apple Inc.

project, with the same research questions and methodology, and written up in the same report. Our guiding principle was to code at the smallest unit possible. This meant:

- If a research project reported impacts separately for each program, then we coded each site's findings as a separate unit. Program characteristics were coded at the program level.
- If the project reported only impacts pooled across programs, then we coded it as a single unit (and program characteristics were assessed for the programs included in the evaluation as a whole).
- If a program was evaluated as part of two separate evaluations, conducted at different time periods with distinct groups of participants, then each evaluation was coded as a separate unit.
- For evaluations in which there was an overlap in participants (as was the case for some Pathways for Advancing Careers and Education (PACE) sites that also were included in Health Profession Opportunity Grants (HPOG)), we conducted a sensitivity analysis using frequentist methods.[24]
- For evaluations in which separate reports covered different follow-up periods, all reports related to a single program evaluation were together considered as part of that evaluation and coded together as one unit.

A senior member of the project team reviewed the initial list of evaluations before coding began and assigned evaluation identification numbers that reflected these guidelines.

Data Post-coding

Several fields within FileMaker asked coders to enter more detail if they selected "Other" as an option. Coders provided additional information that could help senior leadership understand the elements that did not fit within the established set of coding responses. Once data coding was complete, we extracted the text associated with the "other" entries. We analyzed this set of responses and created a series of new codes to reflect the information captured in those response options. For example, the original set of coding categories for type of partner agencies included a set of five specific agency types, with two "other" response options. Once the open-ended "other" entries were examined and classified, seventeen additional categories were added. These included labor union, school or school district, and faith-based organization among others. Additionally, the post-coding of the open-ended "other" fields allowed some cases originally coded as "other" to be reclassified into an existing response category.

Coding the Eligibility Criteria and Minimum Skills Requirements Program Characteristics

Among the program characteristics of interest are eligibility criteria and minimum skills requirements. DOL expressed interest in learning how these characteristics are associated with education, employment, and earnings outcomes. Unlike other program characteristics, initial work on eligibility criteria and minimum skills requirements did not yield obvious categories for us to include in the coding protocol. With these characteristics varying widely within and across evaluations, we decided to take the opportunity to use a data science-driven approach to identify the value responses for each variable. For these two program

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[24] In statistical terms, the estimates from these evaluations are said to be *dependent*. The method of robust variance estimation (RVE) used in the frequentist analysis provides valid point estimates, standard errors and hypothesis tests when there is dependence—even when the degree and structure of dependence between effect sizes is unknown (Fisher, Tipton, & Hou, 2017). RVE methods are not currently available in the Bayesian framework which was used for the main analysis. The frequentist analysis, which does account for dependence, found similar results and thus provides reassurance that the dependence structure is not an important factor. In addition, we conducted a meta-analysis using preliminary data that excluded the PACE evaluations that overlap with the HPOG 1.0 evaluation—this analysis, which is not reported here, yielded similar overall results to a meta-analysis in which all evaluations were coded separately. To maximize the study's potential to learn from variability in effectiveness factors and impact estimates, we coded these sites separately for all analyses described in this report.

characteristics—eligibility criteria and minimum skills requirements—we asked coders to copy the descriptive text directly from reports and paste this information verbatim into FileMaker Pro®. We then used natural language processing (NLP) algorithms to identify which eligibility criteria and minimum skills requirements appeared most frequently in the data.

When the coders' entry of these descriptions was complete, these two data elements were essentially a series of paragraphs describing the eligibility criteria and minimum skills requirements. These text data were then processed in a series of additional steps designed to identify the categories of relevance for the two program characteristics. The first step involved importing the raw text data from FileMaker Pro® into Python, a programming environment commonly used for data science applications.[25]

The second step involved cleaning the text data. We used a process known as **tokenization** to break down the paragraphs of text into individual words or "tokens," which are the building blocks of natural language. Tokenization involves a sequence of discrete steps, including removing non-alphanumeric characters from words and converting to all lower-case characters. For example, words like "well-being" become "wellbeing," and the words "college" and "College" become the same word. Next, we removed all words unlikely to produce meaningful variation (like "to," "a," and "the"), known as **stop words.** Finally, we reduced each word to its root stem so that words like "educate," "education," "educating," and "educational" were read as a single stem (i.e., "educat") and assigned the same meaning.

The third step was conducting a **bag of words** analysis, in which NLP algorithms count the frequency with which each word stem occurs across the entire set of paragraphs describing eligibility criteria and minimum skills requirements. Although this initial analysis provided some insight into the words that occurred most frequently, it became clear that single words often did not capture complete eligibility criteria or minimum skills requirements. Instead, our team needed to analyze strings of multiple words to identify the criteria and requirements.

In turn, the fourth step was to create and count bi-grams (two-word phrases) and tri-grams (three-word phrases). To better understand how frequently each phrase appeared across the programs as either an eligibility criterion or a minimum skills requirement, we set our algorithm to count only the first mention of each bi-gram or tri-gram in each evaluation's text if it was mentioned more than one time. Focusing on a binary measure of whether or not each phrase was present prevented some text entries with many mentions of a particular phrase from skewing the analysis. After reviewing the initial step four results, we removed words from the dataset that were clearly linked to the evaluation requirements rather than the program's eligibility criteria or minimum skills requirements, such as "report" and "impact." Having removed these words, we repeated the analysis for more refined results.

In the fifth step, we examined the distributions of bi- and tri-grams to determine what the categories of values for the eligibility criteria and minimum skills requirements variables should be. To do so, we examined the 15 most frequent bi-grams and 15 most frequent tri-grams. We chose 15 as the threshold based on the distribution of the results: beyond 15 results, any particular bi- or tri-gram appeared in a very small number of texts. Based on these results, we determined that demonstrating minimum skills was often itself an eligibility criterion. As a result, we decided to code a single eligibility criteria variable into the larger dataset based on combining the eligibility criteria and minimum skills texts for each evaluation.

[25] Natural language processing analyses relied specifically on the widely used NLTK (Natural Language Toolkit) Python package.

The sixth step was to create this eligibility criteria variable in the dataset and to code its values. The process described above revealed the following categories for the eligibility criteria program characteristic:

- has high school diploma or GED
- demonstrates basic skills or minimum skill level on test or class
- meets income requirements
- passes background check or drug screen

Note that, in certain cases, categories were combined or dropped to yield this final list. See Exhibit A-3 for details.

Finally, with these categories identified, we created a series of binary variables to denote which categories applied to a given evaluation, just as we did for other program characteristics. Then, an analyst familiar with career pathways programs consulted the dataset and identified keywords indicative of each category (see Exhibit A-3 for a list of the keywords used). To code each evaluation, its eligibility criteria text was scanned for keywords and assigned the relevant binary variables. For example, if the key words "high school diploma" appeared, the program assigned a "1" value to the *high school diploma required* variable to indicate that this was a requirement. After completing coding, the analyst compared the variable coding to the raw data based on keyword scan. When it appeared that the coding did not capture a criterion listed in the raw data, the analyst performed a recode so that the binary variables could most accurately reflect the information in the text. In all, 47 values were recoded, representing 17 percent of all values originally coded based on keywords.

We found value in using natural language processing for this purpose because, ex ante, the specific categories relevant to these characteristics were not obvious. Using human analysts to identify such categories by reading the text extracts would have taken considerable time and resources. We completed this effort much more efficiently by leveraging NLP to identify categories and keyword matching to perform most of the coding. This illustrates a data science application that might be relevant to future meta-analyses, where extracting program characteristics from a large body of implementation narratives can be informative. The greatest benefit from these methods is realized in analyses involving large numbers of evaluations (Alpaydin, 2016).

Exhibit A-3. Keywords Used in the Natural Language Processing Work

Eligibility Criteria Values	Keywords	
Has high school diploma or GED	• High school diploma • HS diploma • GED • High school equivalency	• HSE • HSD • HSD/GED • Secondary school credential
Demonstrates basic skills through participation in class or test *Note: Ultimately combined with "obtains minimum skill level on assessment test."*	• Adult basic skills • Adult basic education • Remedial courses • Remediation	• Test adult basic • Basic skill • Basic education

Eligibility Criteria Values	Keywords	
Obtains minimum skill level on assessment test *Note: Ultimately combined with "demonstrates basic skills through participation in class or test."*	• TABE • Casa • Casas • WorkKeys • Test score • Test score level • Math reading writing • Math reading writing levels • Math level • Reading level • Writing level • Reading proficiency	• Math or numeracy proficiency • Writing proficiency • Level math read • Basic criteria test • 6th 12th grade • Skill proficiency test • 12th grade level • Level 6th 12th • Fallen within NRS functioning levels • Test score increase • Assessment test • Proficiency assessment (or assess proficiency)
Meets income requirements	• Family income requirement • Federal poverty level • 100% above the federal poverty level	• 150% above the federal poverty level • 200% above the federal poverty level • Family income less than
Meets age requirements *Note: Ultimately dropped due to a low number of keyword matches.*	• 14 years old • 15 years old • 16 years old	• 17 years old • 18 years old • 18 or older
Passes background check or drug screen	• Background check • Passed background check • Clean background check • Clean record • No criminal record • No drug offenses	• Background screen • Drug screen • Drug test • Credit check • Check applicant's credit • Check applicant's background

A.2.2 CODING PROCESS FOR EVALUATIONS' IMPACT FINDINGS

To compare impacts of the career pathways approach as implemented across varied programs and as estimated across varied evaluations requires grouping similar outcomes, standardizing impacts on those outcomes into comparable units, and then aggregating the outcomes (Lipsey & Wilson, 2001).

Outcomes

The evaluations we include in the meta-analysis estimated and reported impacts for multiple outcomes, many of which are similar across evaluations. However, even similar outcomes might not be constructed in exactly the same way. For example, evaluations might have reported program impacts on earnings using slightly different time periods (*earnings over 12 months* versus *earnings over 18 months*) or with dollar values from different years (*earnings in 2005 dollars* versus *earnings in 2015 dollars*).

To compare reported impacts across evaluations, team members coded each reported impact to a common set of well-defined outcomes within five outcome domains: *educational progress*, *labor market*, *career knowledge and experiences*, *job quality*, and *overall well-being*. The first two of these are the domains of primary interest because they reflect the most important program objectives: for participants to get training and education, which leads to better jobs with better pay. Outcomes in these two domains are listed in Exhibit A-4.

The exhibit lists our coded outcomes by domain and identifies how we combined across multiple outcome measures, where needed, for our analysis. The exhibit also shows how many of the 46 evaluations included in the meta-analysis reported each outcome and the total number of effect sizes (impacts) that our analysis uses for each outcome.

Impacts

We analyze an evaluation's reported impact of a program as a standardized effect size, permitting us to aggregate across the multiple and varied measures from the evaluations. We use several elements to standardize impacts, including the number of participants in the evaluation and in its program and control/comparison groups, and those groups' mean outcomes and standard deviations.

Exhibit A-4. Outcomes, by Domain, Research Question Addressed, and Number of Contributing Evaluations and Effect Sizes

Domain Outcomes	RQ1: Overall Impacts	RQ2: Effectiveness Factors	Number of Evaluations	Number of Effect Sizes
Educational Progress Domain				
Educational Progress (credential receipt)	X	X	33	159
Post-secondary degree obtained			16	38
Obtained credential			29	95
Number of credentials obtained			9	9
Earned industry-relevant credential			13	17
Labor Market Domain				
All Labor Market (employment, and earnings outcomes at any follow-up point)		X	39	888
Employment (at any follow-up point)	X		37	514
Employed in follow-up months 0-11			27	105
Employed in follow-up months 12-35			36	294
Employment beyond 36 months of follow-up			17	115
Other Employment Outcomes				
Employed in industry/occupation trained for	X		24	71
Short-Term Earnings	X		37	278
Earnings at follow-up months 0-11			28	90
Earnings at follow-up months 12-35			36	188
Medium- & Long-Term Earnings (36+ months)	X		16	96

Note: Bolded items are those outcomes reported for RQ1 and RQ2, and are composites of the (nonbolded) measures, if any, that appear beneath. The Xs indicate the outcomes included in each main analysis. Domains are not mutually exclusive.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Evaluation Impact Data and Uses

As seen in Exhibit A-4, any one evaluation contributes multiple effect sizes to the analysis in two ways: Not only does one evaluation contribute multiple outcome measures, but it also can contribute multiple times to any one outcome measure. The latter occurs for several reasons, including that the evaluation might report on an outcome from multiple time points or periods of follow-up (e.g., reporting earnings as quarterly or annually over a period of years); or it might report on an outcome from multiple data sources. Some evaluations contribute no outcomes for a given outcome measure. As a result, the sample of evaluations used for any specific analysis will differ from 46.

Findings reported in Chapter 2 (Overall Impact Findings) focus on *educational progress* and *labor market* outcomes because they are the most important indicators of the success of the career pathways approach (Peck et al., 2018). They also are the measures for which we have the most consistent coverage across the 46 evaluations, as indicated in Exhibit A-4's right-most two columns. The notes for

each exhibit that reports findings indicate how many evaluations were part of the analysis for that impact. In Chapter 2 (to address RQ1), we report on the five outcomes, denoted with an X in Exhibit A-4. Four of them, whose titles are in bold, are composites of multiple outcomes (the composites include the nonbold items indented below each). In Chapter 3 (to address RQ2), we report on two outcomes, both of which are composites, as we explain below.

Beyond what Exhibit A-4 summarizes, we also examined outcomes in other domains—*career knowledge and experiences, job quality,* and *overall well-being*. Results from these domains are included only in Appendix D because they contain outcomes that are not consistently included in as many evaluations; and when they are, how specific evaluations measured them is more idiosyncratic.

Data for Answering RQ1

As we describe in Chapter 2, the part of the meta-analysis that addresses the first research question (overall impact of the career pathways approach) examines four composite outcomes within the two domains *educational progress* and *labor market* (shown in Exhibit A-4 as bolded rows and denoted with an X), and one additional (non-composite) outcome in the *labor market* domain (denoted with an X). For each, we compute a single composite impact, which essentially aggregates all of the reported impacts for each evaluation into a single measure.

Within the educational progress domain, we consider one composite outcome that relates to *credential receipt*. The credential receipt measure is a higher bar for a career pathways program to meet than is general *program participation*, and we choose it as an indicator of a program's ultimate success within the educational progress domain. Within the labor market domain, we consider three composite outcomes— *employment* (at any time point), *short-term earnings* (follow-up at less than 36 months), and *medium/long-term earnings* (follow-up at 36+ months); and we also consider a fourth (non-composite) outcome— employment in the industry/occupation trained for—because of its centrality to those programs that have a sectoral or industry focus, which is important to the career pathways framework (Sarna & Strawn, 2018).

Data for Answering RQ2

For the part of the meta-analysis that addresses the second research question (effectiveness factors), we assess the contributions of selected characteristics of career pathways programs that associate with smaller or larger impacts. That is, using the coded evaluation data, we analyze how the variation in those characteristics associates with variation in impacts.

We analyze educational progress with our composite measure of *credential receipt*. That is, we assess variations in selected program characteristics, looking for which might make a career pathways program more or less "effective" in improving participants' rate of credential receipt. For the labor market domain, we aggregate across all possible composite measures of employment and earnings (*employment* at any point in time and *earnings* at any point in time) in order to maximize the number of evaluations that contribute to that analysis.[26] Similarly, we assess variations in selected program characteristics, looking for those that might make a career pathways program more or less "effective" in improving employment and earnings outcomes.

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[26] We include only employment and earnings in this composite outcome, and not employment in the industry/occupation trained for, for two reasons. First, only a subset of programs has an explicit sector or industry focus, and so only a subset of evaluations report on the outcome related to industry-specific employment. Second, our research design laid out plans for constructing the labor market outcome for RQ2 as the composite of employment and earnings, and we are carrying out that plan.

Effect Size Computation

Because evaluations measure outcomes of interest in various ways, we recorded or converted each evaluation-reported impact into a standardized Hedges' *g* effect size (Hedges, 1981). Using standardized units permits effect sizes to be readily compared across evaluations and outcomes. To use plain language, throughout the report we simply use the term "impact," and this section details how we computed what are technically "standardized effect sizes" as commonly labeled in meta-analyses.

All effect sizes (Lipsey & Wilson, 2001) were coded so that positively-signed effect sizes represent better, more favorable outcomes (e.g., more employment, higher earnings) for the group receiving the program. This means that for some measures—such as hardship (more of which is a bad thing)—we switch the sign when transforming into effect sizes.

For continuous outcomes, we calculated the small-sample-corrected standardized mean difference effect sizes. The small-sample corrected effect size *g* and its standard error were calculated as follows. First, we calculated the standardized mean difference effect size *d*:

$$ d = \frac{\bar{x}_P - \bar{x}_C}{s_{pooled}} $$

where

the numerator is the difference in group means for the program group $(\bar{x}_P)$ and control/comparison group $(\bar{x}_C)$, and

the denominator (s_{pooled}) is the pooled standard deviation for the program and control/comparison groups.

We then calculated the small-sample-corrected standardized mean difference effect size *g* as follows:

$$ g = \left[1 - \left(\frac{3}{4N - 9} \right) \right] * d $$

$$ SE_g = \sqrt{ \frac{n_P + n_C}{n_P * n_C} + \frac{g^2}{2(n_P + n_C)} } $$

where

SE is the standard error,

N is the total sample size for the program and control/comparison groups,

d is the original standardized mean difference effect size,

n_P is the sample size for the program group, and

n_C is the sample size for the control/comparison group.

For binary outcomes, we used the raw or regression-adjusted program and control/comparison group means to calculate a log odds ratio (LOR), and then we converted the LOR into a Hedges' *g* effect size using the Cox transformation (Sánchez-Meca et al., 2003). The LOR was calculated as:

$$LOR = \ln\left(\frac{A * D}{B * C}\right)$$

where

> *A* is the count of "successes" in the program group,
>
> *B* is the count of "failures" in the program group,
>
> *C* is the count of "successes" in the control/comparison group, and
>
> *D* is the count of "failures" in the control/comparison group.

This LOR effect size was Cox-transformed into a Hedges' *g* effect size per the formula below:

$$g_{Cox} = \frac{LOR}{1.65}$$

The standard error of this effect size was computed as:

$$SE_{g_{Cox}} = \sqrt{0.367\left[\frac{1}{A} + \frac{1}{B} + \frac{1}{C} + \frac{1}{D}\right]}$$

We conducted sensitivity analyses to assess whether there was a systematic relationship between outcome type (continuous or binary) and effect sizes. The results of this analysis are reported in Appendix Exhibit G-6. In brief, excluding Cox-transformed effect sizes had a notable effect on the *educational progress* and *employment in industry trained for* estimates (the average effect sizes are smaller in the samples without Cox-transformed effect sizes; i.e., restricting the sample to effect sizes measured using continuous outcomes).

After coding effect sizes, we examined the distribution of effect sizes for outliers (using fence values defined as 1.5 times the interquartile ranges below/above first/third quartiles, respectively), identifying only a small number of effect size outliers. Sensitivity analyses using effect size values Winsorized (which refers, essentially, to top- or bottom-coding) to the upper/lower fence values yielded no substantial changes to the findings (Hastings et al., 1947) (see Appendix G-7); therefore, all main analyses proceeded using the original, non-Winsorized effect sizes.

Approach to Missing Data in Effect Size Calculation

In many cases, the information contained within the evaluation did not allow coders to calculate an effect size. Most commonly, evaluations failed to report the necessary standard deviations for calculating the standardized mean difference effect size for continuous outcomes. In such cases we backed out the necessary standard deviation from the authors' reported standard error, confidence interval, *t*-statistic, or *p*-value following the procedures in Section 6.5.2.3 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins et al., 2020; hereafter referred to as simply the "*Cochrane Handbook*").

Unfortunately, many evaluations lacked even these types of exact statistics; in most of these evaluations statistical significance was instead reported using asterisks indicating significance thresholds (e.g., *** for $p<0.01$, ** for $p<0.05$, etc.). In such cases, we imputed *p*-values again following the guidance in Section 6.5.2.3 of the *Cochrane Handbook*, and then converted those *p*-values into standard deviations.

More specifically, coders were asked to use the following approach:

- For findings in which the statistical significance level was $p<0.10$ coders entered 0.10 as the p-value.
- For findings listed as $p<0.05$ coders entered 0.05 as the p-value.
- For findings listed as $p<0.01$ coders entered 0.01 as the p-value.
- For findings listed as $p<0.001$ coders entered 0.001 as the p-value.

Through this rule, we took an intentionally conservative approach with findings that had a specified level of statistical significance, entering the largest possible p-value given the description of the significance level.

For non-significant findings (i.e., no asterisks), we "borrowed" standard deviations from other evaluations in the sample, following the guidance in Section 6.5.2.7 of the *Cochrane Handbook*. This process involved several steps. First, for each non-significant effect size, we identified all evaluations that reported an exact standard deviation (or an exact p-value that could be converted to a standard deviation) for an identical outcome measured at an identical or similar time point. We then imputed the missing standard deviation as the simple average of all of the exactly-calculated standard deviations from those evaluations.

The meta-analysis team tested these procedures using the nine PACE evaluations being conducted by a separate group of researchers at Abt Associates. Although the PACE evaluation reports presented statistical significance using asterisks, the meta-analysis team was also able to obtain exact standard deviations from the PACE team. Using the procedures outlined above, we confirmed that the process yielded approximately correct results for all outcomes in the PACE evaluations.

Author Queries

Several of the evaluations included in the analysis were missing critical pieces of information to allow coders to enter data about the evaluations' reported outcomes and impacts. In these cases, we used a standardized template requesting the specific elements needed to complete the coding of the evaluation and emailed the evaluation's lead author (or another author if the lead had left the organization, or in some cases, the organization itself). We conducted nine author queries, and we received responses providing the necessary information for six of them.

Composite Effects

Most evaluations report multiple effect sizes in each of the meta-analysis's outcome domains. For example, within the labor market domain, we conceptualize an outcome that we label "medium/long-term earnings," which is any earnings outcome measured at a time point more than three years after a participant enrolled in the evaluation. Many evaluations reported earnings at multiple intervals later than three years. Therefore, for each outcome, we aggregated all the reported effect sizes for each evaluation into a single composite effect size using the method described in Borenstein et al. (2009, Ch. 24). This method averages the magnitude and variance of effects across effect sizes while accounting for the possibility that effect sizes might be correlated within each evaluation.

This method requires that we assume an average correlation between effect size estimates within evaluations (ρ), which we conservatively assumed to be 0.80. Sensitivity analyses using alternative assumed values of this parameter, ranging from 0.10 to 0.90, yielded robust findings (see Appendix G).

A.2.3 DATA PROCESSING

Following the data collection period, we processed the career pathways meta-analysis data in five steps, as shown in Exhibit A-5. The first step extracted the raw data from the project's FileMaker Pro® database. The database included four interconnected data tables: (1) a header table with evaluation meta-data and participant characteristics, (2) a groups table that included information about the evaluation's program and control groups, (3) an outcomes table with information about the evaluation's outcome variables, and (4) an effect sizes table where effect sizes was recorded and linked to their corresponding outcomes. We exported these four data tables from FileMaker Pro® into the statistical programming software, Stata.

Exhibit A-5. Data Processing Steps

Steps	Description
Step 1: Data Extraction	Extract data from four interconnected data tables.
Step 2: Clean Each Data Table	Check variables for consistency, recode numerical variables to a valid range and standardize, and recode categorical variables to a set of binary indicators and standardize.
Step 3: De-Duplicate Records	Check coders' records for consistency, reconcile discrepancies, assess links between outcomes and effect sizes.
Step 4: Logic and Plausibility Checks	Investigate possible coding errors and logical inconsistencies.
Step 5: Create Analytic Data File	Merge separate data files to create one analysis file.

The second step cleaned each table individually. Only eligible evaluations and their corresponding program and control/comparison groups, outcome variables, and effect sizes were retained in the data files. Then each variable was cleaned. Numerical values were recoded and checked for consistency. Recoding involved changing values such as 99 and 999 to missing, standardizing values to the same data type (e.g., recoding all values to percent instead of a mix of integers and percent), and rounding all numbers to the same decimal place. Additionally, data programmers summarized all numerical variables to ensure that minimum and maximum values fell within a logical range. Categorical variables' names and answer options were standardized and labeled to match the coding protocol. Categorical variables were also converted into a series of binary (or "yes/no") variables. For example, a "check all that apply" question with six possible answer options was used to create a series of six corresponding binary variables. We did this to facilitate later analyses. While data programmers recoded categorical variables, they also reclassified text data from "other" responses. This process involved recoding open-ended text to create new codes.

To this point, each evaluation had two records in our data, one for each of the two coders. The third step de-duplicated the data tables to create one record. De-duplication involved confirming that the reconciliation process was successful, and both coders entered the same information for each evaluation, group, outcome variable, and effect size. Discrepancies between records were exported into coder inquiry data sheets and sent to coders to finish the reconciliation process. Coders completed any needed data edits in FileMaker Pro®. After coders finished reconciliation, the data was re-exported, and the subsequent data processing steps were repeated. To de-duplicate, the data cleaning team compared the two coders' outcomes and effect sizes for each evaluation. To permit this comparison, the data cleaning team linked the coders' corresponding outcomes, which, in some cases required further coder input to ensure that outcomes and effect sizes were correctly linked.

The fourth step involved checking for possible data errors through a series of logic and plausibility checks. The logic checks investigated possible coding errors. The most common test checked that interdependent coding questions were logically consistent. For example, if a coder indicated that the

program did not provide basic skills training, then the data cleaning team checked that the coder did not also note that basic skills were required for participants. The plausibility checks focused on data outliers and identified about 15 records as highly unlikely through the plausibility checks outlined in Exhibit A-6. Those items were subjected to project leadership confirmation and/or correction.

Exhibit A-6. Plausibility Checks

Data Type	Variable	Threshold of Implausible Values
Participant Characteristics	Gender	More than 90-95% of program participants were male or female
	Average age	The average age of the evaluation participants was over 60 or under 18
	Minimum age	The minimum age was 18 or younger
	Baseline education level	More than 50% of the participants' highest level of educational attainment was a Bachelor's degree prior to the program start
	Length of basic skills instruction	The number of weeks participants spent in basic skills instructions was more than 20
Program Characteristics	Length of one-on-one meetings	One-on-one assistance meetings (including in-person, virtual meetings, and phone calls) were more than 90 minutes
	Number of pathways	More than 50 career pathways were offered
Local Context	Unemployment rate	The unemployment rate was less than 3% or greater than 12%

The fifth step combined the four data tables into one analytic file. The file had one record per effect size. Each effect size included columns with information on the effect sizes' corresponding outcome variable, program group, control group, and evaluation.

Appendix B: Analytic Methods

The goal of the meta-analysis is twofold: to assess the overall impacts (RQ1) of the career pathways approach on educational progress outcomes and labor market outcomes, with specific emphasis on whether there is an association between impacts and certain program characteristics (RQ2). This Appendix describes the analytic methods we used to estimate overall effects for each outcome and to assess the associations of potential effectiveness factors with program characteristics. It first describes these methods in summary form; and then, for the interested reader, it details the analytic model and additional technical detail.

B.1 Summary of Analytic Methods

B.1.1 APPROACH TO ANALYZING IMPACTS OVERALL AND FOR POTENTIAL EFFECTIVENESS FACTORS

Following common practice, in assessing the overall impacts (RQ1), the meta-analysis estimates an average impact on the outcome of interest. For the potential effectiveness factors analysis (RQ2), we estimate a "meta-regression," which models average impacts as a function of various selected characteristics.

Most analyses of impacts in the career pathways field use a frequentist (or "classical") statistical approach, in which a program's impact is expressed as a "point estimate" and hypothesis testing using a pre-determined statistical threshold (a p-value) results in an "up or down" vote on whether that impact is likely to be different from zero. In comparison, in this meta-analysis we use a Bayesian statistical approach, which likewise expresses a program's impact as a point estimate but provides the probability that the value exceeds a threshold (such as zero), rather than an "up or down" vote using a pre-determined threshold. As a result, the Bayesian approach allows us to report the probability that there is an impact, and it offers information about the likely size of that impact. Another difference between these two methods is that the Bayesian approach allows us to incorporate prior evidence or beliefs that we might have (which, in this analysis, are not strong). We describe only the Bayesian findings in the main report; and we report results using the frequentist approach in Appendix F.

B.1.2 INTERPRETATION OF THE MAGNITUDE RESULT

For each outcome in each of the 46 evaluations, we compute a standardized effect size. As described in Section A.2.2 this is necessary because the outcomes—as constructed and reported across many evaluations—were measured using various units (e.g., dollars, percentages, scale points). Despite being necessary for conducting the meta-analysis, standardized effect sizes are not easy to interpret on their own. To aid with interpretation and following common practice (Pigott & Polanin, 2020), we convert the standardized effect sizes into natural units and categorize the average impacts that our analysis generates as small, medium, or large using thresholds from the job training literature on earnings impacts. The following observations informed our choice of thresholds:

- **Large effect size:** There is some consensus in the field about which job training program evaluations have found "large" earnings impacts. Previous research has described the impacts from Per Scholas ($6,281 in follow-up year 5, or about $1,570 per quarter; Schaberg & Greenberg, 2020) and Project QUEST ($5,239 in year 9, or $1,310 per quarter; Roder & Elliott, 2019) as large. Evaluation of Year

Up in the Pathways for Advancing Careers and Education (PACE) Project found among the very largest impacts from any job training program yet evaluated, at $1,857 in quarterly earnings as of follow-up year 3 (Fein, 2020). For our meta-analysis, we set the threshold for a large impact at $1,000 in quarterly earnings, such that impacts somewhat smaller than those found for Per Scholas and Project QUEST would be categorized as large. In a sample with a standard deviation of $3,500 (which aligns with the evaluations in our meta-analysis sample), an impact of $1,000 translates to an effect size of 0.29 standard deviations. We rounded to 0.30 standard deviations for ease of exposition.

- **Small effect size:** " We set the threshold for a "small" effect size at 0.10 standard deviations, which corresponds to an impact of roughly $350 in quarterly earnings. . We note that a recently released PACE evaluation of the Bridge to Employment program found (statistically insignificant) impacts of not quite $300 in quarterly earnings as of follow-up year 3 (Farrell et al., 2020). That report's cost-benefit analysis found that the program's costs exceeded its benefits by a small margin. Therefore, a threshold of $350 seems appropriate for categorizing a program's impact as "small.

- **Medium effect size:** We set the threshold for a "medium" effect size at the midpoint between our small and large effect sizes: 0.20 standard deviations. This corresponds to an impact of roughly $700 in quarterly earnings.

In sum, the meta-analysis's thresholds for describing overall impacts are as follows: "any" impact is greater than 0.0 standard deviations, a "small" impact is 0.10 up to 0.20 standard deviations, "medium" is 0.20 up to 0.30 standard deviations, and "large" is 0.30 standard deviations and greater. We apply these thresholds to the interpretation of the overall impact meta-analysis results, and not just for earnings (which we used to identify the thresholds) but also for employment and educational progress.

In comparison, for the effectiveness factors analysis, we simply use "any" impact as an indicator because that analysis is about the contribution of selected characteristics to impact, and we do not characterize magnitude beyond that.

B.1.3 SELECTION OF CHARACTERISTICS FOR POTENTIAL EFFECTIVENESS FACTORS ANALYSIS

The meta-analysis coded a total of 77 program characteristics, and we are limited to the number of those we can analyze at any one time by the number of evaluations. For this effectiveness factors analysis, our sample sizes are 33 evaluations for the *educational progress* domain and 39 evaluations for the *labor market* domain. Due to statistical constraints, the sizes of these samples mean we can include only about six characteristics in a single meta-regression. As a result, we engaged in a selection process to identify which of those many characteristics should be among the ones we include in the final meta-regression.

To do so, we first analyzed *all* of the program characteristics—in groups of three to five variables each, which we term "blocks." In total we had 26 blocks, 23 of which analyzed the 77 distinct program characteristics, and three of which analyzed six sets of interactions among selected characteristics, as shown in Exhibit E-1. This approach is a standard method of analyzing associations between effect sizes and large numbers of factors.[27] The second step involved analyzing how the characteristics in each of those 26 blocks contributed to (1) educational progress impacts and (2) labor market impacts. Third, we examined the output and which characteristics arose as having a high probability of having a relatively large apparent influence on impacts (being associated with larger or smaller impacts). Those

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[27] Lipsey et al. (2012); Therese Pigott, Mark Lipsey, Elizabeth Tipton, personal correspondence with the authors, December 2020.

characteristics are the ones we advanced to the final meta-regressions. In those meta-regressions—one each for educational progress outcomes and labor market outcomes—we model average impacts as a function of the selected characteristics.

B.2 Analytic Model

This report's primary estimates of overall effects come from a Bayesian analysis of a standard random-effects regression model and the estimates of the association of effectiveness factors come from a mixed-effects regression. Bayesian analysis can be viewed as a generalization of classical methods and has the advantage of producing statistics with a more intuitive interpretation. As a result of computational improvements, Bayesian methods for meta-analysis are becoming increasingly common (Borenstein et al., 2009, p. 319). We used a mixed-effects model based on the assumption that there might not be a common effect size across all evaluations. That is, different programs, evaluated in different contexts, might truly have somewhat different effects; the random- or mixed-effects framework allows for this possibility and is the model generally recommended in the literature (Borenstein et al., 2009, p. 183). In particular, in the random effects framework the **true** program effect differs from both the **observed** program effect (due to sampling error) and from the **mean** program effect (because the mean is an average across somewhat dis-similar programs). These components are described below using a formal model. This basic conceptual model is the same for both the Bayesian analyses reported in the main report and the frequentist analyses reported for comparison in the appendix.

B.2.1   ANALYSIS MODEL

The model that we estimate takes the following form:

$$y_j = (\mu + \delta_j) + X_j\beta + \epsilon_j \qquad \text{(eq. B.1)}$$

where:

y_j is the observed effect size of interest for evaluation j;

μ is the average population effect (i.e., the average effect size of all the career pathway programs for the outcome in question);

δ_j represents the true deviation from the average effect size for evaluation j and is assumed to have a normal distribution with a mean of zero and variance of τ^2, where τ^2, the between-evaluation variation in true effect size, is referred to as the *heterogeneity*;

X_j is a vector of covariates for evaluation j;

β are the coefficients that indicate the influence of each covariate on the outcome; and

ϵ_j is an error term representing sampling variation which is assumed to have a normal distribution with a mean of zero and variance of σ_j^2, where σ_j is the measured standard error of outcome y for evaluation j.[28]

We used the model in Equation B.1 *without* covariates (i.e., without $X_j\beta$) to estimate the programs' mean effects and to characterize the variability in true impacts reported in Chapter 2. In this basic model, which we describe as the "meta-analysis model":

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[28] Including this error incorporates the inherent uncertainty in effect size point estimates from individual evaluations (i.e., due to sampling error).

- The **mean effect** of all programs, which we estimate and report, is equal to μ;
- The **true effect** of program *j* is equal to $(\mu + \delta_j)$. In other words, it is the cross-program mean effect plus an offset. We do not observe the true effect of each program. However, we do estimate the *distribution* of true effects across evaluations and use this information to describe heterogeneity (see below);
- The **observed effect** of program *j* is y_j, which can also be represented as $(\mu + \delta_j) + \epsilon_j$; i.e., it is the true effect plus (or minus) sampling error.

Adding covariates to the basic model allows us to explore the influence of potential effectiveness factors, which are the components of X_j. When covariates are added to the model, we use the term "meta-regression" to describe the model. Results from the meta-regression are presented in Chapter 3 (Potential Effectiveness Factor Findings).

B.2.2 MEASURES OF HETEROGENEITY

We report two separate measures of heterogeneity, τ ("tau") and I^2, both of which are estimated from the random-effects model without any covariates, as described in equation B.1. Together, these measures indicate whether there is sufficient variation in true effect sizes across evaluations in the meta-analysis to warrant conducting a meta-regression that includes potential effectiveness factors as covariates.

As defined above, τ^2 represents the variation in true effect sizes across evaluations. A τ^2 value of zero would mean that there is no variation in true impacts; in other words, every program being evaluated had the same true impact and impact estimates varied solely because of sampling error. Non-zero values of τ^2 represent non-zero variation in true impacts across evaluations; in other words, evaluations' impacts *do* vary because of factors other than sampling error.

The second measure, I^2, captures the *relative* heterogeneity, which is the ratio of true heterogeneity to overall variance. I^2 values of 50 percent or more are considered to be substantial and generally indicate sufficient effect size variability to warrant exploration of characteristics (i.e., potential effectiveness factors) associated with impact variation (Higgins et al., 2019).

B.3 Bayesian Methods

Throughout the report and appendices, our primary estimates presented come from Bayesian analysis of equation B.1. The benefits of such an approach include more straightforward interpretation of findings than frequentist confidence intervals and *p*-values allows, as well as incorporation of prior information. In the Bayesian meta-analysis approach evaluations whose effect size estimates have greater precision will be more influential than less-precise evaluations, where precision is primarily driven by the evaluation's sample size. When no covariates are present (i.e., when calculating average effect sizes), we fit equation B.1 in the Bayesian framework using the "bayesmeta" R package (Röver, 2017). This package partially analytically integrates the intermediate integrals necessary to produce average effect size estimates. When we introduce covariates (i.e., when conducting meta-regressions), this approach is no longer an option. Therefore, in these cases we used the "brms" R package (Bürkner, 2018). This package uses Markov Chain Monte Carlo (MCMC) methods to create a series of draws from the meta-regression model that approximate the posterior distributions of statistics of interest.

B.3.1 SELECTION OF PRIORS

One of the defining features of a Bayesian analysis is the incorporation of prior beliefs with respect to the distribution of the data. These are what are referred to as "prior distributions" of the analysis or simply "priors," the underpinning assumptions about the distribution of the variables' values. In some cases, analysts will have a strong prior belief (e.g., based on earlier analysis of similar programs), and in other cases they will not. Fitting equation B.1 in the Bayesian framework requires that we specify a prior for the distributions of two key elements: μ, the average effect, and τ, the between-evaluation variation in true effects. The existing literature detailing career pathways meta-analyses was insufficiently deep to allow the formation of strong expectations as to the shape of these distributions. Therefore, we chose uninformative prior distributions for average effect and heterogeneity.[29]

We used the following prior beliefs about the data's distribution for all analyses: μ_{prior} is assumed to be normally distributed with a mean of zero and standard deviation of four, and τ_{prior} is assumed to have a half-normal distribution (i.e., it cannot be less than zero) with a standard deviation of four. In other words, these equations say that we assume a normal distribution for the mean effect μ; and we assume a half normal distribution for τ, which is the standard deviation of the true effect size. In addition, in the meta-regression model we assume that the βs are normally distributed with a mean of zero and a standard deviation of four. Because we were uncertain about what the prior should be, and we wanted to know whether that choice might have been important, we assessed the sensitivity of the results to various alternative priors and report these results in Appendix Exhibit G-7. In brief, we find that our results are robust to several alternative, but plausible, priors.

B.4 Frequentist Analysis

We conduct a parallel frequentist analysis using a meta-regression framework with *robust variance estimates* (RVE), which allows us to incorporate multiple, statistically-dependent effect sizes per evaluation without the need to generate evaluation-level composite effect sizes as described in Section A.2.2 (Hedges, Tipton, & Johnson, 2010; Tanner-Smith & Tipton, 2014). For the frequentist analysis, we used the "robumeta" procedure in R. As in all meta-analysis models, the RVE meta-regression approach gives more weight to evaluations whose effect size estimates have greater precision, where precision is primarily driven by evaluation sample size (Borenstein et al., 2010). We present findings from the Frequentist analysis in Appendix F. The results are, in most cases, nearly identical to those from the Bayesian analysis.

Like the method of generating composites used for the Bayesian analysis, the RVE approach requires an assumed average correlation between effect size estimates within evaluations (ρ), which we conservatively assumed to be 0.80. Our findings were also robust to sensitivity analyses that explored alternative values of this parameter.

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[29] Uninformative prior distributions do not provide a substantial amount of information regarding the values of the underlying variables. Therefore, estimates will be primarily driven by the underlying data rather than the priors. That said, any choice of prior inherently makes assumptions about the data.

Appendix C: Characteristics of the Evaluations and Their Programs

Summary of Evaluation and Program Characteristics

- Of the 46 evaluations, 27 used an experimental and 19 used a quasi-experimental design.

- Collectively, the evaluations included nearly 1.4 million study participants, with the median evaluation including about 1,000 participants.

- The programs evaluated varied widely in who they served, their administrative arrangements and partnerships, and their program components.

The picture that emerges from this description of the programs is broadly consistent with what is known about characteristics of career pathways programs generally.

This appendix describes the career pathway programs that were the focus of the 46 evaluations we include in this meta-analysis. To provide context for these descriptive findings, we note a few caveats related to consistency in coding data on the program characteristics. First, evaluations did not report some characteristics consistently enough for us to code and include them in our analysis (e.g., participants' public assistance receipt, frequency and nature of programs' one-on-one assistance). Second, even for those characteristics we did code, we might not have collected those data from all evaluations because of variation in what evaluation reports included. Even if the characteristic was present in a program, if the evaluation's description did not align with our coding protocol, then we did not collect its data. An evaluation not mentioning a program characteristic does not necessarily mean that the program did not have the characteristic. Our interpretation standard was as follows: if a characteristic was not mentioned, then it either was not present in the program or was present but not consequential enough to the program's design to warrant mention in the evaluation report.[30]

In discussing the descriptive findings, we consider the extent to which this sample of 46 evaluations is representative of career pathways programs beyond those included in the meta-analysis dataset, using prior DOL-funded studies scanning career pathways research and evaluations (Sarna & Adam, 2020; Schwartz, Strawn, & Sarna, 2018) and the field overall (Sarna & Strawn, 2018), where possible.

C.1 Evaluation Characteristics

Among the 46 evaluations included in this meta-analysis, 27 (59 percent) used an experimental evaluation design whereas the remaining 19 (41 percent) used a quasi-experimental evaluation design.

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[30] There is one exception to this interpretation, and that refers to whether the program offered multiple steps of training within a pathway. Multiple training steps reflect the underlying structure of the program. If there was not enough information for coders to determine whether multiple steps were present or not, then it likely reflects a lack of detail in the evaluation. For this reason, when we had no information on this characteristic, we simply coded the evaluation as missing data, as opposed to the program *not* offering multiple steps.

The evaluations cover a total of 1,376,602 study participants, with a resulting median evaluation size of 1,112 study participants.[31]

Compared to previous DOL-funded scans of the career pathways field, there are some differences in evaluation characteristics in this meta-analysis. For example, experimental research designs were used in nearly twice as many of the impact studies in this dataset as in our expanded 2019 research scan: 59 percent versus 34 percent (Sarna & Adam, 2020). This difference is largely because we were more likely to exclude quasi-experimental studies from the meta-analysis, most often due to their comparison group outcomes and program group outcomes being measured from a different time point/period (see "Free of confounds" in Section A.1.3).

C.2 Program Characteristics

C.2.1 LOCAL CONTEXT

Exhibit C-1 shows the geographic distribution of the programs that were the focus of the 46 evaluations: they were located in 29 states and the District of Columbia (those colored dark grey or blue on the map). Many of these programs operated in specific counties, which appear in the exhibit as blue areas inside states.

The time periods covered by evaluations in our sample range from the early 2000s to 2018; this span includes the Great Recession of 2007–2009. All data we use in the meta-analysis are from before the COVID-19 pandemic and resulting economic disruptions.

To give some economic perspective, we show state-level unemployment rates as of 2012 (the median date of outcomes observed in the 46 evaluations). These rates give an overall sense of the unemployment situation for our analytic sample, but do not directly correspond to the rates in our sample.[32] The average unemployment rate across years and evaluations in that sample is about 7.7 percent, ranging from about 5 percent to about 15 percent. This is a wide range that encompasses what we think of as low and high rates of unemployment. If program impacts vary systematically with the unemployment rate, then our analysis should be able to detect that.

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[31] Mean number of participants was 29,926. Minimum was 195, maximum was 699,062.

[32] Because of the variation in study catchment areas, and because multiple studies might cover the same geographic area at various time points, it is impossible to show unemployment rates graphically. We included the unemployment rate for the relevant area during the study period in our analysis, as described in Chapter 5.

Exhibit C-1. Locations of Programs Evaluated and Surrounding State Unemployment Rates, 2012
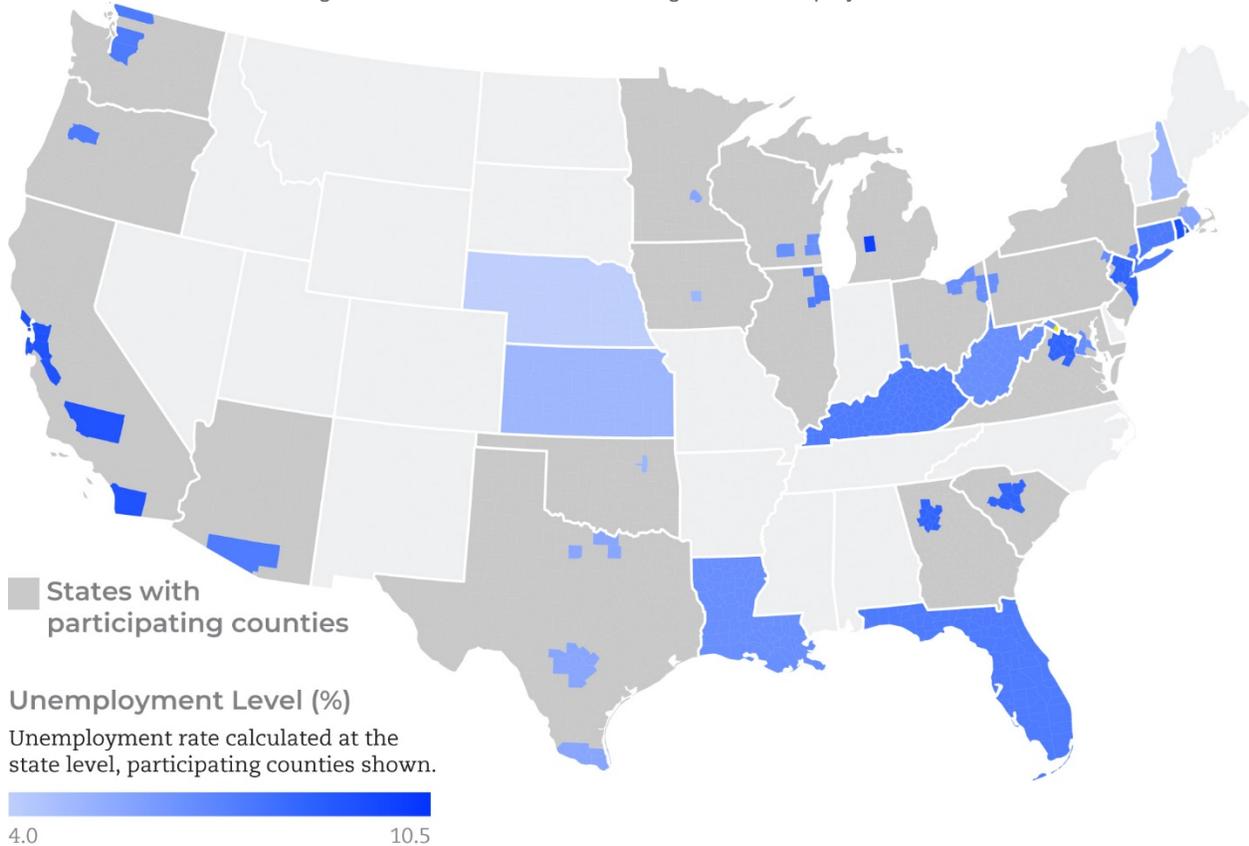
Note: The blue colored areas inside marked states show specific counties with career pathways programs that were the focus of the evaluations included in this meta-analysis. The unemployment rates are state-level averages for 2012. Hawaii and Alaska are not shown and were not the location of any programs evaluated.
Source: Bureau of Labor Statistics (2012).

C.2.2 PARTICIPANT CHARACTERISTICS

Career pathways programs serve a broad range of participants. Our analysis team coded participant baseline characteristics by gender, race/ethnicity, age, and educational background, as summarized in Exhibit C-2.

Gender

Our prior scans showed that examining averages across programs sometimes obscures variation in participant characteristics between programs, and that is true for evaluations in our meta-analysis, as well. As Exhibit C-2 shows, when combined across all 46 evaluations, the gender split among participants is about even. A closer look at the evaluations reveals, however, that most programs served mostly men or mostly women, but not both.[33] We observe quite a range across the evaluations: programs were as little as 6 percent and as much as 93 percent male. The distribution by job sector followed prior patterns (Sarna & Adam, 2020): participants in healthcare programs tended to be women and those in manufacturing programs, men.

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[33] Few of the career pathways programs in our sample target by gender, so these differences are likely related to programs' targeted sectors.

Exhibit C-2. Selected Participant Characteristics of the Included Evaluations

Program Characteristic	Mean	Median (Range)	Number of Evaluations
Age, Gender and Parental Status of Participants			
Average age of participants (years)	31	31 (20 - 40)	41
Maximum age of participants (years)	49	54 (25 - 72)	22
Minimum age of participants (years)	17	18 (14 - 18)	37
Percent of participants who are male (%)	47	45 (6 - 93)	46
Percent of participants who have children (%)	43	47 (12 - 72)	14
Racial and Ethnic Characteristics of Participants			
Percent of participants who are White (%)	38	35 (1 - 91)	45
Percent of participants who are Black (%)	35	36 (0 - 78)	44
Percent of participants who are Hispanic/Latino (%)	23	15 (1 - 99)	40
Baseline Educational Attainment of Participants			
Percent of participants who have less than HS/GED (%)	10	8 (0 - 40)	31
Percent of participants who have HS (not GED) (%)	54	56 (12 - 85)	10
Percent of participants who have GED (not HS) (%)	16	14 (1 - 26)	9
Percent of participants who have HS diploma or GED (%)	46	38 (9 - 99)	38
Percent of participants who have some college (%)	31	32 (0 - 48)	25
Percent of participants who have associate degree (%)	8	9 (0 - 19)	20
Percent of participants who have bachelor's degree (%)	7	6 (0 - 20)	20

Notes: Sample includes 46 evaluations, with varying numbers contributing to each measure. Additional characteristics of interest (such as other racial and ethnic categories or measures of economic well-being) were not reported consistently enough to be coded. *Source*: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit C-3. Eligibility Criteria

Program Characteristic	Percent of Evaluations	Number of Evaluations
Eligibility Criterion: (not mutually exclusive)		*46*
Has high school diploma or GED	35%	16
Demonstrates basic skills through participation in class or test	35%	16
Meets income requirements	35%	16
Passed background check or drug screen	37%	17
Obtains minimum skill level on assessment test	52%	24
Meets age requirements	20%	9
None or no information provided	11%	5

Source: Authors' computations from D&A CP Project meta-analysis dataset.

Race and Ethnicity

Across the evaluations, about 38 percent of participants were White, 35 percent were Black, and 23 percent were Hispanic/Latino. As with gender and educational attainment, race and ethnicity varied substantially by program. As shown in Exhibit C-2, a given evaluation might have no participants of some race or ethnicity or a substantial majority. It is also worth noting that other racial categories, such as Asian, Pacific Islander, and Native American, were often either not reported or reported inconsistently so we could not include them in our analysis.

Age

The average age of participants ranged from 20 to 40 years old, with a median of 31. Participants ranged in age from 14 to 72.

Educational Background

At enrollment in the evaluations, most participants had at least a high school diploma or GED. On average, 10 percent did not have a high school credential at study enrollment, ranging from 0 to 40 percent across the 46 evaluations. We also see substantial variation in the share of participants with higher levels of education. The percentage of program participants having an associate degree or higher in this meta-analysis data ranges from 0 percent to 19 percent.

Additional characteristics were of interest to the analysis team, including basic skills levels, income, dependents, and public assistance receipt. Evaluations either did not report those data or reported them in such different ways that we could not include them in the meta-analysis dataset.

C.2.3 PROGRAM DESIGN AND IMPLEMENTATION CHARACTERISTICS

Exhibit C-4 summarizes administrative arrangements of the career pathways programs that were the focus of the 46 evaluations included in the meta-analysis.

Lead Agency

The first panel in Exhibit C-4 presents data on the career pathway program's lead agency; for evaluations that included multiple programs, the most common lead is listed. In nearly half (46 percent) of evaluated programs, a community college or technical college served as the lead. Community organizations (e.g., private nonprofits) were the lead agency in more than one in three programs (35 percent). Five of the evaluations (11 percent) studied programs where a workforce investment board, one-stop, or American

Job Center was the lead agency. For the remaining three programs (7 percent), "other" types of agencies (e.g., workforce partnerships) served as the administrative lead.

Partner Agency

Although any given program has a single "lead" agency, programs can—and often do—partner with other kinds of agencies to build the offerings that they believe will be most effective. Grants sometimes require certain types of partners. The middle panel of Exhibit C-4 shows the (not mutually exclusive) prevalence of partner agencies.

The most common partner agencies were also the most frequent lead agencies: community or technical college; community organization; or workforce investment board, one-stop, or American Job Center. Each of these was a partner agency type in more than half of the programs. Other types of partners arose less often and included other government agencies, various kinds of other educational institutions (such as schools or school districts, universities, and private or for-profit schools), labor unions, trade associations, staffing agencies, and faith-based organizations.

Exhibit C-4. Administrative Arrangements of the Included Evaluations

Intervention Characteristic	Percent of Evaluations	Number of Evaluations
Type of Lead Agency		
Community or technical college	46%	21
Community organization	35%	16
Workforce board/one-stop/American Job Center	11%	5
Government agency (e.g., TANF agencies, housing agencies)	2%	1
Other (e.g., workforce partnerships)	7%	3
Tribal organization	0%	0
Other educational institution	0%	0
Type of Partner Agency (not mutually exclusive)		
Community or technical college	61%	28
Community organization	61%	28
Workforce board/one-stop/American Job Center	54%	25
Government agency (e.g., TANF agencies, housing agencies)	35%	16
School or school district	20%	9
University	17%	8
Labor union	11%	5
Faith-based organization	9%	4
Private or for-profit school	7%	3
Staffing agency	7%	3
Trade association	7%	3
Other educational institution	4%	2
Other	7%	3
No information provided	7%	3

Intervention Characteristic	Percent of Evaluations	Number of Evaluations
Other Administrative Arrangements		
Lead or partner is community college	83%	38
Lead or partner is community organization	78%	36
Lead or partner is workforce agency	59%	27

Notes: Sample includes 46 evaluations, with varying numbers contributing to each measure.
For mutually exclusive categories coders chose the option that best reflected the intervention for the majority of participants.
Percentages may not sum to 100 percent due to rounding or categorizations that were not mutually exclusive.
TANF refers to the Temporary Assistance for Needy Families program.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Basic Skills Instruction

Exhibit C-5 summarizes approaches to basic skills instruction (i.e., instruction in more general skills such as math, reading, English language vs. specific occupational skills). Almost half (43 percent) of the programs either did not offer such instruction or the evaluation report did not describe it. Of those programs that did offer some sort of basic skills instruction, adult basic education was the most common type, and a high school equivalency diploma was the most common credential offered. For 59 percent of programs, the evaluation reports either did not specify whether basic skills instruction was offered to all participants or the program did not offer it, but 20 percent of programs did; the same share (20%) offered basic skills instruction only to those who did not meet a minimum skill level.

Exhibit C-5. Basic Skills Instruction in the Included Evaluations

Intervention Characteristic	Percent of Evaluations	Number of Evaluations
Type of Basic Skills Instruction Offered (not mutually exclusive)		
Adult basic education	37%	17
College developmental or remedial education	26%	12
Adult secondary education	24%	11
English language acquisition	20%	9
Other	7%	3
No basic skills instruction or no information provided	43%	20
Basic Skills Credential (not mutually exclusive)		
GED/HiSET/TASC or other high school equivalency diploma	17%	8
Certificate of completion	4%	2
Other	4%	2
No basic skills credentials offered, or no information provided	78%	36
Population Offered Basic Skills Training		
Basic skills provided to all participants	20%	9
Basic skills provided to participants who do not meet minimum skill levels (but offered regardless of program, pathway, and training)	20%	9
Basic skills provided to varies by program, pathway and/or training	2%	1
Basic skills not offered, or no information provided	59%	27

Intervention Characteristic	Percent of Evaluations	Number of Evaluations
Basic Skills Requirement		
Yes, it is required for all participants	11%	5
Yes, for a majority of participants	7%	3
Yes, for a minority of participants	13%	6
Varies by program, pathway, and/or training and cannot tell proportion of participants for whom participation is required	9%	4
No, it is not required for any participants	0%	0
Basic skills are not offered, or no information provided	61%	28
No information	15%	7

Notes: Sample includes 46 evaluations, with varying numbers contributing to each measure.
For mutually exclusive categories, coders chose the option that best reflected the intervention for the majority of participants.
Percentages may not sum to 100 percent due to rounding and for categorizations that were not mutually exclusive.
GED refers to General Educational Development, HiSET refers to High School Equivalency Test, and TASC refers to Test Assessing Secondary Completion.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Flexible Instruction

The career pathways framework emphasizes flexibility in how education and training are delivered to respond to competing demands of non-traditional students' lives. Programs use a variety of flexible instruction approaches, such as online instruction and alternative schedules. As Exhibit C-6 shows, about 40 percent of evaluated programs offered some type of flexible instruction. Considered separately, no single type of flexible instruction was reported to be present in more than a fifth of evaluated programs.

Exhibit C-6. Flexible Instruction in the Included Evaluations

Intervention Characteristic	Percent of Evaluations	Number of Evaluations
Flexible Instruction (not mutually exclusive)		
Training is delivered using a hybrid approach	17%	8
Courses can be taken at night	17%	8
Online instruction available for some courses	13%	6
Flexible sequencing of courses	11%	5
Courses are offered in multiple locations or locations more convenient to participants, such as at or near worksites	11%	5
Courses can be taken on the weekends	11%	5
Courses are self-paced	7%	3
Some courses are only taken online	4%	2
Part-time courses offered	4%	2
All courses are only taken online	2%	1
Accelerated courses offered	2%	1
Flexible instruction is not offered, or no information provided	59%	27

Notes: Sample includes 46 evaluations, with varying numbers contributing to each measure.
Sources: Authors' computations from D&A CP Project meta-analysis dataset.

Training Offerings and Options

We also looked at several other program characteristics that were related to occupational training, including the number of distinct occupational pathways offered (a pathway refers to an articulated series of steps designed to prepare participants for a career in a particular industry sector or occupational cluster), the number of steps within a pathway, and the occupational level for which training was offered.

Number and structure of trainings: As the top panel of Exhibit C-7 shows, the majority (67 percent) of programs offered three or more distinct pathways We also looked at whether a given program offered training in multiple steps along the same pathway. Though multiple steps of training are generally thought of as the mechanism for career advancement, many career pathways programs offered only a single step. Other career pathway strategies included in the meta-analysis, such as sectoral training and integrated basic education and training, do not necessarily focus explicitly on this sort of step-to-step advancement. Overall, 70 percent of the evaluations reported on a program that offered multiple steps of training, though sometimes the multiple steps were offered in only some pathways or sites.

Levels of training: We also explored the level of the training that was offered. Some (70%) programs offered training to assist participants in entering an entry-level occupation only,[34] whereas others offered training to access mid- or higher-level occupations. Of the programs in our meta-analysis, 30 percent offered mid- or high-, or mixed-level training.

Credential targeted: The evaluations included in this meta-analysis cover programs that targeted an array of credentials. More than one-third of programs targeted an associate degree, and 15 percent targeted a bachelor's degree. Almost three-quarters of programs targeted an occupational certificate; 28 percent targeted a license, whether the license was offered by a state or local entity; and about one-third of programs targeted a certification developed by an employer or industry association. These categories were not mutually exclusive, and many programs targeted more than one type of credential.

Training duration: In 43 percent of programs, most participants were enrolled in training programs that lasted six months or less; in an additional 20 percent of programs, most participants were enrolled in trainings that lasted six to 12 months. Just 7 percent of programs enrolled most participants in training that lasted longer than a year.

Industry: Finally, the industry sector or occupational area for which the program trained participants was healthcare for 59 percent of programs evaluated, with 48 percent focused on manufacturing, 24 percent on information technology, and 24 percent on business.

Exhibit C-7. Training Offerings of the Included Evaluations

Program Characteristic	Percent of Evaluations	Number of Evaluations
Pathways and Training		
Offers multi-step training	70%	32
Offers 3+ pathways	67%	31
Offers mid-/high-/mixed-level training based on wage level of occupation	30%	14

[34] Our coding protocol defined "entry-level" occupations as those with average annual wages corresponding to the lower two categories of earnings on the CareerOneStop website of the U.S. Department of Labor, Employment and Training Administration (2021). At the time of this project's coding in Spring 2020 this was $38,290 or less. Coders were instructed to reference the CareerOneStop website (DOL, 2021).

Program Characteristic	Percent of Evaluations	Number of Evaluations
Credential Type Offered (not mutually exclusive)		
Occupational certificate (includes college-issued certificate)	72%	33
Associate degree	37%	17
Certification developed by an employer or industry association	33%	15
State or local licensure	28%	13
Bachelor's degree	15%	7
Technical diploma	9%	4
Other	20%	9
Credential not offered or no information provided	7%	3
Duration of Training for which Majority of Participants Enrolled		
6 months or less	43%	20
Between 6 months and 1 year	20%	9
More than one year	7%	3
Varies	15%	7
No information	15%	7
Industry Trained For (not mutually exclusive)		
Healthcare	59%	27
Manufacturing	48%	22
Information technology	24%	11
Business (not including finance/accounting)	24%	11
Shipping/logistics/transportation	20%	9
Construction	17%	8
Automotive	17%	8
Welding	15%	7
Finance and/or accounting	13%	6
Office/clerical	13%	6
Education	11%	5
Energy (including green tech/jobs)	9%	4
Tourism/hospitality	4%	2
Criminal justice	4%	2
Grounds maintenance	4%	2
Security	2%	1
Maintenance	2%	1
Other	11%	5

Notes: Sample includes 46 evaluations, with varying numbers contributing to each measure.
For mutually exclusive categories, coders chose the option that best reflected the intervention for the majority of participants.
Percentages may not sum to 100 percent due to rounding and for categorizations that were not mutually exclusive.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Employer Engagement Activities and Employer Roles

Exhibit C-8 lists employer engagement activities by program staff and employer roles. Implementation research indicates that it can be difficult for programs to build relationships with employers (Werner et al., 2018). For that reason, we distinguish between activities that program staff might undertake to attempt to

engage employers and the roles actually taken on by employers. Some activities were higher in intensity and involved a greater level of commitment, such as to deliver instruction or provide instructors; deliver career awareness services; offer paid work-based learning (e.g., paid internship, apprenticeship); offer unpaid work-based learning; provide financial aid to students (e.g., employer tuition reimbursement); commit to hire graduates; or provide resources (funding, equipment, instructors). Overall, we found that nearly all programs both attempted to engage employers (96%) and worked with them (93%).

Support Services

Support and wraparound services aim to encourage program completion. Exhibit C-9 summarizes these services in the programs evaluated. The most commonly offered services related to financial assistance: of the 46 evaluations, 35 of them (76 percent) offered financial assistance, including assisting with tuition or training costs. Slightly fewer than half (46 percent) offered tutoring assistance, 39 percent offered transportation assistance, 26 percent offered emergency assistance, and 26 percent offered childcare assistance. Less commonly offered services included internet support and food assistance.

Exhibit C-8. Employer Engagement and Roles of the Included Evaluations

Program Characteristic	Percent of Evaluations	Number of Evaluations
Staff Activities that Engage Employers (not mutually exclusive)		
Adapted curricula for employers' needs	72%	33
Has formal partnership with employers	50%	23
Invites employers to events	46%	21
Convenes an employer advisory council	37%	17
Offers incumbent worker training	22%	10
Other	15%	7
The intervention did not attempt to engage employers	4%	2
Roles Undertaken by Employer (not mutually exclusive)		
Provide input on curriculum or program development	78%	36
Offer paid work-based learning (e.g., paid internship, apprenticeship, OJT)	48%	22
Offer unpaid work-based learning (including clinicals and practicums)	43%	20
Provide information on labor market demand, including specific job openings	43%	20
Deliver career awareness services (e.g., speak to participants about working in an occupation/industry/particular company, give worksite tours)	41%	19
Commit to hire graduates	24%	11
Deliver instruction or provide instructors	22%	10
Provide resources (funding, equipment, instructors) either as a donation or a fee for service	20%	9
Provide input on preferred type of applicants	17%	8
Provide financial aid to students	9%	4
Provide mentors to participants	2%	1
Employers were not part of intervention or no information	7%	3

Notes: Sample includes 46 evaluations, with varying numbers contributing to each measure. OJT refers to on-the-job training.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit C-9. Support Services of the Included Evaluations

Program Characteristic	Percent of Evaluations	Number of Evaluations
Support Offered (not mutually exclusive)		
Training cost assistance	54%	25
Tuition assistance	50%	23
Tutoring	46%	21
Transportation assistance	39%	18
Emergency assistance	26%	12
Child/dependent care assistance	26%	12
Other financial assistance	22%	10
Peer support	15%	7
Internet	9%	4
Job search and placement	9%	4
Legal advice	7%	3
Food assistance	4%	2
Connection with benefits and social services	4%	2
Other	7%	3
Support services not provided	13%	6

Notes: Sample includes 46 evaluations, with varying numbers contributing to each measure.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

One-on-One Assistance

Career pathways programs frequently include some form of one-on-one assistance for participants. As shown in Exhibit C-10, almost all (96%) programs offered such assistance, most commonly career or college navigation (91%), followed by case management(63%) and academic advising (43%).

Exhibit C-10. One-On-One Assistance in the Included Evaluations

Program Characteristic	Percent of Evaluations	Number of Evaluations
One-on-One Assistance (not mutually exclusive)		
Career or college navigation	91%	42
Case management	63%	29
Academic advising	43%	20
Counseling	26%	12
Mentorship	7%	3
Other	7%	3
One-on-one assistance not offered	4%	2

Notes: Sample includes 46 evaluations, with varying numbers contributing to each measure.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

C.3 Discussion

This section first describes consistencies between the characteristics present in the dataset with prior scans of career pathways programs, then highlights new insights from the descriptive data of program characteristics.

C.3.1 CONSISTENCIES WITH PRIOR FINDINGS

Analysis of many of the program characteristics shows that programs reported on in the 46 evaluations for the meta-analysis are similar to those that were identified in prior career pathways research and implementation scans (Sarna & Adam, 2020; Sarna & Strawn, 2018; Schwartz et al., 2018). Specifically, the evaluations included in the meta-analysis are consistent with our prior scans in terms of industry of focus, lead agencies, and the inclusion of multiple steps of training. Programs in this meta-analysis dataset most commonly target four industries: healthcare (59%), manufacturing (48%), information technology (24%), and business (24%), which were the same industries most common in the prior scans referenced above. Similarly, as in our earlier scans, community colleges (46%) and community organizations (35%) most frequently lead the evaluated career pathways programs. Workforce agencies are much less common as lead agencies (11%), although they are frequent partners (54%). Multiple steps of training, a key career pathways feature, are also common in the evaluated programs (70%), at least for one or more of their pathways or sites.

C.3.2 NEW INSIGHTS ABOUT CAREER PATHWAYS PROGRAMS IN PRACTICE

This meta-analysis also contributes new insights into characteristics of the career pathways approach. Our review of program design and implementation characteristics also includes additional details on some of the more specific aspects of service delivery that were not included in the previous scans. Our findings on these characteristics could be especially interesting to practitioners and those working on program design:

- **Length of training:** Very few (7%) of the evaluations studied programs where most participants are in training a year or longer; nearly half examined programs where training lasted six months or less.
- **Basic skills instruction:** More than half of the evaluations studied programs that offered basic skills instruction, though few required it.
- **Supports:** About half of programs provided at least some financial support, such as assistance with tuition or other training costs. Tutoring and transportation aid were also common. Other supports, such as emergency assistance and childcare, were less common (26% each). Help with internet and food needs was rare (9% and 4%, respectively).
- **Employer engagement:** Evaluations reported that program staff undertook various activities to engage employers, and employers took on various roles in the programs evaluated. For example, employers commonly provided input on curriculum and program development, and also provided work-based learning opportunities.

C.3.3 SUMMARY

The picture that emerges from this meta-analysis is broadly consistent with what is known about characteristics of career pathways programs generally, including from previous scans of relevant research and implementation (Sarna & Strawn, 2018; Schwartz et al., 2018).

In brief, the evaluated programs we include in the meta-analysis reflect our understanding of career pathways. The programs share many commonalities in their general approach, and they also vary substantially in the more specific details of how that approach is implemented. The wide variability of the characteristics presented here underscores the potential for our meta-analysis to offer insights as to which characteristics affect impacts.

Appendix D: Expanded Results from Chapter 2

Chapter 2 summarizes the meta-analysis results and reports on only a subset of all the outcomes we analyzed. This appendix provides additional meta-analysis results, which come from the project's Bayesian analysis. Section D.1 shows forest plots, and Section D.2 presents meta-analysis findings for each of the specific outcomes, which—in the main report—were aggregated into composite outcomes.

D.1 Forest Plots

Exhibits D-1 through D-5 show forest plots for each of the overall meta-analysis's five main outcomes. In these plots, the meta-analysis results are disaggregated by evaluation; each evaluation's composite outcomes are shown in one row, permitting the reader to graphically see the across-evaluation impact values and variation that are averaged to produce the overall meta-analysis results. Each row in the forest plot shows two effect sizes and credible intervals. The first is the effect size for the relevant outcome that was coded directly from the corresponding evaluation report. This "direct" effect is marked with a square, in dark blue. Because some evaluations reported more than one impact estimate per domain, the effect size shown is a "synthetic effect size," which is a weighted average across these multiple impact estimates (Appendix A explains this calculation). The credible interval is represented as a horizontal line centered on the point estimate. There is a 95 percent probability that the true impact lies within this interval. In broad terms, studies that have more precise estimates (i.e., narrower credible intervals) receive more weight in the meta-analytic average than studies that have less precise estimates (i.e., wider credible intervals).

Directly underneath the effect size in each row—marked with a circle in light blue—is the "shrinkage" estimate for that evaluation. The idea behind the shrinkage estimate is that each evaluation's impact was estimated with (sometimes considerable) noise due to sampling variability. Thus, the largest impact estimate in the sample is probably "too large," and the smallest impact estimate is probably "too small." In these cases, if the program were implemented and evaluated in the future under similar circumstances, we might expect to see an impact that is closer to the cross-evaluation average. The shrinkage estimate is an attempt to predict what this future impact would be. Therefore, the shrinkage estimate is potentially a more useful guide for program implementers in terms of what to expect in the future than the "direct" estimate of the effect.

In each forest plot, evaluations are grouped into two categories: experimentally designed evaluations (at the top) and quasi-experimentally designed evaluations (at the bottom). Within each category, evaluations are ordered from least to most favorable.

The bottom two rows of each forest plot show the mean effect size, with the credible interval represented by a diamond, and the prediction interval represented by a rectangular bar. The credible interval quantifies the accuracy of the mean, while the prediction interval represents the likely range of true effect sizes across evaluations. The mean effect size reported in the second to last row corresponds exactly to the effect size reported in Chapter 4, where we report the effect size in a footnote associated with the interpretation in natural units in the main body of the report.

Exhibits D-1 through D-5 show forest plot for each of the five main composite variables analyzed: educational progress, employment, industry-specific employment, short-term earnings, and medium- and long-term earnings.

Exhibit D-1. Forest Plot for Educational Progress

EXPERIMENTAL EVALUATION DESIGN   ■ Direct estimate ● Shrinkage estimate

Evaluation	Effect Size	95% CI
PACE Patient Care Academies	−0.03	[−0.38, 0.32]
PACE Health Careers for All	0.12	[−0.10, 0.34]
HPOG 1.0 Non–Tribal Grantees	0.20	[0.14, 0.26]
PACE Workforce Training Academy	0.22	[−0.03, 0.47]
YouthBuild	0.23	[−0.55, 1.02]
PACE VIDA	0.23	[0.09, 0.38]
Green Jobs Health Matrix Grant Scholarship	0.29	[−0.18, 0.77]
Career Focused Learning Communities	0.38	[−0.26, 1.01]
PACE Year Up	0.38	[0.19, 0.58]
PACE Pathways to Healthcare	0.40	[0.22, 0.58]
PACE Bridge to Employment	0.40	[0.21, 0.60]
Green Jobs American Indian Opportunities	0.43	[−0.15, 1.01]
Green Jobs Clean Energy Center	0.43	[−0.34, 1.20]
PACE Carreras en Salud	0.48	[0.23, 0.72]
Project QUEST	0.49	[0.23, 0.74]
PACE IBEST	0.54	[0.07, 1.02]
WorkAdvance St Nick Alliance	0.83	[0.57, 1.09]
Accelerated Training for Illinois Manufacturing (WIF)	0.84	[0.67, 1.01]
WorkAdvance Towards Employment	0.91	[0.66, 1.16]
WorkAdvance Madison Strategies Group	0.95	[0.67, 1.22]
Green Jobs Pathways to Prosperity	1.01	[−0.45, 2.46]
Sectoral Employment Wisconson Regional Training	1.30	[0.70, 1.89]
WorkAdvance Per Scholas	1.33	[1.08, 1.59]
Sectoral Employment Per Scholas	1.45	[1.10, 1.81]
I–BEST Washington	2.04	[1.11, 2.96]

QUASI-EXPERIMENTAL EVALUATION DESIGN

Evaluation	Effect Size	95% CI
Accelerating Opportunity Illinois	0.19	[0.11, 0.27]
Accelerating Opportunity Kansas	0.24	[0.18, 0.30]
INTERFACE (TAACCCT)	0.32	[0.22, 0.42]
Accelerating Opportunity Kentucky	0.36	[0.30, 0.43]
Making the Future (TAACCCT)	0.47	[0.40, 0.53]
Bridging the Gap Consortium (TAACCCT)	0.69	[0.37, 1.01]
ACT (TAACCCT)	0.71	[0.58, 0.84]
Accelerating Opportunity Louisiana	0.73	[0.59, 0.86]

MEAN	**0.55**	**[0.41, 0.69]**
PREDICTION	**0.55**	**[−0.18, 1.28]**

−1.5   −1   −0.5   0   0.5   1   1.5   2   2.5

Notes: Results from 33 evaluations reporting 159 effect sizes. Hedges' *g* effect sizes and 95 percent credible intervals shown for each evaluation. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes coded such that effect sizes greater than zero indicate a beneficial effect of the program (i.e., more educational progress).
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit D-2. Forest Plot for Employment

EXPERIMENTAL EVALUATION DESIGN   ■ Direct estimate   ● Shrinkage estimate

Evaluation	Effect Size	95% CI
Year Up	−0.26	[−0.70, 0.19]
Green Jobs Health Matrix Grant Scholarship	−0.08	[−0.25, 0.09]
PACE Patient Care Academies	−0.07	[−0.32, 0.18]
PACE VIDA	−0.07	[−0.22, 0.09]
HPOG 1.0 Non–Tribal Grantees	−0.05	[−0.09, −0.01]
PACE Pathways to Healthcare	−0.02	[−0.15, 0.12]
PACE Health Careers for All	−0.01	[−0.20, 0.18]
PACE Year Up	−0.01	[−0.12, 0.10]
PACE Carreras en Salud	0.01	[−0.17, 0.18]
PACE Bridge to Employment	0.04	[−0.09, 0.16]
YouthBuild	0.05	[−0.07, 0.16]
WorkAdvance St Nick Alliance	0.05	[−0.17, 0.27]
Green Jobs American Indian Opportuities	0.07	[−0.17, 0.30]
PACE Workforce Training Academy	0.08	[−0.07, 0.24]
PACE IBEST	0.09	[−0.08, 0.27]
Project QUEST	0.11	[−0.15, 0.37]
WorkAdvance Towards Employment	0.11	[−0.07, 0.29]
Sectoral Employment Wisconson Regional Training	0.13	[−0.14, 0.41]
Green Jobs Clean Energy Center	0.15	[−0.03, 0.32]
Green Jobs Pathways to Prosperity	0.16	[−0.16, 0.47]
Accelerated Training for Illinois Manufacturing (WIF)	0.16	[−0.03, 0.35]
Sectoral Employment Per Scholas	0.18	[−0.04, 0.41]
WorkAdvance Per Scholas	0.20	[0.01, 0.38]
WorkAdvance Madison Strategies Group	0.21	[0.00, 0.41]
Sectoral Employment Jewish Vocational Services	0.27	[0.02, 0.51]

(continued)

Exhibit D-2. Forest Plot for Employment (continued)

QUASI-EXPERIMENTAL EVALUATION DESIGN			
Linn Benton iLearn Campus (TAACCCT)	−1.06	[−1.44, −0.68]	
Bridging the Gap Consortium (TAACCCT)	0.05	[−0.06, 0.16]	
Accelerating Opportunity Illinois	0.06	[−0.03, 0.15]	
Accelerating Opportunity Kentucky	0.06	[−0.01, 0.12]	
Accelerating Opportunity Kansas	0.07	[−0.01, 0.16]	
Accelerating Opportunity Louisiana	0.08	[−0.05, 0.21]	
WPP Wisconsin Construction Pathway	0.11	[−0.03, 0.26]	
WPP Construction Sector Partnership	0.42	[0.24, 0.59]	
WPP Advanced Manufacturing Partnership	0.43	[0.29, 0.57]	
WPP Health Careers Cincinnati	0.63	[0.56, 0.70]	
WPP Milwaukee Area Health Alliance	0.65	[0.51, 0.79]	
WPP Wisconsin Manufacturing Pathway	0.82	[0.57, 1.06]	
MEAN	**0.11**	**[.03, 0.2]**	
PREDICTION	**0.11**	**[−0.38, .61]**	

Notes: Results from 37 evaluations reporting 514 effect sizes. Hedges' *g* effect sizes and 95 percent credible intervals shown for each evaluation. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes coded such that effect sizes greater than zero indicate a beneficial effect of the program (i.e., more employment).

Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit D-3. Forest Plot for Industry-Specific Employment

Evaluation	Effect Size	95% CI
EXPERIMENTAL EVALUATION DESIGN		
PACE Pathways to Healthcare	0.03	[–0.14, 0.19]
Green Jobs Health Matrix Grant Scholarship	0.03	[–0.15, 0.21]
YouthBuild	0.06	[–0.20, 0.32]
Green Jobs Pathways to Prosperity	0.09	[–0.30, 0.48]
PACE Workforce Training Academy	0.11	[–0.16, 0.37]
PACE Patient Care Academies	0.14	[–0.14, 0.41]
PACE Health Careers for All	0.17	[–0.05, 0.39]
Project QUEST	0.20	[–0.04, 0.45]
PACE Carreras en Salud	0.26	[0.04, 0.48]
PACE Bridge to Employment	0.27	[0.07, 0.46]
HPOG 1.0 Non–Tribal Grantees	0.28	[0.23, 0.33]
Green Jobs American Indian Opportuities	0.30	[0.03, 0.56]
WorkAdvance St Nick Alliance	0.38	[0.10, 0.67]
WorkAdvance Madison Strategies Group	0.41	[0.20, 0.61]
WorkAdvance Towards Employment	0.41	[0.21, 0.62]
Green Jobs Clean Energy Center	0.77	[0.47, 1.07]
PACE Year Up	0.83	[0.69, 0.97]
WorkAdvance Per Scholas	1.10	[0.87, 1.33]
QUASI-EXPERIMENTAL EVALUATION DESIGN		
WPP Wisconsin Construction Pathway	–0.13	[–0.34, 0.09]
WPP Advanced Manufacturing Partnership	0.62	[0.40, 0.84]
WPP Milwaukee Area Health Alliance	0.83	[0.70, 0.97]
WPP Construction Sector Partnership	0.86	[0.59, 1.13]
WPP Health Careers Cincinnati	1.00	[0.93, 1.08]
WPP Wisconsin Manufacturing Pathway	1.12	[0.87, 1.37]
MEAN	**0.42 [0.26, 0.59]**	
PREDICTION	**0.42 [–0.36, 1.20]**	

■ Direct estimate ● Shrinkage estimate

Notes: Results from 24 evaluations reporting 71 effect sizes. Hedges' *g* effect sizes and 95 percent credible intervals shown for each evaluation. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes coded such that effect sizes greater than zero indicate a beneficial effect of the program (i.e., more employment).
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit D-4. Forest Plot for Short-term Earnings

EXPERIMENTAL EVALUATION DESIGN   ■ Direct estimate   ● Shrinkage estimate

Evaluation	Effect Size	95% CI
Project QUEST	−0.23	[−0.41, −0.04]
PACE Patient Care Academies	−0.10	[−0.26, 0.07]
PACE Pathways to Healthcare	−0.09	[−0.19, 0.02]
PACE VIDA	−0.08	[−0.19, 0.04]
PACE Carreras en Salud	−0.07	[−0.20, 0.05]
PACE Health Careers for All	−0.07	[−0.21, 0.07]
WorkAdvance St Nick Alliance	−0.03	[−0.23, 0.16]
PACE Workforce Training Academy	−0.02	[−0.14, 0.09]
Green Jobs Health Matrix Grant Scholarship	−0.02	[−0.13, 0.10]
PACE Year Up	−0.01	[−0.08, 0.07]
HPOG 1.0 Non–Tribal Grantees	−0.00	[−0.03, 0.03]
Green Jobs American Indian Opportuities	−0.00	[−0.16, 0.16]
YouthBuild	0.01	[−0.05, 0.08]
PACE Bridge to Employment	0.01	[−0.10, 0.13]
PACE IBEST	0.03	[−0.11, 0.17]
Green Jobs Pathways to Prosperity	0.05	[−0.18, 0.29]
WorkAdvance Towards Employment	0.07	[−0.09, 0.23]
Accelerated Training for Illinois Manufacturing (WIF)	0.08	[−0.07, 0.23]
Green Jobs Clean Energy Center	0.13	[0.00, 0.26]
WorkAdvance Madison Strategies Group	0.14	[−0.01, 0.29]
WorkAdvance Per Scholas	0.15	[−0.01, 0.31]
Sectoral Employment Per Scholas	0.21	[0.01, 0.41]
Sectoral Employment Jewish Vocational Services	0.23	[0.01, 0.44]
Sectoral Employment Wisconson Regional Training	0.25	[0.05, 0.46]

(continued)

Exhibit D-4. Forest Plot for Short-term Earnings (continued)

QUASI-EXPERIMENTAL EVALUATION DESIGN

Evaluation	Effect	CI
Accelerating Opportunity Kentucky	−0.03	[−0.08, 0.03]
Accelerating Opportunity Louisiana	−0.02	[−0.13, 0.09]
Oh–Penn Pathways Pennsylvania (WIF)	−0.01	[−0.02, 0.01]
Oh–Penn Pathways Ohio (WIF)	−0.00	[−0.02, 0.01]
Accelerating Opportunity Illinois	0.01	[−0.07, 0.08]
Bridging the Gap Consortium (TAACCCT)	0.06	[−0.04, 0.15]
WPP Construction Sector Partnership	0.06	[−0.04, 0.15]
Accelerating Opportunity Kansas	0.08	[0.02, 0.15]
WPP Advanced Manufacturing Partnership	0.15	[0.08, 0.22]
WPP Health Careers Cincinnati	0.32	[0.26, 0.37]
WPP Milwaukee Area Health Alliance	0.38	[0.28, 0.50]
WPP Wisconsin Construction Pathway	0.40	[0.34, 0.45]
WPP Wisconsin Manufacturing Pathway	0.84	[0.65, 1.04]
MEAN	**0.07**	**[0.02, 0.13]**
PREDICTION	**0.07**	**[−0.27, 0.42]**

Notes: Results from 37 evaluations reporting 278 effect sizes. Hedges' *g* effect sizes and 95 percent credible intervals shown for each evaluation. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes coded such that effect sizes greater than zero indicate a beneficial effect of the program (i.e., higher short-term earnings).

Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit D-5. Forest Plot for Medium- and Long-term Earnings

EXPERIMENTAL EVALUATION DESIGN			
Evaluation	Effect Size	95% CI	■ Direct estimate ● Shrinkage estimate
PACE Carreras en Salud	−0.10	[−0.23, 0.02]	
WorkAdvance St Nick Alliance	−0.09	[−0.27, 0.08]	
PACE Patient Care Academies	−0.08	[−0.24, 0.08]	
PACE Health Careers for All	−0.06	[−0.20, 0.08]	
PACE VIDA	−0.05	[−0.17, 0.06]	
PACE Pathways to Healthcare	−0.00	[−0.10, 0.10]	
PACE Workforce Training Academy	0.01	[−0.11, 0.12]	
HPOG 1.0 Non–Tribal Grantees	0.02	[−0.02, 0.05]	
WorkAdvance Towards Employment	0.02	[−0.13, 0.17]	
YouthBuild	0.04	[−0.02, 0.11]	
PACE Bridge to Employment	0.05	[−0.07, 0.16]	
WorkAdvance Madison Strategies Group	0.06	[−0.09, 0.21]	
PACE IBEST	0.08	[−0.06, 0.23]	
Project QUEST	0.17	[−0.01, 0.35]	
WorkAdvance Per Scholas	0.24	[0.09, 0.38]	
PACE Year Up	0.38	[0.30, 0.45]	
MEAN	**0.04**	**[−0.03, 0.12]**	
PREDICTION	**0.04**	**[−0.23, 0.32]**	

Notes: Results from 16 evaluations reporting 96 effect sizes. Hedges' *g* effect sizes and 95 percent credible intervals shown for each evaluation. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes coded such that effect sizes greater than zero indicate a beneficial effect of the program (i.e., higher medium- and long-term earnings).
Source: Authors' computations from D&A CP Project meta-analysis dataset.

D.2 Results for Specific Outcomes

Exhibit D-6 presents meta-analysis results (i.e., average effect sizes) for each of the primary outcomes that together comprise the main five composite variables analyzed: educational progress, employment, industry-specific employment, short-term earnings, and medium- and long-term earnings. Findings for each of these five aggregates are reported in Chapter 2. Exhibit D-7 presents results for the remainder of the outcomes that were coded from evaluation reports.

Exhibit D-6. Average Effects by Outcome (Primary Outcomes)

Outcome	# of Evaluations	# of Effect Sizes	Mean	[95% Credible Interval]	Tau	I2	Probability of Any Effect	Probability of Small Effect (>0.1 sd)	Probability of Medium Effect (>0.2 sd)	Probability of Large Effect (>0.3 sd)
Educational attainment (credential receipt)	33	159	0.55	[0.41, 0.69]	0.36	96	100	100	100	100
Employment (at any time point)	37	514	0.11	[0.03, 0.20]	0.24	93	99	64	2	0
Employed in industry/occupation trained for	24	71	0.42	[0.26, 0.59]	0.38	95	100	100	100	94
Short-term earnings	37	278	0.07	[0.02, 0.13]	0.17	97	99	19	0	0
Medium- and long-term earnings (36+ months)	16	96	0.04	[-0.03, 0.12]	0.13	86	89	6	0	0

Notes: Effects were coded such that positive effect sizes indicate effects favoring the program group (e.g., higher earnings, better well-being).
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit D-7. Average Effects by Outcome (Secondary Outcomes)

Outcome	# of Evaluations	# of Effect Sizes	Mean	[95% Credible Interval]	Tau	I2	Probability of Any Effect	Probability of Small Effect (>0.1 sd)	Probability of Medium Effect (>0.2 sd)	Probability of Large Effect (>0.3 sd)
Education										
Post-secondary degree obtained	16	38	0.21	[-0.01, 0.41]	0.30	91	97	85	54	17
Obtained credential	29	95	0.61	[0.45, 0.77]	0.40	97	100	100	100	100
Number of credentials obtained	9	9	0.24	[0.08, 0.41]	0.22	95	100	96	69	20
Earned industry-relevant credential	13	17	0.77	[0.48, 1.07]	0.50	93	100	100	100	100
Completed occupational training	12	19	0.59	[0.24, 0.92]	0.53	96	100	99	98	95
Participated in training	16	37	0.82	[0.42, 1.22]	0.79	99	100	100	100	99
Number of college credits	16	26	0.05	[-0.01, 0.12]	0.11	87	96	7	0	0
Employment										
Employed in months 0-11	27	105	0.07	[-0.06, 0.21]	0.34	97	86	33	3	0
Employed in months 12-35	36	294	0.11	[0.03, 0.19]	0.23	92	99	60	2	0
Employment in months 36+	17	115	0.07	[0.03, 0.11]	0.02	7	100	5	0	0
Employed in industry/occupation trained for in months 0-35	23	50	0.43	[0.25, 0.60]	0.40	96	100	100	99	93
Employed in industry/occupation trained for in months 36+	9	21	0.20	[0.10, 0.29]	0.08	43	100	97	51	1
Employed full-time	13	15	0.09	[-0.01, 0.19]	0.14	69	96	43	2	0

Outcome	# of Evaluations	# of Effect Sizes	Mean	[95% Credible Interval]	Tau	I2	Probability of Any Effect	Probability of Small Effect (>0.1 sd)	Probability of Medium Effect (>0.2 sd)	Probability of Large Effect (>0.3 sd)
Employed full-time - less than 36 months	7	8	0.18	[0.00, 0.35]	0.18	75	98	84	37	6
Employed full-time – 36 months+	7	7	0.02	[-0.07, 0.11]	0.06	26	70	3	0	0
Number of hours worked	13	17	0.08	[0.02, 0.15]	0.08	55	99	28	0	0
Advanced in career	6	10	-0.12	[-0.66, 0.41]	0.58	95	29	16	9	5
Earnings										
Earnings (at any time point)	37	374	0.09	[0.03, 0.15]	0.16	97	100	35	0	0
Earnings at 0-11 months	28	90	0.04	[-0.06, 0.13]	0.25	99	78	10	0	0
Earnings at 12-35 months	36	188	0.09	[0.03, 0.15]	0.16	97	100	34	0	0
Earnings and income	37	410	0.09	[0.03, 0.14]	0.16	97	100	34	0	0
Career Knowledge										
Confidence in career knowledge	10	18	0.07	[0.03, 0.11]	0.03	16	100	8	0	0
Perceived career progress	9	16	0.15	[0.07, 0.22]	0.07	47	100	92	8	0
Well-being										
Employed in a high-quality job	13	55	0.05	[-0.02, 0.13]	0.06	17	93	10	0	0
Employed in a job that offers healthcare benefit	18	20	0.03	[-0.02, 0.09]	0.05	24	89	1	0	0
Well-being	20	139	0.04	[0.00, 0.07]	0.02	6	97	0	0	0

Notes: Effects were coded such that positive effect sizes indicate effects favoring the program group (e.g., higher earnings, better well-being).

Source: Authors' computations from D&A CP Project meta-analysis dataset.

Appendix E: Approach to Selecting Covariates and Expanded Results from Chapter 3

This appendix details the approach we used to select the covariates to be included in the final meta-regression. Although our focus is on program characteristics, we also recognize the need to control for other factors, including evaluation design, quality, outcome timing, participant characteristics, and local context. Appendix A, Section A.2, described the multiple measures to be included in this meta-analysis: impacts, potential effectiveness factors, and evaluation data. Because we have limited degrees of freedom—that is, we have many covariates we want to analyze but only 46 evaluations on which to analyze them—we undertook a selection process that identified the covariates that would be part of our final analysis.[35] In addition, this appendix includes all of the results from the block analyses (summarized in Chapter 3), which some readers might find useful independent of the final meta-regressions. This appendix also reports the bivariate correlations between all the characteristics analyzed.

E.1 Description of Approach to Selecting Covariates

The block approach to selecting covariates narrows from 78 characteristics and some additional interactions among them to the characteristics that are included in the final meta-regression. The left-hand column of Exhibit E-1 shows the "block" of variables grouped together in the first part of the analysis. The right-hand column includes details on the specific characteristics.

Exhibit E-1. Blocks and Specific Measures

Block Label	Specific Measures Included
Lead administrative agency	• Four mutually-exclusive binary indicators of lead agency type: Community or technical college (reference category) Workforce board/one-stop/American Job Center Community organization Other Government Agency (e.g., TANF, housing agencies)
Partner agency (most common)	• Four binary indicators, one for each selected partner agency type: Community or technical college Workforce board/One-Stop/American Job Center Community organization Other government agency (e.g., TANF, housing agencies)
Partner agency (less common)	• Four binary indicators, one for each selected partner agency type: School or school district University Labor union Other (e.g., Other educational institution)

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[35] In addition to the "content-driven" moderator block approach that we used to select covariates, we also tested a machine learning, "data-driven" approach. For various reasons, we concluded that that approach was not a good fit for this analysis and so instead report only on the results of our conventional, moderator block approach for selecting covariates.

Block Label	Specific Measures Included
Partner agency (rarer)	• Three binary indicators, one for each selected partner agency type: Private or for-profit school Staffing agency Faith-based organization
Administrative arrangements	• Alternative specification of lead or partner agency, along with a test of whether there is a synergistic effect of these partners working together. Specification 1: Lead or partner is community or technical college Lead or partner is workforce agency Interaction (two organization types together) Specification 2: Lead or partner is community or technical college Lead or partner is community organization Interaction (two organization types together) Specification 3: Lead or partner is workforce board/One-Stop/American Job Center Lead or partner is community or technical college Lead or partner is community organization Interaction (all three organization types together)
Eligibility criteria	• Four binary indicators, one for each criterion used: Has high school diploma or GED/HiSET/TASC Demonstrates basic skills through participation in class or test Meets income requirements Passed background check or drug screen
Basic skills instructional offerings	• Basic skills offered (1=yes, 0=no or no information provided) • Two binary indicators for types of basic skills offered: Adult basic/secondary education and/or English language acquisition College developmental or remedial education • Basic skills required for majority of or all participants (1=yes, 0=required for minority of participants, not required, no information)
Flexible instruction	• Three binary indicators for types of flexible instruction: online instruction (some or all courses available or taken online) hybrid instruction flexible sequencing • Courses offered in multiple locations or at locations more convenient to participants, or at night or on the weekends
Pathways & training	• Offers 3+ pathways (versus 1-2; 1=yes, 0=no) • Offers multiple steps of training (1=yes, 0=no) • Offers mid-/high-/mixed-level training (1=yes; 0=entry-level only, or no information)
Type of credentials offered	• Four binary indicators for types of credentials offered: Occupational certificate (including college-issued certificate) or technical diploma Associate or bachelor's degree State or local license Certification developed by an employer or industry association
Training length	• Five mutually-exclusive binary indicators for length of training for *most* participants: Short-term (6 months or less; reference category) Medium-term (More than 6 months through 12 months) Long-term (12+ months) Varies (and cannot determine length for most participants) No information

Block Label	Specific Measures Included
Training industry or occupation	• Four binary indicators for occupational sectors or industries in which training is offered: Healthcare Manufacturing or construction Information technology Education
Employer engagement and roles	• Extent of employer engagement (count of 0-6 activities), among: Convenes employer council Adapts curriculum for employer needs Has formal partnership with employers Offers incumbent worker training Invites employers to events Other • Highly engaged employers (1 if yes to any of the following): Deliver instruction or provide instructors Deliver career awareness services Offer paid work-based learning Offer unpaid work-based learning Provide financial aid to students Commit to hire graduates Provide resources • Presence of job development staff (1=yes, 0=no or no information)
Employer engagement (Actions taken by program staff)	• Four binary variables for types of outreach activities to employers: Convenes employer council Adapts curriculum for employer needs Has formal partnership with employers Offers incumbent worker training
Employer roles (part 1) (Actions taken by employers)	• Four binary variables indicating types of employer roles: Offer work-based learning (paid or unpaid) Provide resources (including financial aid, mentors, resources) Provide information on preferred type of applicant Commit to hire graduates
Employer roles (part 2) (Actions taken by employers)	• Four binary variables indicating additional types of employer roles: Provides input on curriculum, program development Provides information on labor market Delivers instruction or provides instructors Delivers career awareness services
One-on-one support	• Three binary indicators of type of one-on-one staff assistance: Case management or counseling Career or college navigation Academic advising • Binary indicator for whether one-on-one staff was required or mandatory
Services (part 1)	• Five binary indicators of services provided: Tuition, training cost, other financial assistance Emergency assistance Food assistance Internet Tutoring assistance

Block Label	Specific Measures Included
Services (part 2)	• Four binary indicators of services provided: Child/dependent care assistance Transportation assistance Connection with benefits and social services Job search and placement
Selected interactions among service offerings	• Interactions between financial assistance and selected other service offerings: Specification 1: Tuition, training cost, other financial assistance Case management or counseling Interaction between above two factors Specification 2: Tuition, training cost, other financial assistance Career or college navigation Interaction between above two factors Specification 3: Tuition, training cost, other financial assistance Job search and placement Interaction between above two factors
Participant composition	• Participants' gender composition (% male) • Participants' education level (mutually exclusive): % with <HS/GED (reference category) % with HS/GED % w/some college % w/bachelor's or associate degree
Participant composition and local context	• Participants' race/ethnicity: % Black % Hispanic • Unemployment rate (%)

Notes: Each block's regression includes one design-related covariate indicating whether the design was experimental or quasi-experimental. The exhibit uses the following abbreviations: Temporary Assistance for Needy Families (TANF), General Educational Development (GED), High School Equivalency Test (HiSET), Test Assessing Secondary Completion (TASC), High School (HS).

Because we expect that the covariates that contribute to explaining educational progress outcomes likely differ from those that explain labor market outcomes, we analyzed each block twice: once for educational progress and once for labor market outcomes. All block analyses controlled for evaluation design type (experiment or quasi-experiment). A rule of thumb suggests that there should be at least eight observations per independent variable (Green, 1991). Given that we had at most 40 evaluations (and sometimes fewer) for any given effect size, we targeted having no more than four or five covariates.

E.2 Results of Block Analyses

This section reports the complete results from the block analyses, first for educational progress and then labor market outcomes.

E.2.1 EDUCATIONAL PROGRESS

As a means of explaining how we chose the variables to be included in the two, final meta-regressions, we share the results here, and follow them with an explanation of the decisions. Exhibit E-2 presents results from the block analyses for the educational progress domain, where *italics* indicate a characteristic that makes a meaningful contribution to impact with a relatively high probability. (Note that each block

was run as a separate regression and does not control for any of the characteristics in other blocks). The threshold for the magnitude of the contribution (coefficient) is an effect size of 0.05, and the criterion for a "relatively high probability" is 90 percent.

Exhibit E-2. Relationships Between Potential Effectiveness Factors and Average Effect Sizes for Educational Progress

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Lead Administrative Agency			
Lead agency type: Workforce board/one-stop/American Job Center	-0.12	[-0.67, 0.40]	68
Lead agency type: Community organization	*0.38*	*[0.05, 0.71]*	*99*
Lead agency type: Other, including government agency	0.27	[-0.36, 0.86]	82
Lead agency type: community or technical college (reference category)	N/A	N/A	N/A
Partner Agency, Most Common			
Partner agency type: Community or technical college	-0.09	[-0.41, 0.24]	72
Partner agency type: Workforce board/one-stop/American Job Center	-0.14	[-0.48, 0.20]	80
Partner agency type: Community organization	*0.32*	*[-0.06, 0.70]*	*95*
Partner agency type: Government agency (other than Workforce board/one-stop/American Job Center)	*-0.34*	*[-0.71, 0.05]*	*96*
Partner Agency, Less Common			
Partner agency type: School or school district	-0.17	[-0.57, 0.22]	81
Partner agency type: University	-0.10	[-0.54, 0.34]	69
Partner agency type: Labor union	-0.07	[-0.68, 0.56]	59
Partner agency type: Other	0.30	[-0.27, 0.85]	86
Partner Agency, Rarer			
Partner agency type: Private or for-profit school	-0.10	[-0.55, 0.35]	67
Partner agency type: Staffing agency or company	*0.55*	*[0.02, 1.07]*	*98*
Partner agency type: Faith-based organization	-0.16	[-0.65, 0.33]	75
Administrative Arrangements			
Administrative arrangement: Lead or partner is workforce agency	-0.11	[-0.37, 0.15]	81
Administrative arrangement: Lead or partner is community college	*-0.58*	*[-0.94, -0.22]*	*100*
Administrative Arrangements			
Administrative arrangement: Lead or partner is community college	*-0.61*	*[-0.95, -0.25]*	*100*
Administrative arrangement: Lead or partner is community organization	0.10	[-0.16, 0.37]	76
Administrative Arrangements			
Administrative arrangement: Lead or partner is workforce agency	0.02	[-0.42, 0.44]	53
Administrative arrangement: Lead or partner is community college	*-0.46*	*[-0.86, -0.06]*	*99*
Administrative arrangement: Lead or partner is community organization	*0.27*	*[-0.13, 0.67]*	*91*

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Interaction effect: (Lead or partner agency was a Workforce board)*(Lead or partner agency was a community college)*(Lead or partner agency was a community organization)	-0.26	[-0.79, 0.29]	84
Eligibility			
Eligibility criteria: Has HS diploma or GED	-0.16	[-0.48, 0.16]	84
Eligibility criteria: Demonstrates basic skills/minimum skill level on test or in class	0.12	[-0.29, 0.53]	72
Eligibility criteria: Meets income requirements	0.00	[-0.36, 0.36]	50
Eligibility criteria: Passed background check or drug screen	0.08	[-0.24, 0.40]	68
Basic Skills Instructional Offerings			
Offers basic skills training	*-0.33*	*[-0.80, 0.15]*	*91*
Offers adult basic/secondary education or English language acquisition	0.12	[-0.25, 0.51]	74
Offers college developmental or remedial education	0.01	[-0.36, 0.37]	53
Basic skills required for majority of or all participants	-0.05	[-0.42, 0.33]	61
Instructional Offerings' Flexibility			
Flexible instruction type: Some or all courses taken online	0.06	[-0.41, 0.52]	60
Flexible instruction type: Hybrid instruction	-0.31	[-0.91, 0.28]	86
Flexible instruction type: Flexible sequencing	-0.17	[-0.65, 0.32]	76
Flexible instruction type: Courses offered at alternative places/times	-0.03	[-0.44, 0.37]	57
Pathways and Training			
Offers 3+ pathways	-0.05	[-0.32, 0.22]	66
Offers multi-step training	*-0.29*	*[-0.62, 0.06]*	*95*
Offers mid-/high-/mixed-level training based on wage level of occupation	-0.01	[-0.25, 0.23]	53
Credentials			
Type of credential: Occupational certificate or technical diploma	*-0.35*	*[-0.67, -0.02]*	*98*
Type of credential: College (associate or bachelor's) degree	-0.13	[-0.37, 0.11]	87
Type of credential: State or local licensure	-0.05	[-0.33, 0.21]	65
Type of credential: Certification developed by an employer or industry association	*0.33*	*[0.02, 0.63]*	*98*
Training Length			
Length of training: More than 6 months to 1 year	-0.15	[-0.58, 0.30]	75
Length of training: More than 1 year	-0.27	[-0.85, 0.31]	83
Length of training: Varies	0.10	[-0.36, 0.58]	67
Length of training: 6 months or less (reference category)	N/A		
Training Industry or Occupation			
Industry trained for: Healthcare	*-0.33*	*[-0.69, 0.04]*	*96*
Industry trained for: Manufacturing or construction	-0.16	[-0.58, 0.26]	78
Industry trained for: Information technology	0.06	[-0.33, 0.46]	61
Industry trained for: Education	0.07	[-0.38, 0.53]	61

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Employer Engagement and Roles			
Extent of employer engagement (count of 0-6 activities)	0.06	[-0.07, 0.19]	83
Highly engaged employers	0.06	[-0.27, 0.41]	64
Presence of job development staff	*0.31*	*[-0.01, 0.62]*	*97*
Employer Engagement and Roles			
Engaged employer: Convenes an employer advisory council	0.20	[-0.13, 0.52]	89
Engaged employer: Curricula adapted for employers' needs	*0.27*	*[-0.07, 0.60]*	*95*
Engaged employer: Has formal partnership with employers	-0.13	[-0.46, 0.19]	80
Engaged employer: Offer incumbent worker training	0.10	[-0.30, 0.49]	69
Employer Engagement and Roles			
Employer role: Offer work-based learning (paid and unpaid)	*-0.21*	*[-0.54, 0.11]*	*90*
Employer role: Provide resources (including financial aid, mentors, resources)	-0.10	[-0.59, 0.39]	66
Employer role: Provide input on preferred type of applicants	*0.35*	*[0.01, 0.68]*	*98*
Employer role: Commit to hire graduates	*0.30*	*[-0.15, 0.76]*	*91*
Employer Engagement and Roles			
Employer role: Provide input on curriculum or program development	*0.53*	*[0.22, 0.83]*	*100*
Employer role: Provide information on labor market demand, including specific job	0.04	[-0.23, 0.29]	61
Employer role: Deliver instruction or provide instructors	-0.05	[-0.38, 0.30]	63
Employer role: Deliver career awareness services	0.02	[-0.28, 0.32]	57
One-on-One Support			
One on one: Case management or counseling	0.06	[-0.30, 0.40]	63
One on one: Career or college navigation	0.06	[-0.45, 0.57]	59
One on one: Academic advising	*-0.32*	*[-0.62, -0.01]*	*98*
One-on-one staff assistance mandatory/required	-0.11	[-0.45, 0.24]	74
Services			
Support offered: Tuition, training cost, other financial assistance	-0.24	[-0.71, 0.22]	85
Support offered: Emergency assistance	*-0.33*	*[-0.65, -0.01]*	*98*
Support offered: Food assistance	0.06	[-0.62, 0.74]	58
Support offered: Internet	0.28	[-0.28, 0.83]	85
Support offered: Tutoring	*-0.24*	*[-0.52, 0.05]*	*95*
Services			
Support offered: Child/dependent care assistance	*-0.26*	*[-0.66, 0.13]*	*91*
Support offered: Transportation assistance	0.00	[-0.35, 0.34]	50
Support offered: Connection with benefits and social services	-0.45	[-1.25, 0.36]	87
Support offered: Job search and placement	0.10	[-0.55, 0.75]	62

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	-0.36	[-1.18, 0.46]	82
One on one: Case management or counseling	0.19	[-0.76, 1.14]	65
Interaction effect: (Support offered: Tuition, training cost, other financial assistance)*(One on one: Case management or counseling)	-0.06	[-1.07, 0.95]	54
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	*-0.70*	*[-1.67, 0.28]*	*92*
One on one: Career or college navigation	-0.38	[-1.37, 0.62]	77
Interaction effect: (Support offered: Tuition, training cost, other financial assistance)*(One on one: Career or college navigation)	0.42	[-0.68, 1.52]	78
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	*-0.37*	*[-0.87, 0.13]*	*93*
Support offered: Job search and placement	-0.08	[-0.60, 0.44]	62
Participant Composition			
Percentage of participants: Male	*0.76*	*[0.23, 1.28]*	*100*
Education level: Percentage with degree	0.88	[-0.93, 2.65]	84
Education level: Percentage with HS diploma or GED	0.14	[-0.55, 0.87]	66
Education level: Percentage with some college	0.06	[-1.24, 1.25]	55
Education level: percent with <HS/GED (reference category)	N/A		
Participant Composition and Local Context			
Percentage of participants: Black	0.35	[-0.47, 1.15]	81
Percentage of participants: Hispanic/Latino	-0.10	[-0.83, 0.62]	60
Average unemployment rate	-0.33	[-3.79, 3.13]	57

Notes: All moderator block analyses control for design type (experimental or not). Moderator blocks for participant composition, local context, pathways and training, and training length used dummy variable adjustment for missing data (see Puma et al., 2009 for details). *Italicized* rows indicate characteristics that met our criterion for initial selection for the meta-regression.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

The primary criterion we used for selecting variables from among these many characteristics to consider for the meta-regression was that the variable had a coefficient that was relatively large in magnitude and had a relatively high probability of having an effect. This can be described simply as an "it is likely to matter a lot" criterion. Covariates listed in *italics* in Exhibit E-2 are those that met that criterion. As well as summarizing them in Exhibit 3-3. we list them here alongside their coefficient and the probability that they had an effect:

- Partner Agency: Staffing agency (coeff.=0.55; prob.=98)
- Partner Agency: Government agency (coeff.=-0.34; prob.=96)
- Types of Credential Offered: Occupational certificate or technical diploma (coeff.=-0.35; prob.=98)
- Types of Credential Offered: Certification developed by an employer or industry association (coeff.=0.33; prob.=98)
- Employer Engagement and Roles: Presence of job development staff (coeff.=0.31; prob.=97)

- Employer Roles: Provide input on curriculum or program development (coeff.=0.53; prob.=100)
- Training Industry: Healthcare (coeff.=-0.33; prob.=98)
- Participant composition: Percent male (coeff.=0.76; prob.=100)

Several variables were selected based on their coefficients and probabilities in multiple blocks:

- Administrative Arrangements: Lead or partner is community college
- Administrative Arrangements: Lead or partner is community organization
- Services: Tuition, training cost, other financial assistance

Finally, "Training Length: 6 months or less" was included as a reference category and was selected based on the results for the other characteristics in its block.

When it came to selecting the characteristics that appeared useful in explaining educational progress outcomes, a larger number of characteristics appeared relevant than the final meta-regression could accommodate. This may have arisen for two, interrelated reasons: first, the overall impact on educational progress is large; and second, there is substantial variation in educational progress impacts. In response to having too many characteristics, we grouped these "winners" into three groups that formed a "semi-final" round of meta-regressions, incorporating a total of 12 characteristics, as summarized in Exhibit E-3. These characteristics were selected as candidates because they had a combination of coefficients that were relatively large in magnitude (whether negative or positive) and had a high probability (at least 90 percent) of having an effect. From those results, we identified which characteristics should advance to the final meta-regression for educational progress.

As shown in Exhibit E-3, we included both healthcare and participant gender composition in the same block, under the supposition that the two would be correlated: healthcare sector programs predominantly serve women; and so, placing these two characteristics in the same analysis would allow us to distinguish whether one of these is an important factor, while controlling for the other. Again, each regression controls only for characteristics within the block and not for characteristics in other blocks.

Exhibit E-3. Blocks and Specific Measures included in the Semi-Final Educational Progress Analysis

Block Label	Specific Measures Included
Semi-Final Heat 1: Training sector, length, financial assistance, and gender composition	- One binary for occupational sector or industry where training is offered: Healthcare - One binary indicator for length of training for most participants: 6 months or less - One binary indicator of services provided: Tuition, training cost, other financial assistance - Participants' gender composition (% male)
Semi-Final Heat 2: Employer engagement and roles, and types of credentials offered	- Two binary indicators for employer engagement and roles: Presence of job development staff Provide input on curriculum or program development - Two binary indicators for types of credential offered: Occupational certificate or technical diploma Certification developed by an employer or industry association

Block Label	Specific Measures Included
Semi-Final Heat 3: Administrative arrangements	• Two binary indicators for lead or partner agency: Community or technical college / Community organization • Two binary indicators for partner agency: Staffing agency or staffing company / Government agency

From among the results from the block analyses summarized in Exhibit E-4, we ultimately chose to include the following variables in the educational progress final meta-regression, again, using the "likely to matter a lot" criterion, based on a combination of the coefficient's magnitude and probability values. As well as summarizing them in Exhibit 3-3, we list them here alongside their coefficient and the probability that they had an effect:

- Administrative Arrangement: Lead or partner is community college (coeff.=-0.35; prob.=98)
- Partner Agency Type: Staffing agency or company (coeff.=0.42; prob.=98)
- Partner Agency Type: Government agency (other than Workforce Board/one-stop/American Job Center) (coeff.=-0.22; prob.=97)
- Employer Role: Provide input on curriculum or program development (coeff.=0.32; prob.=99)
- Participant Composition: Percent male (coeff.=0.55; prob.=88)

We also included "Evaluation Design: Experimental" as a binary indicator of design type because experimental evaluations tend to have smaller impacts and smaller sample sizes, and some factors might be correlated with design type.

Exhibit E-4. Regressions Used to Select Characteristics for Educational Progress Meta-Regression

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Semi-Final Heat 1			
Industry trained for: Healthcare	0.05	[-0.49, 0.60]	58
Length of training: 6 months or less (excluded group)	0.01	[-0.31, 0.31]	52
Support offered: Tuition, training cost, other financial assistance	-0.17	[-0.63, 0.28]	77
Percentage of participants: Male	0.55	[-0.39, 1.49]	88
Education level: Percentage with bachelor's degree	1.48	[-1.44, 4.29]	85
Education level: Percentage with bachelor's degree - no information	-0.10	[-0.44, 0.24]	71
Design: Experimental evaluation	0.14	[-0.20, 0.49]	80
Intercept	0.34	[-0.76, 1.45]	73
Semi-Final Heat 2			
Employer engagement: Presence of job development staff	*0.16*	*[-0.07, 0.39]*	*92*
Type of credential: Occupational certificate or technical diploma	*-0.24*	*[-0.52, 0.04]*	*96*
Type of credential: Certification developed by an employer or industry association	0.13	[-0.14, 0.41]	83
Employer role: Provide input on curriculum or program development	*0.32*	*[0.06, 0.59]*	*99*
Education level: Percentage with bachelor's degree	*1.60*	*[-0.92, 3.94]*	*90*

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Education level: Percentage with bachelor's degree - no information	0.01	[-0.27, 0.28]	54
Design: Experimental evaluation	0.02	[-0.23, 0.28]	56
Intercept	0.32	[-0.20, 0.84]	89
Semi-Final Heat 3			
Partner agency type: Staffing agency or company	*0.42*	*[0.04, 0.81]*	*98*
Administrative arrangement: Lead or partner is community college	*-0.35*	*[-0.70, 0.00]*	*98*
Partner agency type: Government agency (other than Workforce board/one-stop/American Job Center)	*-0.22*	*[-0.43, 0.01]*	*97*
Administrative arrangement: Lead or partner is community organization	*0.16*	*[-0.08, 0.40]*	*91*
Education level: Percentage with bachelor's degree	0.82	[-1.76, 3.29]	74
Education level: Percentage with bachelor's degree - no information	-0.11	[-0.39, 0.15]	79
Design: Experimental evaluation	-0.05	[-0.26, 0.16]	71
Intercept	0.87	[0.37, 1.38]	100

Source: Authors' computations from D&A CP Project meta-analysis dataset.

E.2.2 LABOR MARKET

Next, we turn to the selection of characteristics for the labor market meta-regression. Exhibit E-5 shows the results from the block analyses, again with asterisks indicating those characteristics whose coefficients were large in magnitude and had a high probability of having an effect.

Exhibit E-5. Relationships Between Potential Effectiveness Factors and Average Effect Sizes for Labor Market Outcomes

Outcome: Labor Market (employment & earnings)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Lead Administrative Agency			
Lead agency type: Workforce board/one-stop/American Job Center	*0.22*	*[0.03, 0.41]*	*99*
Lead agency type: Community organization	*0.21*	*[0.07, 0.36]*	*100*
Lead agency type: Other, including government agency	0.03	[-0.17, 0.24]	62
Lead agency type: Community or technical college (reference category)	N/A		
Partner Agency, Most Common			
Partner agency type: Community or technical college	-0.01	[-0.17, 0.16]	53
Partner agency type: Workforce board/one-stop/American Job Center	0.11	[-0.08, 0.31]	88
Partner agency type: Community organization	0.05	[-0.15, 0.26]	70
Partner agency type: Government agency (other than Workforce board/one-stop/American Job Center)	*-0.11*	*[-0.28, 0.07]*	*90*
Partner Agency, Less Common			
Partner agency type: School or school district	-0.08	[-0.24, 0.08]	84
Partner agency type: University	*-0.28*	*[-0.47, -0.10]*	*100*

Outcome: Labor Market (employment & earnings)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Partner agency type: Labor union	0.09	[-0.09, 0.28]	84
Partner agency type: Other	*-0.19*	*[-0.41, 0.02]*	*96*
Partner Agency, Rarer			
Partner agency type: Trade association	*0.28*	*[0.00, 0.58]*	*97*
Partner agency type: Private or for-profit school	-0.04	[-0.31, 0.22]	63
Partner agency type: Staffing agency or company	0.09	[-0.18, 0.37]	75
Partner agency type: Faith-based organization	-0.09	[-0.34, 0.17]	77
Administrative Arrangements			
Administrative arrangement: Lead or partner is workforce agency	*0.30*	*[-0.08, 0.69]*	*94*
Administrative arrangement: Lead or partner is community college	-0.18	[-0.41, 0.05]	94
Interaction effect: (Lead or partner agency is a Workforce board)*(Lead or partner agency is a community college)	-0.19	[-0.58, 0.21]	83
Administrative Arrangements			
Administrative arrangement: Lead or partner is community college	*-0.19*	*[-0.37, -0.01]*	*98*
Administrative arrangement: Lead or partner is community organization	-0.01	[-0.21, 0.20]	52
Administrative Arrangements			
Administrative arrangement: Lead or partner is workforce agency	0.14	[-0.13, 0.41]	85
Administrative arrangement: Lead or partner is community college	*-0.25*	*[-0.50, 0.00]*	*98*
Administrative arrangement: Lead or partner is community organization	-0.01	[-0.30, 0.27]	53
Interaction effect: (Lead or partner agency is a Workforce board)*(Lead or partner agency is a community college)*(Lead or partner agency is a community organization)	0.01	[-0.31, 0.33]	51
Eligibility			
Eligibility criteria: Has HS diploma or GED	0.05	[-0.11, 0.21]	72
Eligibility criteria: Demonstrates basic skills/minimum skill level on test or in class	-0.11	[-0.30, 0.08]	87
Eligibility criteria: Meets income requirements	*0.18*	*[0.02, 0.34]*	*99*
Eligibility criteria: Passed background check or drug screen	0.01	[-0.15, 0.16]	53
Basic Skills Instructional Offerings			
Offers basic skills training	-0.13	[-0.37, 0.12]	86
Offers adult basic/secondary education or English language acquisition	0.00	[-0.22, 0.22]	51
Offers college developmental or remedial education	-0.01	[-0.24, 0.21]	54
Basic skills required for majority of or all participants	0.00	[-0.22, 0.21]	51
Instructional Offerings' Flexibility			
Flexible instruction type: Some or all courses taken online	*-0.17*	*[-0.44, 0.08]*	*91*
Flexible instruction type: Hybrid instruction	*-0.15*	*[-0.34, 0.05]*	*93*
Flexible instruction type: Flexible sequencing	*-0.21*	*[-0.44, 0.00]*	*97*
Flexible instruction type: Courses offered at alternative places/times	0.04	[-0.16, 0.26]	67

Outcome: Labor Market (employment & earnings)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Pathways and Training			
Offers 3+ pathways	-0.01	[-0.18, 0.16]	53
Offers multi-step training	-0.08	[-0.37, 0.20]	72
Offers mid-/high-/mixed-level training based on wage level of occupation	*0.12*	*[-0.05, 0.29]*	*92*
Credentials			
Type of credential: Occupational certificate or technical diploma	*-0.11*	*[-0.27, 0.06]*	*91*
Type of credential: College (associate or bachelor's) degree	*-0.18*	*[-0.33, -0.03]*	*99*
Type of credential: State or local licensure	-0.02	[-0.20, 0.16]	61
Type of credential: Certification developed by an employer or industry association	0.02	[-0.14, 0.18]	57
Training Length			
Length of training: More than 6 months to 1 year	-0.07	[-0.25, 0.10]	79
Length of training: More than 1 year	-0.06	[-0.36, 0.24]	66
Length of training: Varies	-0.01	[-0.23, 0.22]	52
Length of training: 6 months or less (reference category)	N/A		
Training Industry or Occupation			
Industry trained for: Healthcare	-0.09	[-0.28, 0.10]	83
Industry trained for: Manufacturing or construction	0.03	[-0.19, 0.26]	59
Industry trained for: Information technology	-0.05	[-0.27, 0.17]	66
Industry trained for: Education	-0.10	[-0.40, 0.22]	74
Employer Engagement and Roles			
Extent of employer engagement (count of 0-6 activities)	-0.02	[-0.09, 0.05]	76
Highly engaged employers	-0.05	[-0.23, 0.13]	71
Presence of job development staff	0.06	[-0.09, 0.22]	80
Employer Engagement and Roles			
Engaged employer: Convenes an employer advisory council	*-0.12*	*[-0.28, 0.03]*	*95*
Engaged employer: Curricula adapted for employers' needs	0.04	[-0.12, 0.21]	71
Engaged employer: Has formal partnership with employers	-0.03	[-0.18, 0.14]	65
Engaged employer: Offer incumbent worker training	*0.16*	*[-0.01, 0.33]*	*97*
Employer Engagement and Roles			
Employer role: Offer work-based learning (paid and unpaid)	-0.03	[-0.19, 0.15]	63
Employer role: Provide resources (including financial aid, mentors, resources)	-0.14	[-0.39, 0.11]	88
Employer role: Provide input on preferred type of applicants	0.04	[-0.15, 0.24]	66
Employer role: Commit to hire graduates	0.08	[-0.15, 0.31]	75
Employer Engagement and Roles			
Employer role: Provide input on curriculum or program development	*0.11*	*[-0.06, 0.29]*	*90*
Employer role: Provide information on labor market demand, including specific job	0.06	[-0.09, 0.22]	80

Outcome: Labor Market (employment & earnings)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Employer role: Deliver instruction or provide instructors	-0.04	[-0.23, 0.16]	66
Employer role: Deliver career awareness services	*-0.17*	*[-0.34, -0.01]*	*98*
One-on-One Support			
One on one: Case management or counseling	-0.08	[-0.25, 0.08]	83
One on one: Career or college navigation	-0.13	[-0.48, 0.22]	78
One on one: Academic advising	*-0.12*	*[-0.26, 0.03]*	*95*
One-on-one staff assistance mandatory/required	-0.01	[-0.19, 0.19]	53
Services			
Support offered: Tuition, training cost, other financial assistance	*-0.35*	*[-0.54, -0.16]*	*100*
Support offered: Emergency assistance	-0.01	[-0.17, 0.16]	53
Support offered: Food assistance	0.16	[-0.12, 0.45]	87
Support offered: Internet	0.08	[-0.21, 0.38]	72
Support offered: Tutoring	-0.01	[-0.13, 0.12]	57
Services			
Support offered: Child/dependent care assistance	-0.04	[-0.25, 0.17]	66
Support offered: Transportation assistance	0.02	[-0.17, 0.21]	57
Support offered: Connection with benefits and social services	0.09	[-0.25, 0.43]	70
Support offered: Job search and placement	-0.14	[-0.47, 0.19]	81
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	*-0.38*	*[-0.60, -0.16]*	*100*
One on one: Case management or counseling	-0.08	[-0.34, 0.15]	74
Interaction effect: (Support offered: Tuition, training cost, other financial assistance)*(One on one: Case management or counseling)	0.11	[-0.17, 0.40]	78
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	-0.03	[-0.54, 0.48]	55
One on one: Career or college navigation	0.20	[-0.22, 0.63]	83
Interaction effect: (Support offered: Tuition, training cost, other financial assistance)*(One on one: Career or college navigation)	-0.31	[-0.85, 0.22]	88
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	*-0.34*	*[-0.53, -0.16]*	*100*
Support offered: Job search and placement	0.06	[-0.16, 0.30]	71
Participant Composition			
Percentage of participants: Male	-0.01	[-0.30, 0.29]	53
Education level: Percentage with degree	0.24	[-0.89, 1.38]	67
Education level: Percentage with HS diploma or GED	0.16	[-0.24, 0.55]	79
Education level: Percentage with some college	0.13	[-0.74, 1.01]	62
Education level: percent with <HS/GED (reference category)			
Participant Composition and Local Context			
Percentage of participants: Black	0.15	[-0.11, 0.42]	87

Outcome: Labor Market (employment & earnings)	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Percentage of participants: Hispanic/Latino	0.01	[-0.25, 0.29]	53
Average unemployment rate	-0.23	[-2.25, 1.81]	59

Notes: All moderator block analyses control for design type (experimental or not). Moderator blocks for participant composition, local context, pathways and training, and training length used dummy variable adjustment for missing data (see Puma et al., 2009 for details). *Italicized* rows indicate characteristics that met our criterion for selection for the meta-regression.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

When it came to selecting the characteristics that appeared useful in explaining the labor market outcomes, the block analysis clearly led to a limited number of characteristics that we chose to advance to the final meta-regression. The following characteristics had a combination of large-in-magnitude coefficients and high-probability of effect, which together warranted their inclusion in the final labor market meta-regression:

- Flexible Instruction Type: Flexible sequencing (coeff.=-0.21; prob.=97)
- Participant Composition: Percent Black (coeff.=0.15; prob.=87) [plus a binary indicator for missing race]

Several variables were selected based on their coefficients and probabilities in multiple blocks:

- Administrative Arrangements: Lead or partner is community college
- Services: Tuition, training cost, other financial assistance

We selected "Training Length: 6 months or less," which was included as a reference category and was selected based on the results for the other covariates in its block.

We also selected unemployment rate for theoretical reasons: an analysis of labor market analysis would be incomplete—or at least charged with missing variable bias—were it not include an indicator of the local labor market. Although the block analysis shows that the unemployment rate has just a 59 percent probability of having any effect, the large magnitudes of the values spanning the credible interval (from 2.25 to 1.81) imply that the unemployment rate might be an important characteristics for which to control.

As with the educational progress meta-regression, we also included a binary indicator of design type because experimental evaluations tend to have smaller impacts and smaller sample sizes, and some factors might be correlated with design type.

E.2.3 FINAL EDUCATIONAL PROGRESS AND LABOR MARKET META-REGRESSION RESULTS

The prior sections have described the intermediate results from our block analyses and led to a selected set of potential effectiveness factors being analyzed together in one of two meta-regressions, one for educational progress and one for labor market outcomes. Exhibit E-6 shows the complete results, described in Chapter 3.

Exhibit E-6. Final Meta-Regressions, Educational Progress and Labor Market Domains

Outcomes: Educational Progress and Labor Market	Contribution to Impact (Coefficient)	[95% Credible Interval]	Probability of Any Contribution (%)
Educational Progress			
Percentage of participants: Male	0.10	[-0.31, 0.54]	69
Employer role: Provide input on curriculum or program development	*0.27*	*[-0.01, 0.56]*	*97*
Partner agency type: Staffing agency or company	*0.35*	*[-0.07, 0.75]*	*95*
Administrative arrangement: Lead or partner is community college	*-0.40*	*[-0.72, -0.06]*	*99*
Partner agency type: Government agency (other than Workforce board/one-stop/American Job Center)	-0.10	[-0.31, 0.12]	83
Design: Experimental evaluation	0.11	[-0.14, 0.37]	82
Intercept	0.58	[0.00, 1.12]	98
Earnings and Employment			
Administrative arrangement: Lead or partner is community college	-0.04	[-0.20, 0.11]	72
Length of training: 6 months or less	0.01	[-0.11, 0.14]	56
Flexible instruction type: Flexible sequencing	*-0.20*	*[-0.38, -0.04]*	*99*
Support offered: Tuition, training cost, other financial assistance	*-0.24*	*[-0.42, -0.06]*	*99*
Percentage of participants: Black	*0.17*	*[-0.10, 0.44]*	*90*
Percentage of participants: Black - no information	-0.01	[-0.35, 0.32]	53
Average unemployment rate	0.26	[-1.87, 2.39]	60
Design: Experimental evaluation	-0.01	[-0.16, 0.14]	57
Intercept	0.26	[-0.04, 0.56]	96

Source: Authors' computations from D&A CP Project meta-analysis dataset.

E.3 Bivariate Correlations between Potential Effectiveness Factors

Even with 46 eligible evaluations, our sample sizes were limited for estimating multivariable meta-regression models. Therefore, all block meta-regression analyses were estimated independently; i.e., controlling only for other potential effectiveness factors in the same block. As described in the text (and Exhibit 3-3), the process for selecting characteristics for the final meta-regression considered correlations between potential effectiveness factors. However, the number of characteristics that could be selected was limited and each meta-regression reported in the main text controlled only for other characteristics in that regression. In addition to being standard practice for meta-analyses, we believe that some readers might find the correlations between characteristics—presented in Exhibits E-7 through E-10—useful in their interpretation of the findings from the block analyses and meta-regressions. Correlations are important for interpretation because if two variables are highly correlated it is difficult to separate the effects of each.

Exhibit E-7. Bivariate Correlations between All Program Characteristics, Rows 1–19

		Lead Agency: Workforce Agency	Lead Agency: Community Org	Lead Agency: Govt Agency	Lead Agency: Community College	Community College Partners	Workforce Agency Partners	Community Org Partners	Government Agency Partners	School/School District Partners	University Partners	Labor Union Partners	Other Agency Partners	Trade Association Partners	Private School Partners	Staffing Agency Partners	Faith Based Organization Partners	Workforce Agency Admin	Community College Admin	Community Organization Admin
1	Lead Agency: Workforce Agency	1.00																		
2	Lead Agency: Community Org	-0.32	1.00																	
3	Lead Agency: Govt Agency	-0.11	-0.22	1.00																
4	Lead Agency: Community College	-0.33	-0.65	-0.23	1.00															
5	Community College Partners	0.30	0.00	0.20	-0.32	1.00														
6	Workforce Agency Partners	-0.14	-0.40	0.28	0.35	-0.03	1.00													
7	Community Org Partners	0.39	-0.23	0.27	-0.19	0.32	0.46	1.00												
8	Government Agency Partners	0.21	-0.35	0.32	0.03	0.30	0.30	0.65	1.00											
9	School/School District Partners	0.43	-0.43	0.32	-0.05	0.14	0.09	0.28	0.36	1.00										
10	University Partners	-0.15	-0.02	-0.01	0.13	0.27	0.37	0.36	0.41	0.06	1.00									
11	Labor Union Partners	0.22	-0.04	0.39	-0.32	0.01	0.07	0.38	0.39	0.41	-0.15	1.00								
12	Other Agency Partners	-0.10	0.31	-0.07	-0.20	-0.11	-0.25	0.02	-0.21	-0.14	-0.08	0.03	1.00							
13	Trade Association Partners	0.11	0.14	-0.06	-0.19	-0.16	0.23	0.22	0.13	-0.12	-0.09	0.38	-0.06	1.00						
14	Private School Partners	0.69	-0.13	-0.10	-0.31	0.11	-0.37	0.20	0.27	0.50	-0.14	0.26	-0.09	-0.09	1.00					
15	Staffing Agency Partners	-0.09	-0.10	0.29	0.01	-0.12	0.15	0.22	-0.01	-0.13	-0.09	-0.09	-0.06	-0.05	-0.09	1.00				
16	Faith-Based Organization Partners	-0.13	-0.25	-0.09	0.39	0.23	0.32	0.31	0.37	0.04	0.59	-0.12	-0.08	-0.07	-0.12	-0.07	1.00			
17	Workforce Agency Admin	0.33	-0.56	0.23	0.20	0.11	0.83	0.65	0.53	0.45	0.30	0.26	-0.30	0.19	0.14	0.11	0.26	1.00		
18	Community College Admin	0.16	-0.50	0.11	0.33	0.54	0.19	-0.08	0.13	0.21	0.15	-0.24	-0.30	-0.37	-0.09	-0.02	0.13	0.27	1.00	
19	Community Organization Admin	0.23	0.45	0.16	-0.68	0.53	-0.03	0.58	0.28	0.02	0.21	0.22	0.14	0.13	0.21	0.13	0.18	0.08	-0.22	1.00
20	Eligibility: HS Graduate or GED	-0.04	0.02	-0.07	0.05	0.27	0.06	0.30	0.30	-0.07	0.39	-0.33	-0.02	-0.19	0.01	0.07	0.38	0.11	0.11	0.27
21	Eligibility: Basic Skills	-0.38	0.14	0.09	0.08	0.13	-0.19	-0.13	0.07	0.00	0.13	-0.32	0.14	-0.41	-0.11	0.13	0.18	-0.30	0.01	0.10
22	Eligibility: Income Requirement	0.45	0.29	-0.25	-0.48	0.20	-0.08	0.27	0.10	-0.03	-0.07	0.12	-0.01	0.26	0.41	-0.01	-0.29	0.14	-0.15	0.51
23	Eligibility: Background Check/Drug Screen	-0.04	-0.04	0.37	-0.12	0.20	0.03	0.23	0.24	0.19	0.19	0.31	0.33	-0.17	0.17	0.02	0.42	0.07	-0.06	0.32
24	Basic Skills Offered (Y/N)	-0.26	-0.30	0.05	0.45	0.13	0.21	-0.01	0.23	0.17	0.29	0.10	0.00	-0.29	-0.20	-0.09	0.25	0.15	0.40	-0.22
25	Basic Skills Instr.: ABE/ASE/ESL	-0.34	-0.41	0.17	0.56	0.03	0.22	0.04	0.22	-0.09	0.15	-0.01	-0.12	-0.19	-0.31	0.01	0.38	0.06	0.23	-0.21
26	Basic Skills Instr.: Remedial	-0.28	0.00	0.17	0.11	-0.15	0.16	-0.31	-0.01	0.13	0.05	0.00	-0.17	-0.16	-0.26	-0.16	-0.22	0.03	0.27	-0.35
27	Basic Skills Requirements	-0.22	-0.25	0.25	0.27	-0.07	0.16	-0.10	0.21	0.39	0.16	0.09	-0.14	-0.12	-0.20	-0.13	0.24	0.06	0.21	-0.22
28	Flexible Instruction: Online	-0.15	-0.30	0.14	0.33	-0.35	0.11	-0.23	0.07	-0.17	-0.10	-0.15	-0.08	-0.09	-0.14	0.19	-0.12	0.04	0.15	-0.48
29	Flexible Instruction: Hybrid	-0.17	-0.33	-0.12	0.51	-0.01	0.42	0.10	0.16	0.31	0.44	-0.16	-0.11	-0.10	-0.16	-0.10	0.75	0.35	0.17	-0.12
30	Flexible Instruction: Sequencing	-0.13	-0.09	-0.09	0.22	-0.10	0.00	0.15	0.03	-0.14	-0.08	-0.12	0.26	-0.07	-0.12	-0.07	-0.10	-0.06	-0.10	-0.01
31	Flexible Instruction: Time/Location	0.01	-0.19	-0.01	0.19	-0.16	-0.05	-0.11	0.09	-0.11	-0.22	0.03	0.29	-0.15	0.05	0.05	-0.21	0.02	0.12	-0.24

		Lead Agency: Workforce Agency	Lead Agency: Community Org	Lead Agency: Govt Agency	Lead Agency: Community College	Community College Partners	Workforce Agency Partners	Community Org Partners	Government Agency Partners	School/School District Partners	University Partners	Labor Union Partners	Other Agency Partners	Trade Association Partners	Private School Partners	Staffing Agency Partners	Faith-Based Organization Partners	Workforce Agency Admin	Community College Admin	Community Organization Admin
32	Pathway: Multiple Steps of Training	-0.23	-0.34	0.08	0.45	-0.01	0.36	0.02	0.19	-0.03	0.15	0.14	-0.23	-0.04	-0.35	0.04	0.18	0.23	0.33	-0.31
33	Pathway: Target Occupation Level	-0.04	0.37	-0.16	-0.25	0.24	0.21	0.17	0.05	-0.31	0.10	0.01	-0.14	0.23	-0.22	-0.14	-0.19	0.10	0.00	0.30
34	Credential Type: Occupational	0.08	-0.47	0.05	0.38	-0.11	0.27	0.20	0.36	0.21	0.12	0.18	-0.16	0.11	0.18	0.01	0.15	0.36	0.13	-0.26
35	Credential Type: College-issued	0.37	-0.23	-0.14	0.04	0.29	-0.03	0.12	0.17	0.15	0.08	-0.01	-0.17	-0.17	0.34	-0.17	-0.23	0.23	0.29	-0.09
36	Credential Type: State/Local	0.17	-0.08	0.08	-0.08	0.04	-0.17	-0.25	-0.07	0.40	-0.35	0.15	-0.01	-0.21	0.40	-0.21	-0.30	0.03	0.21	-0.07
37	Credential Type: Employer-issued	-0.11	0.01	0.51	-0.20	-0.09	0.20	0.11	-0.02	0.02	-0.12	0.22	-0.14	0.07	-0.20	0.43	-0.17	0.10	-0.15	0.18
38	Training Length > 6 Months	-0.23	-0.18	0.23	0.22	0.17	0.30	0.05	0.16	0.35	0.26	0.07	-0.14	-0.13	-0.21	-0.13	0.56	0.20	0.23	0.05
39	Training Length > 1 Year	-0.12	0.37	-0.08	-0.24	0.22	0.03	0.02	0.08	-0.16	0.38	-0.12	-0.07	-0.07	-0.11	-0.07	-0.09	-0.03	0.12	0.17
40	Training Length: Varies	-0.13	0.22	-0.09	-0.07	0.06	-0.14	-0.18	-0.28	-0.16	-0.10	-0.13	-0.08	-0.08	-0.12	0.26	-0.11	-0.21	0.13	0.15
41	Training Length: No Info Provided	0.19	0.14	-0.08	-0.23	-0.04	0.30	0.29	-0.01	-0.15	-0.10	0.25	-0.06	0.75	-0.11	-0.07	-0.10	0.24	-0.24	0.17
42	Training Length < 6 Months	0.24	-0.26	-0.05	0.12	-0.28	-0.36	-0.11	0.00	-0.04	-0.32	-0.06	0.25	-0.22	0.38	0.04	-0.31	-0.17	-0.20	-0.32
43	Focus Industry: Healthcare	0.06	-0.31	-0.07	0.30	0.18	0.01	0.09	0.26	0.28	0.17	0.02	0.16	-0.36	0.06	-0.37	0.20	0.13	0.36	-0.24
44	Focus Industry: Manufacturing/Construction	0.01	-0.22	0.55	-0.07	0.19	0.50	0.48	0.43	0.03	0.19	0.37	-0.13	0.45	-0.19	0.11	0.42	0.41	-0.05	0.28
45	Focus Industry: IT	-0.21	0.28	0.27	-0.27	0.09	0.06	0.08	0.01	0.01	0.16	0.11	-0.13	-0.12	-0.19	0.23	-0.16	-0.04	-0.05	0.29
46	Focus Industry: Education	-0.13	0.05	-0.09	0.10	0.24	0.32	0.31	0.38	-0.18	0.59	-0.13	-0.08	-0.08	-0.12	-0.08	0.48	0.26	0.13	0.18
47	Intervention Engages Employers	-0.32	0.06	0.09	0.12	0.12	0.07	0.10	0.09	-0.23	0.25	-0.19	0.03	-0.06	-0.40	0.14	0.49	-0.15	0.03	0.24
48	Level of Engagement: High	0.03	-0.33	0.20	0.20	-0.05	0.08	0.10	0.07	-0.09	-0.01	0.01	-0.05	0.17	-0.18	0.17	0.23	0.03	0.08	-0.16
49	Intervention Includes Job Developer	0.31	0.12	-0.12	-0.28	-0.04	-0.35	-0.04	-0.24	-0.08	-0.36	-0.07	0.24	-0.23	0.37	0.23	-0.32	-0.17	-0.14	0.24
50	Employer Engaged: On Council	-0.25	0.14	-0.17	0.13	0.03	-0.19	-0.15	0.07	-0.19	0.25	-0.18	0.19	-0.14	-0.23	-0.15	0.51	-0.32	-0.04	0.11
51	Employer Engaged: Curricula Input	-0.38	0.41	-0.10	-0.08	-0.11	-0.02	-0.05	-0.01	-0.45	0.32	-0.18	0.03	0.06	-0.27	0.20	0.27	-0.24	-0.21	0.22
52	Employer Engaged: Formal Partner	-0.11	-0.08	0.30	0.00	0.24	0.34	0.38	0.18	-0.11	0.13	0.10	-0.05	0.25	-0.34	0.17	0.35	0.17	0.03	0.40
53	Employer Engaged: Offers Training	0.09	0.16	-0.11	-0.17	0.03	-0.09	-0.02	-0.35	-0.20	-0.13	-0.07	0.03	-0.09	-0.15	-0.09	-0.13	-0.17	0.01	0.05
54	Employer Offers Work-based Learning	0.00	-0.26	0.24	0.13	0.11	-0.01	0.03	0.20	0.01	0.05	0.01	-0.10	0.20	-0.11	-0.08	0.27	-0.02	0.12	-0.14
55	Employer Provides Resources	-0.10	-0.18	0.34	0.07	0.36	0.29	0.26	0.26	0.19	0.38	0.11	-0.13	-0.12	-0.19	-0.12	0.61	0.20	0.21	0.27
56	Employer Provide Applicant Advice	-0.20	0.18	0.07	-0.07	-0.06	-0.18	-0.04	-0.10	-0.26	-0.18	-0.19	0.39	-0.11	-0.18	0.22	-0.15	-0.27	-0.23	0.14
57	Employer Commits to Hire Grads	-0.09	-0.09	-0.14	0.22	0.16	0.20	0.21	0.05	-0.10	0.36	-0.11	-0.01	-0.11	-0.18	0.14	0.65	0.11	0.12	0.25
58	Employer Gives Input on Curriculum	-0.48	0.37	0.20	-0.13	0.03	-0.21	-0.16	-0.17	-0.36	-0.02	0.00	0.18	0.01	-0.36	0.16	0.23	-0.48	-0.28	0.21
59	Employer Explains Labor Market	0.09	0.24	-0.04	-0.28	0.12	-0.22	-0.22	-0.31	-0.21	-0.30	-0.30	0.26	-0.07	-0.03	-0.03	-0.30	-0.20	0.02	0.17
60	Employer Provides Instruction	-0.22	-0.13	-0.15	0.36	0.19	0.10	0.07	0.07	-0.16	0.28	-0.09	-0.14	0.06	-0.20	0.11	0.58	0.00	0.10	0.02
61	Employer Explains Industry Career	0.13	-0.30	0.41	-0.01	0.34	0.22	0.34	0.35	0.31	0.26	0.01	-0.16	-0.16	0.08	0.13	0.47	0.31	0.21	0.25
62	One-On-One Counseling	0.15	0.14	0.10	-0.29	0.38	0.01	0.17	0.11	-0.01	0.15	0.01	-0.06	-0.38	0.22	0.14	0.19	0.13	0.14	0.53
63	One-On-One Career Navigation	0.08	0.03	0.05	-0.11	0.26	-0.05	0.08	0.16	0.10	0.07	-0.10	-0.20	0.04	0.07	0.04	0.06	-0.02	0.09	0.20

		Lead Agency: Workforce Agency	Lead Agency: Community Org	Lead Agency: Govt Agency	Lead Agency: Community College	Community College Partners	Workforce Agency Partners	Community Org Partners	Government Agency Partners	School/School District Partners	University Partners	Labor Union Partners	Other Agency Partners	Trade Association Partners	Private School Partners	Staffing Agency Partners	Faith-Based Organization Partners	Workforce Agency Admin	Community College Admin	Community Organization Admin
64	One-On-One Academic Advising	-0.43	-0.04	-0.29	0.50	-0.10	0.01	-0.43	-0.17	-0.18	0.30	-0.41	-0.08	-0.24	-0.39	-0.24	0.30	-0.19	0.29	-0.51
65	One-On-One Assistance Mandatory	0.25	0.31	-0.21	-0.37	0.12	-0.33	0.16	0.09	0.05	-0.01	-0.03	0.00	-0.18	0.48	0.11	-0.25	-0.09	-0.19	0.44
66	Support: Financial Assistance	-0.22	-0.21	0.11	0.31	0.14	-0.19	-0.23	0.14	0.20	0.12	-0.23	-0.03	-0.58	-0.08	0.09	0.13	-0.11	0.45	-0.22
67	Support: Emergency Assistance	-0.08	-0.17	0.11	0.17	0.30	0.36	0.30	0.38	0.34	0.38	0.20	0.01	-0.19	-0.03	0.01	0.38	0.39	0.33	0.23
68	Support: Food Assistance	-0.07	-0.04	0.43	-0.14	0.03	0.08	0.16	0.10	-0.09	-0.06	-0.07	-0.04	-0.04	-0.06	0.52	-0.05	0.04	-0.07	0.10
69	Support: Offers Internet	-0.13	-0.25	-0.09	0.39	0.23	0.32	0.31	0.37	0.04	0.59	-0.12	-0.08	-0.07	-0.12	-0.07	1.00	0.26	0.13	0.18
70	Support: Offers Tutoring	-0.45	-0.25	0.03	0.55	-0.16	0.18	-0.16	0.09	-0.01	0.01	0.03	-0.09	0.06	-0.41	-0.26	0.29	-0.03	0.06	-0.39
71	Support: Childcare Assistance	0.28	-0.16	-0.04	-0.02	0.31	0.02	0.42	0.44	0.21	0.44	-0.01	-0.18	-0.17	0.34	0.24	0.44	0.29	0.24	0.30
72	Support: Transport Assistance	0.10	0.04	0.19	-0.20	0.20	-0.16	0.30	0.49	0.06	0.11	0.09	0.13	-0.25	0.33	0.13	0.11	0.01	-0.04	0.42
73	Support: Connects to Benefits	-0.09	-0.11	-0.06	0.21	-0.31	-0.23	-0.17	0.20	-0.13	-0.09	-0.09	-0.06	-0.05	-0.09	-0.05	-0.07	-0.28	-0.01	-0.33
74	Support: Job Search Assistance	-0.13	-0.25	-0.09	0.39	0.23	0.32	0.31	0.37	0.04	0.59	-0.12	-0.08	-0.07	-0.12	-0.07	1.00	0.26	0.13	0.18
75	Participants: % Male	-0.24	0.19	0.28	-0.16	-0.19	0.07	-0.01	-0.03	-0.21	-0.02	0.18	-0.04	0.31	-0.13	0.29	0.02	-0.10	-0.42	0.17
76	Participants: % White	-0.10	-0.66	0.07	0.68	-0.19	0.38	0.03	0.08	0.11	0.00	-0.12	-0.14	-0.03	-0.18	0.22	0.30	0.33	0.26	-0.47
77	Unemployment Rate	0.06	0.06	0.24	-0.23	0.15	0.35	0.29	0.16	-0.08	0.27	0.07	-0.12	0.10	-0.03	0.09	-0.07	0.33	0.04	0.20

| No correlation (<.40) |
| Low correlation (.40-.59) |
| Moderate correlation (.60-.79) |
| **High correlation (>.80)** |

+ indicates a positive correlation; - indicates a negative correlation

Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit E-8. Bivariate Correlations between All Program Characteristics, Rows 20–39

		Eligibility: HS Graduate or GED	Eligibility: Basic Skills	Eligibility: Income Requirement	Eligibility: Background Check/Drug Screen	Basic Skills Offered (Y/N)	Basic Skills Instr.: ABE/ASE/ESL	Basic Skills Instr.: Remedial	Basic Skills Requirements	Flexible Instruction: Online	Flexible Instruction: Hybrid	Flexible Instruction: Sequencing	Flexible Instruction: Time/Location	Pathway: Multiple Steps of Training	Pathway: Target Occupation Level	Credential Type: Occupational	Credential Type: College-issued	Credential Type: State/Local	Credential Type: Employer-issued	Training Length > 6 Months	Training Length > 1 Year
20	Eligibility: HS Graduate or GED	1.00																			
21	Eligibility: Basic Skills	0.35	1.00																		
22	Eligibility: Income Requirement	-0.20	-0.16	1.00																	
23	Eligibility: Background Check/Drug Screen	0.22	0.17	-0.27	1.00																
24	Basic Skills Offered (Y/N)	-0.14	0.19	-0.23	0.01	1.00															
25	Basic Skills Instr.: ABE/ASE/ESL	-0.13	0.18	-0.32	0.02	0.66	1.00														
26	Basic Skills Instr.: Remedial	-0.22	0.10	-0.24	-0.31	0.54	0.23	1.00													
27	Basic Skills Requirements	-0.04	0.30	-0.48	0.07	0.42	0.22	0.53	1.00												
28	Flexible Instruction: Online	-0.17	-0.19	-0.34	-0.15	0.16	0.28	0.40	0.11	1.00											
29	Flexible Instruction: Hybrid	0.18	0.19	-0.38	0.22	0.33	0.19	0.06	0.44	-0.08	1.00										
30	Flexible Instruction: Sequencing	0.36	-0.03	0.01	-0.07	-0.08	0.03	-0.19	-0.17	-0.08	-0.10	1.00									
31	Flexible Instruction: Time/Location	-0.07	-0.14	0.01	0.11	0.11	0.06	0.01	-0.13	0.56	-0.24	0.31	1.00								
32	Pathway: Multiple Steps of Training	0.14	-0.02	-0.39	0.07	0.45	0.34	0.38	0.30	0.21	0.23	0.17	0.10	1.00							
33	Pathway: Target Occupation Level	0.07	-0.14	0.45	-0.44	0.06	-0.08	0.24	-0.12	-0.17	-0.21	0.16	-0.15	0.23	1.00						
34	Credential Type: Occupational	0.12	0.05	-0.15	0.18	0.19	0.32	0.12	0.03	0.18	0.20	0.15	0.02	0.54	-0.13	1.00					
35	Credential Type: College-issued	0.13	-0.20	0.17	-0.32	0.28	0.03	0.12	-0.21	0.11	-0.26	0.10	0.17	0.11	0.27	0.02	1.00				
36	Credential Type: State/Local	-0.17	-0.04	0.21	-0.12	0.21	-0.04	0.34	0.12	-0.02	-0.09	0.16	0.22	-0.10	0.03	-0.02	0.27	1.00			
37	Credential Type: Employer-issued	-0.01	0.06	-0.09	0.07	-0.12	-0.09	0.07	0.18	-0.03	-0.21	-0.14	-0.12	0.06	0.07	-0.33	-0.08	-0.12	1.00		
38	Training Length > 6 Months	0.17	0.26	-0.51	0.46	0.17	0.17	0.09	0.51	-0.21	0.68	-0.18	-0.37	0.25	-0.33	0.20	-0.42	-0.09	-0.05	1.00	
39	Training Length > 1 Year	0.35	0.17	0.06	-0.22	0.23	-0.25	0.43	0.16	-0.11	-0.13	-0.09	-0.19	0.16	0.51	-0.21	0.41	-0.01	0.16	-0.17	1.00
40	Training Length: Varies	-0.26	0.13	0.32	-0.25	0.08	0.20	0.13	-0.18	-0.06	-0.08	-0.07	0.02	-0.02	0.18	-0.07	-0.19	0.19	0.02	-0.19	-0.10
41	Training Length: No Info Provided	-0.26	-0.52	0.32	-0.23	-0.38	-0.26	-0.20	-0.16	-0.08	-0.11	-0.08	-0.19	-0.11	0.40	-0.02	-0.20	-0.28	-0.02	-0.17	-0.09
42	Training Length < 6 Months	-0.04	-0.10	0.04	0.00	-0.11	0.02	-0.28	-0.32	0.32	-0.41	0.29	0.52	-0.23	-0.32	-0.01	0.36	0.13	-0.05	-0.56	-0.29
43	Focus Industry: Healthcare	0.09	0.10	-0.16	-0.08	0.65	0.40	0.41	0.34	0.07	0.24	0.18	0.07	0.28	0.10	0.24	0.33	0.36	-0.41	0.07	0.19
44	Focus Industry: Manufacturing/Construction	0.01	-0.14	-0.13	0.33	-0.04	0.17	-0.12	0.13	-0.04	0.25	-0.16	-0.22	0.14	-0.01	0.09	-0.24	-0.25	0.34	0.35	-0.15

		Eligibility: HS Graduate or GED	Eligibility: Basic Skills	Eligibility: Income Requirement	Eligibility: Background Check/Drug Screen	Basic Skills Offered (Y/N)	Basic Skills Instr.: ABE/ASE/ESL	Basic Skills Instr.: Remedial	Basic Skills Requirements	Flexible Instruction: Online	Flexible Instruction: Hybrid	Flexible Instruction: Sequencing	Flexible Instruction: Time/Location	Pathway: Multiple Steps of Training	Pathway: Target Occupation Level	Credential Type: Occupational	Credential Type: College-issued	Credential Type: State/Local	Credential Type: Employer-issued	Training Length > 6 Months	Training Length > 1 Year
45	Focus Industry: IT	0.08	0.21	-0.01	0.09	-0.07	-0.09	0.15	-0.01	-0.16	-0.18	-0.14	-0.32	0.02	-0.04	-0.05	-0.12	-0.26	0.35	0.30	0.25
46	Focus Industry: Education	0.36	0.18	0.00	0.12	0.25	0.08	0.11	0.05	-0.12	0.33	-0.10	-0.22	0.17	0.15	0.15	0.07	-0.31	-0.15	0.22	0.45
47	Intervention Engages Employers	0.37	0.26	-0.32	0.38	-0.15	0.20	-0.30	0.08	-0.04	0.33	0.08	-0.19	0.13	-0.11	0.05	-0.56	-0.52	0.03	0.47	-0.24
48	Level of Engagement: High	0.06	-0.11	-0.41	0.13	-0.16	0.40	-0.09	-0.05	0.27	0.01	-0.08	-0.15	0.24	-0.25	0.41	-0.20	-0.38	0.08	0.17	-0.41
49	Intervention Includes Job Developer	-0.03	-0.13	0.44	-0.15	-0.16	-0.18	-0.13	-0.37	0.07	-0.41	0.30	0.34	-0.26	0.10	-0.23	0.27	0.52	0.08	-0.58	-0.03
50	Employer Engaged: On Council	-0.07	0.31	-0.02	0.12	0.25	0.38	0.01	0.15	0.11	0.35	-0.17	0.08	-0.16	-0.11	-0.19	-0.42	-0.14	-0.18	0.12	-0.19
51	Employer Engaged: Curricula Input	0.26	0.10	-0.08	0.18	-0.24	-0.21	-0.23	0.00	0.02	0.08	-0.18	-0.12	-0.16	0.04	-0.32	-0.43	-0.51	0.17	0.04	0.26
52	Employer Engaged: Formal Partner	0.22	-0.08	-0.07	0.27	-0.11	0.25	-0.23	-0.05	-0.17	0.17	0.33	-0.21	0.35	0.18	0.26	-0.37	-0.24	0.12	0.37	-0.27
53	Employer Engaged: Offers Training	0.12	-0.29	-0.09	0.03	-0.37	-0.21	-0.24	-0.22	-0.09	-0.12	0.13	-0.22	-0.02	0.10	-0.11	-0.16	-0.23	-0.09	0.08	-0.12
54	Employer Offers Work-based Learning	0.07	-0.12	-0.39	0.10	-0.08	0.38	0.02	0.03	0.32	0.08	-0.03	-0.14	0.23	-0.21	0.37	-0.08	-0.21	-0.11	0.24	-0.34
55	Employer Provides Resources	0.26	0.12	-0.39	0.57	0.10	0.29	-0.09	0.26	-0.13	0.47	-0.14	-0.31	0.24	-0.19	0.20	-0.29	-0.25	0.04	0.73	-0.15
56	Employer Provide Applicant Advice	0.18	0.14	0.17	-0.01	-0.27	-0.20	-0.34	-0.26	-0.03	-0.21	0.61	0.43	-0.25	-0.05	-0.34	-0.13	0.13	0.07	-0.28	-0.14
57	Employer Commits to Hire Grads	0.31	0.14	-0.25	0.41	0.06	0.25	-0.30	0.04	-0.13	0.49	-0.13	-0.28	0.21	-0.17	0.23	-0.32	-0.43	-0.11	0.53	-0.14
58	Employer Gives Input on Curriculum	-0.08	0.33	-0.26	0.34	-0.10	0.21	-0.17	0.12	-0.06	0.00	-0.25	-0.16	-0.05	-0.07	-0.25	-0.58	-0.44	0.30	0.15	-0.13
59	Employer Explains Labor Market	0.19	0.09	0.15	-0.06	-0.28	-0.15	-0.06	-0.33	0.12	-0.36	0.15	0.31	-0.25	0.11	-0.19	0.13	0.25	0.04	-0.32	-0.01
60	Employer Provides Instruction	0.20	0.19	-0.31	0.28	0.12	0.35	-0.34	0.00	-0.18	0.40	-0.17	-0.34	0.30	-0.21	0.26	-0.14	-0.49	-0.06	0.46	-0.16
61	Employer Explains Industry Career	0.49	0.23	-0.32	0.52	-0.20	0.07	-0.23	0.11	-0.06	0.32	-0.18	-0.21	0.03	-0.29	0.23	-0.19	-0.21	0.17	0.52	-0.20
62	One-On-One Counseling	0.29	0.19	0.24	0.30	0.05	0.04	-0.06	-0.20	-0.09	-0.08	-0.18	0.06	-0.11	0.08	-0.14	0.16	0.23	0.16	0.06	0.18
63	One-On-One Career Navigation	-0.09	-0.09	0.17	-0.23	0.11	0.03	0.13	0.10	0.07	0.08	0.06	-0.14	0.05	0.10	-0.08	0.13	0.18	-0.19	0.11	0.06
64	One-On-One Academic Advising	0.28	0.24	-0.59	-0.02	0.36	0.25	0.45	0.31	0.20	0.38	0.00	-0.08	0.58	-0.04	0.31	0.00	-0.16	-0.26	0.29	0.28
65	One-On-One Assistance Mandatory	0.24	0.22	0.54	0.01	-0.16	-0.20	-0.14	-0.42	-0.29	-0.33	0.22	-0.02	-0.12	0.16	0.18	0.22	0.14	-0.14	-0.22	0.11
66	Support: Financial Assistance	0.32	0.46	-0.37	0.08	0.43	0.27	0.26	0.22	0.12	0.14	0.10	0.24	0.25	-0.32	0.06	0.18	0.22	-0.03	0.23	0.12
67	Support: Emergency Assistance	0.22	0.26	-0.02	0.44	0.46	0.12	0.03	0.25	-0.31	0.46	0.04	-0.05	0.33	-0.09	0.26	-0.05	0.07	-0.13	0.62	0.08
68	Support: Food Assistance	0.20	0.10	-0.15	0.13	-0.12	-0.05	-0.12	-0.09	0.31	-0.07	-0.05	0.16	-0.02	-0.10	-0.04	-0.12	-0.16	0.20	-0.10	-0.05
69	Support: Offers Internet	0.38	0.18	-0.29	0.42	0.25	0.38	-0.22	0.24	-0.12	0.75	-0.10	-0.21	0.18	-0.19	0.15	-0.23	-0.30	-0.17	0.56	-0.09
70	Support: Offers Tutoring	0.01	0.10	-0.52	0.02	0.36	0.59	0.27	0.31	0.21	0.38	0.27	-0.02	0.58	-0.08	0.49	-0.19	-0.01	-0.28	0.46	-0.33

		Eligibility: HS Graduate or GED	Eligibility: Basic Skills	Eligibility: Income Requirement	Eligibility: Background Check/Drug Screen	Basic Skills Offered (Y/N)	Basic Skills Instr.: ABE/ASE/ESL	Basic Skills Instr.: Remedial	Basic Skills Requirements	Flexible Instruction: Online	Flexible Instruction: Hybrid	Flexible Instruction: Sequencing	Flexible Instruction: Time/Location	Pathway: Multiple Steps of Training	Pathway: Target Occupation Level	Credential Type: Occupational	Credential Type: College-issued	Credential Type: State/Local	Credential Type: Employer-issued	Training Length > 6 Months	Training Length > 1 Year
71	Support: Childcare Assistance	0.40	0.08	0.21	0.14	0.17	0.09	-0.11	-0.14	-0.14	0.23	-0.07	-0.18	0.11	0.00	0.30	0.08	0.00	-0.18	0.03	0.13
72	Support: Transport Assistance	0.10	0.42	0.42	0.20	0.16	0.16	-0.02	-0.07	-0.03	-0.09	0.10	0.25	-0.16	-0.05	0.08	-0.05	0.18	-0.06	-0.12	0.00
73	Support: Connects to Benefits	-0.12	0.13	-0.21	-0.17	0.18	0.27	0.26	0.35	0.51	-0.10	-0.07	0.28	0.05	-0.14	0.02	-0.17	-0.21	-0.12	-0.13	-0.07
74	Support: Job Search Assistance	0.38	0.18	-0.29	0.42	0.25	0.38	-0.22	0.24	-0.12	0.75	-0.10	-0.21	0.18	-0.19	0.15	-0.23	-0.30	-0.17	0.56	-0.09
75	Participants: % Male	-0.14	0.11	-0.01	0.30	-0.44	-0.15	-0.35	-0.13	-0.04	-0.11	-0.26	-0.07	-0.22	-0.28	-0.14	-0.42	-0.43	0.49	0.08	-0.21
76	Participants: % White	0.04	-0.05	-0.38	0.07	0.14	0.18	-0.17	0.09	0.15	0.51	0.14	0.15	0.32	-0.31	0.28	-0.09	-0.13	0.04	0.17	-0.32
77	Unemployment Rate	0.12	0.08	0.35	0.05	-0.14	-0.03	0.04	-0.29	-0.21	-0.25	-0.12	-0.21	0.06	0.26	0.25	0.01	-0.18	0.24	-0.15	0.20

No correlation (<.40)
Low correlation (.40-.59)
Moderate correlation (.60-.79)
High correlation (>.80)

+ indicates a positive correlation; - indicates a negative correlation

Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit E-9. Bivariate Correlations between All Program Characteristics, Rows 40–58

		Training Length: Varies	Training Length: No Info Provided	Training Length < 6 Months	Focus Industry: Healthcare	Focus Industry: Manufacturing/Construc	Focus Industry: IT	Focus Industry: Education	Intervention Engages Employers	Level of Engagement: High	Intervention Includes Job Developer	Employer Engaged: On Council	Employer Engaged: Curricula Input	Employer Engaged: Formal Partner	Employer Engaged: Offers Training	Employer Offers Work-based Learning	Employer Provides Resources	Employer Provide Applicant Advice	Employer Commits to Hire Grads	Employer Gives Input on Curriculum
40	Training Length: Varies	1.00																		
41	Training Length: No Info Provided	-0.10	1.00																	
42	Training Length < 6 Months	-0.33	-0.30	1.00																
43	Focus Industry: Healthcare	-0.17	-0.22	0.07	1.00															
44	Focus Industry: Manufacturing/Construction	-0.16	0.29	-0.28	-0.20	1.00														
45	Focus Industry: IT	0.03	-0.14	-0.33	-0.32	0.00	1.00													
46	Focus Industry: Education	-0.11	-0.10	-0.32	0.21	0.25	0.22	1.00												
47	Intervention Engages Employers	0.10	0.00	-0.33	-0.26	0.28	0.22	0.13	1.00											
48	Level of Engagement: High	0.06	0.09	-0.01	-0.10	0.37	0.01	-0.07	0.41	1.00										
49	Intervention Includes Job Developer	0.30	-0.20	0.45	-0.01	-0.34	-0.23	-0.33	-0.34	-0.21	1.00									
50	Employer Engaged: On Council	0.37	-0.18	-0.12	0.13	0.06	-0.17	0.17	0.44	0.06	-0.04	1.00								
51	Employer Engaged: Curricula Input	-0.01	0.15	-0.25	-0.41	0.07	0.21	0.26	0.58	-0.05	-0.20	0.35	1.00							
52	Employer Engaged: Formal Partner	0.18	0.20	-0.39	-0.20	0.54	0.16	0.03	0.63	0.49	-0.12	0.06	0.06	1.00						
53	Employer Engaged: Offers Training	-0.07	0.21	-0.08	-0.15	-0.10	0.14	-0.13	0.47	0.14	-0.03	-0.10	0.26	0.23	1.00					
54	Employer Offers Work-based Learning	-0.04	0.02	-0.01	0.04	0.44	-0.07	-0.04	0.33	0.84	-0.26	0.11	-0.18	0.48	0.05	1.00				
55	Employer Provides Resources	-0.12	-0.01	-0.47	0.01	0.45	0.30	0.24	0.69	0.38	-0.44	0.21	0.24	0.56	0.27	0.37	1.00			
56	Employer Provide Applicant Advice	0.06	-0.15	0.37	-0.15	-0.12	-0.03	-0.16	0.07	-0.28	0.48	0.13	0.10	0.09	-0.04	-0.23	-0.25	1.00		
57	Employer Commits to Hire Grads	0.09	-0.01	-0.43	-0.09	0.18	0.19	0.26	0.75	0.35	-0.24	0.31	0.42	0.47	0.37	0.18	0.74	-0.24	1.00	
58	Employer Gives Input on Curriculum	0.24	0.10	-0.26	-0.30	0.20	0.13	-0.09	0.56	0.29	-0.23	0.44	0.54	0.25	0.06	0.16	0.37	0.00	0.35	1.00
59	Employer Explains Labor Market	0.19	-0.05	0.19	-0.14	-0.26	-0.11	-0.31	-0.01	0.02	0.53	0.02	-0.10	0.02	0.06	-0.02	-0.12	0.37	-0.07	-0.01
60	Employer Provides Instruction	0.02	-0.02	-0.31	-0.10	0.22	0.13	0.24	0.55	0.40	-0.45	0.16	0.23	0.35	0.12	0.35	0.54	-0.27	0.71	0.39
61	Employer Explains Industry Career	-0.18	-0.07	-0.19	-0.09	0.39	0.19	0.15	0.55	0.49	-0.27	0.05	0.17	0.38	0.15	0.38	0.77	-0.17	0.54	0.24
62	One-On-One Counseling	0.17	-0.36	-0.06	-0.08	-0.02	0.28	0.17	0.07	-0.12	0.40	0.15	0.12	0.09	-0.03	-0.19	0.26	0.04	0.27	0.00
63	One-On-One Career Navigation	0.05	0.06	-0.18	0.16	0.08	0.10	0.04	-0.04	-0.14	0.08	-0.02	-0.15	0.17	-0.09	0.21	0.10	0.09	-0.07	-0.12
64	One-On-One Academic Advising	-0.04	-0.31	-0.21	0.35	-0.20	-0.06	0.31	0.15	0.21	-0.36	0.15	0.03	-0.05	-0.02	0.28	0.15	-0.29	0.20	0.04

		Training Length: Varies	Training Length: No Info Provided	Training Length < 6 Months	Focus Industry: Healthcare	Focus Industry: Manufacturing/Construc	Focus Industry: IT	Focus Industry: Education	Intervention Engages Employers	Level of Engagement: High	Intervention Includes Job Developer	Employer Engaged: On Council	Employer Engaged: Curricula Input	Employer Engaged: Formal Partner	Employer Engaged: Offers Training	Employer Offers Work-based Learning	Employer Provides Resources	Employer Provide Applicant Advice	Employer Commits to Hire Grads	Employer Gives Input on Curriculum
65	One-On-One Assistance Mandatory	0.20	-0.24	0.14	-0.10	-0.39	0.35	0.05	-0.10	-0.23	0.39	-0.17	-0.18	0.01	-0.04	-0.22	-0.17	0.14	-0.02	-0.24
66	Support: Financial Assistance	0.10	-0.74	0.09	0.35	-0.27	0.18	0.13	0.03	-0.02	0.00	0.16	-0.16	-0.12	-0.35	0.06	0.08	0.19	-0.02	-0.09
67	Support: Emergency Assistance	-0.13	-0.25	-0.36	0.22	0.14	0.35	0.37	0.23	-0.28	-0.30	0.01	-0.02	0.23	-0.07	-0.22	0.47	-0.06	0.42	-0.19
68	Support: Food Assistance	-0.06	-0.05	0.17	-0.16	0.22	-0.09	-0.06	0.13	0.02	0.07	0.00	0.15	0.09	0.07	0.05	-0.09	0.23	-0.08	0.12
69	Support: Offers Internet	-0.11	-0.10	-0.31	0.20	0.42	-0.16	0.48	0.49	0.23	-0.32	0.51	0.27	0.35	-0.13	0.27	0.61	-0.15	0.65	0.23
70	Support: Offers Tutoring	-0.03	-0.08	-0.15	0.33	0.16	-0.09	-0.01	0.31	0.39	-0.40	0.16	-0.26	0.40	0.03	0.55	0.35	-0.11	0.19	0.09
71	Support: Childcare Assistance	0.22	-0.22	-0.11	0.26	0.09	-0.03	0.43	0.10	0.10	0.11	0.21	0.04	0.17	-0.12	0.13	0.10	-0.13	0.25	-0.20
72	Support: Transport Assistance	0.25	-0.34	0.14	0.17	0.09	0.10	0.27	0.00	-0.21	0.27	0.37	-0.04	0.02	-0.40	-0.11	-0.04	0.28	-0.09	0.02
73	Support: Connects to Benefits	-0.08	-0.07	0.24	0.15	-0.12	-0.12	-0.08	0.17	0.09	-0.23	0.37	0.20	-0.21	0.01	0.13	-0.12	-0.11	-0.11	0.16
74	Support: Job Search Assistance	-0.11	-0.10	-0.31	0.20	0.42	-0.16	0.48	0.49	0.23	-0.32	0.51	0.27	0.35	-0.13	0.27	0.61	-0.15	0.65	0.23
75	Participants: % Male	0.05	0.11	-0.05	-0.82	0.41	0.36	-0.03	0.30	0.19	-0.20	0.08	0.46	0.15	-0.04	0.05	0.16	0.12	0.13	0.50
76	Participants: % White	-0.03	-0.03	0.06	0.03	0.22	-0.36	0.05	0.19	0.19	-0.22	0.01	0.04	0.11	-0.07	0.06	0.12	0.05	0.21	-0.02
77	Unemployment Rate	0.13	0.11	-0.13	-0.15	0.22	0.34	0.39	-0.06	0.18	-0.11	-0.16	0.01	0.16	-0.07	0.02	0.05	-0.14	-0.06	-0.04

No correlation (<.40)
Low correlation (.40-.59)
Moderate correlation (.60-.79)
High correlation (>.80)

+ indicates a positive correlation; - indicates a negative correlation

Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit E-10. Bivariate Correlations between All Program Characteristics, Rows 59-77

		Employer Explains Labor Market	Employer Provides Instruction	Employer Explains Industry Career	One-On-One Counseling	One-On-One Career Navigation	One-On-One Academic Advising	One-On-One Assistance Mandatory	Support: Financial Assistance	Support: Emergency Assistance	Support: Food Assistance	Support: Offers Internet	Support: Offers Tutoring	Support: Childcare Assistance	Support: Transport Assistance	Support: Connects to Benefits	Support: Job Search Assistance	Participants: % Male	Participants: % White	Unemployment Rate
59	Employer Explains Labor Market	1.00																		
60	Employer Provides Instruction	-0.27	1.00																	
61	Employer Explains Industry Career	0.09	0.35	1.00																
62	One-On-One Counseling	0.36	-0.03	0.35	1.00															
63	One-On-One Career Navigation	-0.18	0.10	-0.14	-0.09	1.00														
64	One-On-One Academic Advising	-0.09	0.32	-0.01	-0.23	-0.04	1.00													
65	One-On-One Assistance Mandatory	0.23	-0.09	-0.06	0.36	0.15	-0.17	1.00												
66	Support: Financial Assistance	0.13	0.10	0.16	0.22	0.09	0.40	0.15	1.00											
67	Support: Emergency Assistance	-0.31	0.32	0.23	0.27	0.16	0.07	0.19	0.33	1.00										
68	Support: Food Assistance	0.09	-0.09	0.15	0.10	0.03	-0.18	-0.13	0.07	-0.14	1.00									
69	Support: Offers Internet	-0.30	0.58	0.47	0.19	0.06	0.30	-0.25	0.13	0.38	-0.05	1.00								
70	Support: Offers Tutoring	-0.20	0.39	0.06	-0.35	0.21	0.53	-0.23	0.23	0.19	-0.09	0.29	1.00							
71	Support: Childcare Assistance	-0.19	0.17	0.24	0.34	0.14	0.08	0.33	0.29	0.26	0.23	0.44	-0.11	1.00						
72	Support: Transport Assistance	0.00	-0.18	0.03	0.37	0.21	-0.28	0.47	0.29	0.25	0.15	0.11	-0.15	0.46	1.00					
73	Support: Connects to Benefits	-0.22	-0.13	-0.16	-0.30	0.04	0.15	-0.18	0.09	-0.19	0.17	-0.07	0.21	-0.10	0.21	1.00				
74	Support: Job Search Assistance	-0.30	0.58	0.47	0.19	0.06	0.30	-0.25	0.13	0.38	-0.05	1.00	0.29	0.44	0.11	-0.07	1.00			
75	Participants: % Male	-0.11	0.22	0.22	0.06	-0.26	-0.31	-0.13	-0.28	-0.10	0.13	0.02	-0.19	-0.27	0.00	-0.06	0.02	1.00		
76	Participants: % White	-0.24	0.29	0.19	-0.35	-0.18	0.17	-0.49	0.13	0.09	0.18	0.30	0.24	0.07	-0.20	0.00	0.30	0.08	1.00	
77	Unemployment Rate	0.02	-0.07	0.22	0.28	-0.29	-0.07	0.26	-0.12	0.05	-0.01	-0.07	-0.23	0.29	0.22	-0.28	-0.07	0.24	-0.16	1.00

No correlation (<.40)
Low correlation (.40-.59)
Moderate correlation (.60-.79)
High correlation (>.80)

+ indicates a positive correlation; - indicates a negative correlation

Source: Authors' computations from D&A CP Project meta-analysis dataset.

Appendix F: Frequentist Results

This appendix provides alternative results that were calculated in the frequentist statistical framework. Main results in the body of the report and in Appendices D and E were calculated using Bayesian statistical methods. For readers more accustomed to frequentist methods (and the resulting statistics such as confidence intervals and *p*-values), we replicated all analyses in the frequentist framework. Conducting parallel analyses also lends confidence to the main results.

This appendix provides frequentist analogues to each table in the body of the report and Appendices D and E. **Because the findings from the Bayesian and frequentist approaches are very similar, the findings in this appendix are reported without commentary.**

F.1 Results Corresponding to the Report's Main Body

This section presents frequentist results corresponding to Exhibits 2-1, 3-5, and 3-6 in the main body of the report.

Exhibit F-1. Overall Effects for Main Outcomes (Expanded Results from Exhibit 2-1)

Outcome Construct	# of Studies	# of Effect Sizes Reported	Mean	[95% Confidence Interval]	Tau^2	I^2
Educational attainment (credential receipt)	33	159	0.55***	[0.41, 0.68]	0.11	94.92
Employment (at any time point)	37	514	0.11**	[0.02, 0.20]	0.15	96.37
Employed in industry/occupation trained for	24	71	0.43***	[0.27, 0.58]	0.14	94.87
Short-term earnings	37	278	0.07**	[0.02, 0.13]	0.02	94.33
Medium- and long-term earnings (36+ months)	16	96	0.05	[-0.03, 0.12]	0.01	83.42

Notes: Effects were coded such that positive effect sizes indicate effects favoring the program group (e.g., higher earnings).
*** *p* <0.01, ** *p* <0.05, * *p* <0.10.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit F-2. Relationships between Average Effect Sizes and Key Effectiveness Factors (Expanded Results from Exhibits 3-5 and 3-6)

Evaluation Characteristic	Contribution to Impact (Coefficient)	[95% Confidence Interval]	*p*-Value
Educational Progress			
Administrative arrangement: Lead or partner is community college	-0.39	[-0.81, 0.02]	0.06
Partner agency type: Government agency (other than Workforce board/one-stop/American Job Center)	-0.09	[-0.33, 0.15]	0.45
Partner agency type: Staffing agency or company	0.33	[-0.23, 0.89]	0.14
Employer role: Provide input on curriculum or program development	0.28	[-0.01, 0.57]	0.05
Percentage of participants: Male	0.13	[-0.35, 0.62]	0.54
Design: Experimental evaluation	0.13	[-0.20, 0.45]	0.42
Intercept	0.54	[-0.16, 1.24]	0.12

Evaluation Characteristic	Contribution to Impact (Coefficient)	[95% Confidence Interval]	*p*-Value
Earnings and Employment			
Administrative arrangement: Lead or partner is community college	-0.06	[-0.28, 0.17]	0.59
Length of training: 6 months or less (excluded group)	0.02	[-0.10, 0.14]	0.68
Flexible instruction type: Flexible sequencing	-0.27	[-0.68, 0.15]	0.17
Support offered: Tuition, training cost, other financial assistance	-0.25	[-0.53, 0.04]	0.08
Average unemployment rate	0.49	[-1.87, 2.86]	0.64
Percentage of participants: Black	0.18	[-0.05, 0.41]	0.11
Percentage of participants: Black – no information[1]	-0.01	[-0.20, 0.18]	0.94
Experimental evaluation	0.00	[-0.22, 0.22]	0.97
Intercept	0.24	[-0.13, 0.61]	0.19

Notes: All meta-regression models estimated using robust variance estimation to handle statistically dependent effect sizes. Effects were coded such that positive effect sizes indicate effects favoring the program group (e.g., higher earnings).

[1] The regression model used dummy variable adjustment for missing right-hand-side covariates as described in Puma et al., 2009. "Percentage of participants: Black – no information" is a dichotomous variable set equal to one for those cases where the percentage of participants who were Black was not reported. The coefficient associated with this variable has no natural interpretation.

Source: Authors' computations from D&A CP Project meta-analysis dataset.

F.2 Results Corresponding to Appendix D

This section presents frequentist results corresponding to the exhibits in Appendix D, section D.2. As in Appendix D, each block shows the findings from independent analyses; i.e., not controlling for moderators in other blocks.

Exhibit F-3. Average Effects by Outcome (Secondary Outcomes) (Corresponds to Exhibit D-7 in Appendix D)

Outcome Construct	# of Studies	# of Effect Sizes Reported	Mean	[95% Confidence Interval]	Tau^2	I^2
Education						
Post-secondary degree obtained	16	38	0.21**	[0.01, 0.42]	0.08	90.25
Obtained credential	29	95	0.59***	[0.45, 0.74]	0.09	93.84
Number of credentials obtained	9	9	0.22***	[0.07, 0.36]	0.01	86.62
Earned industry-relevant credential	13	17	0.77***	[0.49, 1.05]	0.16	90.24
Completed occupational training	12	19	0.60***	[0.29, 0.90]	0.19	94.65
Participated in training	16	37	0.83***	[0.44, 1.22]	0.36	97.42
Number of college credits	16	26	0.05*	[-0.01, 0.11]	0.01	82.84

Outcome Construct	# of Studies	# of Effect Sizes Reported	Mean	[95% Confidence Interval]	Tau^2	I^2
Employment						
Employed in months 0-11	27	105	0.07	[-0.06, 0.20]	0.10	96.44
Employed in months 12-35	36	294	0.10**	[0.01, 0.19]	0.18	96.90
Employment in months 36+	17	115	0.06***	[0.03, 0.10]	0.01	51.33
Employed in industry/occupation trained for in months 0-35	23	50	0.43***	[0.26, 0.60]	0.15	95.16
Employed in industry/occupation trained for in months 36+	9	21	0.20***	[0.09, 0.31]	0.00	31.86
Employed full-time	13	15	0.09*	[-0.01, 0.19]	0.02	70.52
Employed full-time - less than 36 months	7	8	0.17**	[0.02, 0.33]	0.03	75.53
Employed full-time - 36 months or later	7	7	0.03	[-0.06, 0.12]	0.00	0.00
Number of hours worked	13	17	0.08**	[0.01, 0.15]	0.00	48.38
Advanced in career	6	10	-0.11	[-0.55, 0.33]	0.10	86.87
Earnings						
Earnings (at any time point)	37	374	0.09***	[0.03, 0.14]	0.01	93.80
Earnings at 0-11 months	28	90	0.03	[-0.06, 0.12]	0.02	96.23
Earnings at 12-35 months	36	188	0.09***	[0.03, 0.14]	0.02	93.99
Earnings and income	37	410	0.09***	[0.03, 0.14]	0.01	93.80
Career Knowledge						
Confidence in career knowledge	10	18	0.07**	[0.02, 0.12]	0.00	0.00
Perceived career progress	9	16	0.15***	[0.07, 0.22]	0.01	48.10
Well-being						
Employed in a high-quality job	13	55	0.06*	[-0.01, 0.13]	0.01	32.71
Employed in a job that offers healthcare benefit	18	20	0.03	[-0.02, 0.09]	0.00	18.84
Well-being	20	139	0.04**	[0.01, 0.07]	0.00	19.27

Notes: Effects were coded such that positive effect sizes indicate effects favoring the program group (e.g., higher earnings).
*** *p* < .01, ** *p* < .05, * *p* < .10.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit F-4. Relationships between Potential Effectiveness Factors and Average Effect Sizes for Educational Progress (Corresponds to Exhibit E-2)

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Confidence Interval]	p-Value
Lead Administrative Agency			
Lead agency type: Workforce board/one-stop/American Job Center	-0.10	[-0.99, 0.78]	0.62
Lead agency type: Community organization	0.42	[0.06, 0.77]	0.03
Lead agency type: Other, including government agency	0.32	[-1.39, 2.04]	0.40
Lead agency type: community or technical college (reference category)	N/A		
Partner Agency, Most Common			
Partner agency type: Community or technical college	-0.10	[-0.41, 0.20]	0.47
Partner agency type: Workforce board/one-stop/American Job Center	-0.15	[-0.54, 0.24]	0.41
Partner agency type: Community organization	0.34	[-0.13, 0.81]	0.13
Partner agency type: Government agency (other than Workforce board/one-stop/American Job Center)	-0.36	[-0.74, 0.03]	0.07
Partner Agency, Less Common			
Partner agency type: School or school district	-0.15	[-0.57, 0.26]	0.41
Partner agency type: University	-0.11	[-0.55, 0.34]	0.58
Partner agency type: Labor union	-0.08	[-1.03, 0.86]	0.80
Partner agency type: Other	0.34	[-0.58, 1.25]	0.28
Partner Agency, Rarer			
Partner agency type: Private or for-profit school	-0.10	[-0.83, 0.64]	0.69
Partner agency type: Staffing agency or company	0.57	[-1.01, 2.14]	0.22
Partner agency type: Faith-based organization	-0.16	[-0.54, 0.21]	0.33
Administrative Arrangements			
Administrative arrangement: Lead or partner is workforce agency	-0.11	[-0.37, 0.14]	0.35
Administrative arrangement: Lead or partner is community college	-0.60	[-1.04, -0.16]	0.01
Administrative Arrangements			
Administrative arrangement: Lead or partner is community college	-0.63	[-1.08, -0.17]	0.01
Administrative arrangement: Lead or partner is community organization	0.10	[-0.14, 0.35]	0.38
Administrative Arrangements			
Administrative arrangement: Lead or partner is workforce agency	0.02	[-0.41, 0.45]	0.90
Administrative arrangement: Lead or partner is community college	-0.48	[-0.95, 0.00]	0.05
Administrative arrangement: Lead or partner is community organization	0.29	[-0.03, 0.60]	0.07
Interaction effect: (Lead or partner agency was a Workforce board)*(Lead or partner agency was a community college)*(Lead or partner agency was a community organization)	-0.27	[-0.82, 0.28]	0.30

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Confidence Interval]	p-Value
Eligibility			
Eligibility criteria: Has HS diploma or GED	-0.15	[-0.48, 0.18]	0.35
Eligibility criteria: Demonstrate basic skills/minimum skill level on test or in class	0.12	[-0.41, 0.64]	0.62
Eligibility criteria: Meets income requirements	-0.01	[-0.41, 0.40]	0.97
Eligibility criteria: Passed background check or drug screen	0.07	[-0.32, 0.45]	0.72
Basic Skills Instructional Offerings			
Offers basic skills training	-0.34	[-1.00, 0.31]	0.25
Offers adult basic/secondary education or English language acquisition	0.10	[-0.29, 0.50]	0.57
Offers college developmental or remedial education	0.01	[-0.38, 0.40]	0.96
Basic skills required for majority of or all participants	-0.06	[-0.45, 0.33]	0.74
Instructional Offerings' Flexibility			
Flexible instruction type: Some or all courses taken online	0.05	[-0.40, 0.50]	0.80
Flexible instruction type: Hybrid instruction	-0.31	[-3.04, 2.42]	0.50
Flexible instruction type: Flexible sequencing	-0.16	[-0.75, 0.43]	0.50
Flexible instruction type: Courses offered at alternative places/times	-0.03	[-0.48, 0.42]	0.88
Pathways and Training			
Offers 3+ pathways	-0.03	[-0.28, 0.21]	0.77
Offers multi-step training	-0.27	[-0.73, 0.19]	0.20
Offers multi-step training: No information	0.56	[0.05, 1.08]	0.04
Offers mid-/high-/mixed-level training based on wage level of occupation	-0.02	[-0.23, 0.20]	0.88
Credentials			
Type of credential: Occupational certificate or technical diploma	-0.33	[-0.72, 0.07]	0.09
Type of credential: College (associate or bachelor's) degree	-0.15	[-0.38, 0.09]	0.20
Type of credential: State or local licensure	-0.05	[-0.37, 0.27]	0.73
Type of credential: Certification developed by an employer or industry association	0.35	[-0.02, 0.71]	0.06
Training Length			
Length of training: More than 6 months to 1 year	-0.18	[-0.75, 0.40]	0.50
Length of training: More than 1 year	-0.28	[-1.53, 0.96]	0.30
Length of training: Varies	0.08	[-0.41, 0.57]	0.70
Length of training: No information	-0.22	[-0.72, 0.27]	0.34
Length of training: 6 Months or less (reference category)	N/A		
Training Industry or Occupation			
Industry trained for: Healthcare	-0.33	[-0.60, -0.06]	0.02
Industry trained for: Manufacturing or construction	-0.16	[-0.51, 0.19]	0.30
Industry trained for: Information technology	0.06	[-0.39, 0.51]	0.76
Industry trained for: Education	0.06	[-0.40, 0.53]	0.76
Employer Engagement and Roles			

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Confidence Interval]	p-Value
Extent of employer engagement (count of 0-6 activities)	0.07	[-0.07, 0.20]	0.29
Highly engaged employers	0.06	[-0.32, 0.45]	0.74
Presence of job development staff	0.33	[0.03, 0.63]	0.03
Employer Engagement and Roles			
Engaged employer: Convenes an employer advisory council	0.20	[-0.16, 0.55]	0.24
Engaged employer: Curricula adapted for employers' needs	0.29	[-0.06, 0.64]	0.10
Engaged employer: Has formal partnership with employers	-0.13	[-0.40, 0.13]	0.29
Engaged employer: Offer incumbent worker training	0.11	[-0.27, 0.48]	0.52
Employer Engagement and Roles			
Employer role: Offer work-based learning (paid and unpaid)	-0.22	[-0.52, 0.08]	0.14
Employer role: Provide resources (including financial aid, mentors, resources)	-0.11	[-0.64, 0.42]	0.53
Employer role: Provide input on preferred type of applicants	0.36	[-0.03, 0.76]	0.07
Employer role: Commit to hire graduates	0.32	[-0.29, 0.93]	0.19
Employer Engagement and Roles			
Employer role: Provide input on curriculum or program development	0.54	[0.24, 0.85]	0.00
Employer role: Provide information on labor market demand, including specific job	0.03	[-0.29, 0.34]	0.86
Employer role: Deliver instruction or provide instructors	-0.07	[-0.52, 0.39]	0.76
Employer role: Deliver career awareness services	0.04	[-0.34, 0.42]	0.82
One-on-One Support			
One on one: Case management or counseling	0.07	[-0.29, 0.43]	0.69
One on one: Career or college navigation	0.06	[-0.55, 0.68]	0.81
One on one: Academic advising	-0.33	[-0.56, -0.09]	0.01
One-on-one staff assistance mandatory/required	-0.11	[-0.41, 0.19]	0.45
Services			
Support offered: Tuition, training cost, other financial assistance	-0.25	[-0.80, 0.31]	0.24
Support offered: Emergency assistance	-0.34	[-0.68, 0.01]	0.06
Support offered: Food assistance	0.06	[-0.25, 0.36]	0.69
Support offered: Internet	0.29	[-0.20, 0.79]	0.22
Support offered: Tutoring	-0.25	[-0.54, 0.05]	0.09
Services			
Support offered: Child/dependent care assistance	-0.28	[-0.67, 0.10]	0.13
Support offered: Transportation assistance	0.01	[-0.40, 0.41]	0.98
Support offered: Connection with benefits and social services	-0.48	[-0.83, -0.13]	0.01
Support offered: Job search and placement	0.12	[-0.43, 0.66]	0.65
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	-0.39	[-0.77, -0.01]	0.05
One on one: Case management or counseling	0.18	[-1.17, 1.53]	0.57
Interaction effect: (Support offered: Tuition, training cost, other financial assistance)*(One on one: Case management or counseling)	-0.03	[-1.07, 1.01]	0.92

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Confidence Interval]	p-Value
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	-0.80	[-1.23, -0.38]	0.01
One on one: Career or college navigation	-0.47	[-1.00, 0.05]	0.06
Interaction effect: (Support offered: Tuition, training cost, other financial assistance)*(One on one: Career or college navigation)	0.54	[0.16, 0.91]	0.02
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	-0.37	[-0.94, 0.19]	0.12
Support offered: Job search and placement	-0.08	[-0.47, 0.31]	0.63
Participant Composition			
Percentage of participants: Male	0.76	[0.29, 1.22]	0.00
Education level: Percentage with degree	1.10	[-0.74, 2.95]	0.21
Education level: Percentage with degree - no information	0.11	[-0.36, 0.59]	0.61
Education level: Percentage with HS diploma or GED	0.21	[-0.76, 1.17]	0.61
Education level: Percentage with HS diploma or GED - no information	-0.24	[-0.93, 0.44]	0.42
Education level: Percentage with some college	-0.10	[-2.06, 1.86]	0.91
Education level: Percentage with some college - no information	0.06	[-0.52, 0.64]	0.82
Education level: percent with <HS/GED (reference category)	N/A		
Participant Composition and Local Context			
Percentage of participants: Black	0.42	[-0.52, 1.37]	0.36
Percentage of participants: Hispanic/Latino	-0.02	[-0.83, 0.79]	0.96
Average unemployment rate	-1.45	[-8.46, 5.56]	0.64

Notes: All moderator block analyses control for design type (experimental or not). Moderator blocks for participant composition, local context, pathways and training, and training length used dummy variable adjustment for missing data (see Puma et al., 2009 for details).
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit F-5. Relationships between Potential Effectiveness Factors and Average Effect Sizes for labor Market Outcomes (Corresponds to Exhibit E-5)

Outcome: Labor Market (employment & earnings)	Contribution to Impact (Coefficient)	[95% Confidence Interval]	p-Value
Lead Administrative Agency			
Lead agency type: Workforce board/one-stop/American Job Center	0.22	[0.00, 0.45]	0.05
Lead agency type: Community organization	0.22	[0.06, 0.37]	0.01
Lead agency type: Other, including government agency	0.03	[-0.18, 0.24]	0.74
Lead agency type: Community or technical college (reference category)	N/A		
Partner Agency, Most Common			
Partner agency type: Community or technical college	0.00	[-0.24, 0.23]	0.97
Partner agency type: Workforce board/one-stop/American Job Center	0.10	[-0.19, 0.39]	0.46
Partner agency type: Community organization	0.06	[-0.11, 0.23]	0.49
Partner agency type: Government agency (other than Workforce board/one-stop/American Job Center)	-0.12	[-0.32, 0.07]	0.19
Partner Agency, Less Common			
Partner agency type: School or school district	-0.08	[-0.22, 0.07]	0.27
Partner agency type: University	-0.29	[-0.55, -0.03]	0.03
Partner agency type: Labor union	0.10	[-0.22, 0.41]	0.49
Partner agency type: Other	-0.21	[-0.85, 0.42]	0.40
Partner Agency, Rarer			
Partner agency type: Trade association	0.28	[-0.38, 0.93]	0.29
Partner agency type: Private or for-profit school	-0.04	[-0.15, 0.07]	0.30
Partner agency type: Staffing agency or company	0.09	[-0.02, 0.21]	0.08
Partner agency type: Faith-based organization	-0.09	[-0.43, 0.24]	0.53
Administrative Arrangements			
Administrative arrangement: Lead or partner is workforce agency	0.29	[-0.82, 1.40]	0.45
Administrative arrangement: Lead or partner is community college	-0.17	[-0.37, 0.02]	0.07
Interaction effect: (Lead or partner agency was a Workforce board)*(Lead or partner agency was a community college)	-0.18	[-1.21, 0.84]	0.60
Administrative Arrangements			
Administrative arrangement: Lead or partner is community college	-0.19	[-0.39, 0.01]	0.06
Administrative arrangement: Lead or partner is community organization	0.00	[-0.11, 0.10]	0.92
Administrative Arrangements			
Administrative arrangement: Lead or partner is workforce agency	0.13	[-0.18, 0.44]	0.37
Administrative arrangement: Lead or partner is community college	-0.24	[-0.56, 0.08]	0.12
Administrative arrangement: Lead or partner is community organization	-0.01	[-0.31, 0.28]	0.93
Interaction effect: (Lead or partner agency was a Workforce board)*(Lead or partner agency was a community college)*(Lead or partner agency was a community organization)	0.01	[-0.42, 0.43]	0.98
Eligibility			
Eligibility criteria: Has HS diploma or GED	0.04	[-0.16, 0.24]	0.66
Eligibility criteria: Demonstrate basic skills/minimum skill level on test or in class	-0.11	[-0.42, 0.21]	0.47

Outcome: Labor Market (employment & earnings)	Contribution to Impact (Coefficient)	[95% Confidence Interval]	p-Value
Eligibility criteria: Meets income requirements	0.17	[-0.02, 0.37]	0.08
Eligibility criteria: Passed background check or drug screen	0.00	[-0.21, 0.22]	0.96
Basic Skills Instructional Offerings			
Offers basic skills training	-0.14	[-0.33, 0.04]	0.11
Offers adult basic/secondary education or English language acquisition	0.00	[-0.10, 0.10]	1.00
Offers college developmental or remedial education	-0.01	[-0.11, 0.10]	0.90
Basic skills required for majority of or all participants	0.00	[-0.09, 0.09]	0.99
Instructional Offerings' Flexibility			
Flexible instruction type: Some or all courses taken online	-0.17	[-0.55, 0.20]	0.31
Flexible instruction type: Hybrid instruction	-0.15	[-0.42, 0.13]	0.26
Flexible instruction type: Flexible sequencing	-0.22	[-0.60, 0.17]	0.21
Flexible instruction type: Courses offered at alternative places/times	0.05	[-0.09, 0.18]	0.44
Pathways and Training			
Offers 3+ pathways	-0.01	[-0.12, 0.11]	0.91
Offers multi-step training	-0.08	[-0.28, 0.12]	0.28
Offers mid-/high-/mixed-level training based on wage level of occupation	0.13	[-0.09, 0.35]	0.23
Credentials			
Type of credential: Occupational certificate or technical diploma	-0.11	[-0.25, 0.03]	0.11
Type of credential: College (associate or bachelor's) degree	-0.18	[-0.34, -0.01]	0.04
Type of credential: State or local licensure	-0.03	[-0.13, 0.08]	0.61
Type of credential: Certification developed by an employer or industry association	0.01	[-0.12, 0.14]	0.87
Training Length			
Length of training: More than 6 months to 1 year	-0.06	[-0.17, 0.04]	0.23
Length of training: More than 1 year	-0.06	[-0.78, 0.65]	0.57
Length of training: Varies	-0.01	[-0.17, 0.16]	0.93
Length of training: 6 months or less (reference category)	N/A		
Training Industry or Occupation			
Industry trained for: Healthcare	-0.08	[-0.24, 0.08]	0.26
Industry trained for: Manufacturing or construction	0.01	[-0.29, 0.31]	0.94
Industry trained for: Information technology	-0.04	[-0.15, 0.08]	0.44
Industry trained for: Education	-0.10	[-0.29, 0.09]	0.22
Employer Engagement and Roles			
Extent of employer engagement (count of 0-6 activities)	-0.02	[-0.09, 0.04]	0.43
Highly engaged employers	-0.05	[-0.21, 0.11]	0.53
Presence of job development staff	0.07	[-0.07, 0.21]	0.33
Employer Engagement and Roles			
Engaged employer: Convenes an employer advisory council	-0.12	[-0.27, 0.03]	0.10
Engaged employer: Curricula adapted for employers' needs	0.04	[-0.07, 0.15]	0.46

Outcome: Labor Market (employment & earnings)	Contribution to Impact (Coefficient)	[95% Confidence Interval]	p-Value
Engaged employer: Has formal partnership with employers	-0.03	[-0.25, 0.18]	0.75
Engaged employer: Offer incumbent worker training	0.16	[-0.02, 0.34]	0.07
Employer Engagement and Roles			
Employer role: Offer work-based learning (paid and unpaid)	-0.03	[-0.25, 0.18]	0.74
Employer role: Provide resources (including financial aid, mentors, resources)	-0.15	[-0.42, 0.13]	0.25
Employer role: Provide input on preferred type of applicants	0.03	[-0.08, 0.14]	0.52
Employer role: Commit to hire graduates	0.07	[-0.10, 0.25]	0.34
Employer Engagement and Roles			
Employer role: Provide input on curriculum or program development	0.11	[-0.03, 0.25]	0.10
Employer role: Provide information on labor market demand, including specific job	0.06	[-0.10, 0.22]	0.42
Employer role: Deliver instruction or provide instructors	-0.04	[-0.27, 0.19]	0.72
Employer role: Deliver career awareness services	-0.17	[-0.36, 0.01]	0.06
One-on-One Support			
One on one: Case management or counseling	-0.07	[-0.25, 0.11]	0.42
One on one: Career or college navigation	-0.13	[-0.56, 0.30]	0.23
One on one: Academic advising	-0.12	[-0.23, -0.01]	0.03
One-on-one staff assistance mandatory/required	-0.01	[-0.11, 0.09]	0.83
Services			
Support offered: Tuition, training cost, other financial assistance	-0.36	[-0.76, 0.04]	0.07
Support offered: Emergency assistance	-0.01	[-0.09, 0.08]	0.89
Support offered: Food assistance	0.16	[-0.48, 0.80]	0.26
Support offered: Internet	0.09	[-0.27, 0.46]	0.58
Support offered: Tutoring	-0.01	[-0.15, 0.12]	0.86
Services			
Support offered: Child/dependent care assistance	-0.04	[-0.14, 0.06]	0.38
Support offered: Transportation assistance	0.01	[-0.06, 0.09]	0.68
Support offered: Connection with benefits and social services	0.08	[-0.96, 1.13]	0.63
Support offered: Job search and placement	-0.14	[-0.40, 0.12]	0.27
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	-0.38	[-0.69, -0.06]	0.02
One on one: Case management or counseling	-0.08	[-0.52, 0.36]	0.69
Interaction effect: (Support offered: Tuition, training cost, other financial assistance)*(One on one: Case management or counseling)	0.10	[-0.30, 0.50]	0.58
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	-0.02	[-0.02, -0.02]	0.00
One on one: Career or college navigation	0.21	[-0.05, 0.48]	0.11
Interaction effect: (Support offered: Tuition, training cost, other financial assistance)*(One on one: Career or college navigation)	-0.32	[-0.58, -0.07]	0.02

Outcome: Labor Market (employment & earnings)	Contribution to Impact (Coefficient)	[95% Confidence Interval]	*p*-Value
Selected Interactions			
Support offered: Tuition, training cost, other financial assistance	-0.35	[-0.75, 0.04]	0.07
Support offered: Job search and placement	0.08	[-0.29, 0.44]	0.63
Participant Composition			
Percentage of participants: Male	-0.01	[-0.43, 0.42]	0.98
Education level: Percentage with degree	0.27	[-0.48, 1.02]	0.45
Education level: Percentage with HS diploma or GED	0.15	[-0.29, 0.59]	0.45
Education level: Percentage with some college	0.15	[-0.53, 0.83]	0.64
Education level: percent with <HS/GED (reference category)	N/A		
Participant Composition and Local Context			
Percentage of participants: Black	0.22	[-0.16, 0.59]	0.25
Percentage of participants: Hispanic/Latino	0.05	[-0.27, 0.38]	0.71
Average unemployment rate	-0.29	[-3.19, 2.61]	0.82

Notes: All moderator block analyses control for design type (experimental or not). Moderator blocks for participant composition, local context, pathways and training, and training length used dummy variable adjustment for missing data (see Puma et al., 2009 for details).
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit F-6. Regressions Used to Select Covariates for Educational Progress Meta-Regression (Corresponds to Exhibit E-4)

Outcome: Educational Progress (credential receipt)	Contribution to Impact (Coefficient)	[95% Confidence Interval]	*p*-Value
Semi-Final Heat 1			
Industry trained for: Healthcare	0.16	[-0.55, 0.87]	0.63
Length of training: 6 months or less (excluded group)	-0.03	[-0.45, 0.38]	0.86
Support offered: Tuition, training cost, other financial assistance	-0.18	[-0.97, 0.62]	0.55
Percentage of participants: Male	0.70	[-0.36, 1.77]	0.17
Education level: Percentage with bachelor's degree	2.94	[-2.74, 8.61]	0.21
Education level: Percentage with bachelor's degree - no information	0.02	[-0.42, 0.47]	0.91
Design: Experimental evaluation	0.17	[-0.24, 0.58]	0.39
Intercept	0.08	[-1.16, 1.32]	0.88
Semi-Final Heat 2			
Employer engagement: Presence of job development staff	0.16	[-0.10, 0.41]	0.20
Type of credential: Occupational certificate or technical diploma	-0.24	[-0.57, 0.10]	0.14
Type of credential: Certification developed by an employer or industry association	0.13	[-0.29, 0.56]	0.50
Employer role: Provide input on curriculum or program development	0.35**	[0.09, 0.61]	0.01
Education level: Percentage with bachelor's degree	2.10	[-2.05, 6.26]	0.22
Education level: Percentage with bachelor's degree - no information	0.06	[-0.36, 0.48]	0.73
Design: Experimental evaluation	0.04	[-0.24, 0.32]	0.76
Intercept	0.25	[-0.31, 0.80]	0.34
Semi-Final Heat 3			
Partner agency type: Staffing agency or company	0.42	[-0.46, 1.30]	0.17
Administrative arrangement: Lead or partner is community college	-0.35	[-0.87, 0.17]	0.15
Partner agency type: Government agency (other than Workforce board/one-stop/American Job Center)	-0.21*	[-0.43, 0.01]	0.06
Administrative arrangement: Lead or partner is community organization	0.18*	[-0.01, 0.37]	0.07
Education level: Percentage with bachelor's degree	0.94	[-4.72, 6.61]	0.66
Education level: Percentage with bachelor's degree - no information	-0.11	[-0.63, 0.42]	0.63
Design: Experimental evaluation	-0.05	[-0.27, 0.17]	0.63
Intercept	0.85**	[0.09, 1.61]	0.03

Notes: All three regressions used dummy variable adjustment for missing data (see Puma et al., 2009 for details).
*** *p* < 0.01, ** *p* < 0.05, * *p* < 0.10.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Appendix G: Results of Sensitivity Analyses

This appendix presents the results of sensitivity tests designed to assess whether the results from the meta-analysis are sensitive to alternate specifications of key assumptions, as well as how likely it is that external factors such as publication bias might have affected the findings. Section G.1 assesses potential publication bias; Section G.2 provides additional detail on the relationships between evaluation methods and effect sizes; and Section G.3 assesses the robustness of mean effect size estimates to various analytic assumptions.

G.1 Publication Bias

The meta-analysis produces an unbiased estimate of the mean effect for evaluations that have been included in the meta-analysis research sample, i.e., those evaluations that have been identified, screened, and determined to be eligible. However, for at least two reasons, the research sample may not be representative of all relevant research that has been conducted to date. First, research with null or adverse findings may be less likely to have been published than research with favorable findings. Alternately, such research may be more difficult to identify even when published, for example because it is less likely to be cited. Second, among published evaluations, authors may have selectively reported favorable and/or statistically significant findings and omitted less favorable or less statistically significant findings.

The primary method of combatting publication bias in this analysis was to conduct an exhaustive search of both the formal and informal ("grey") literature to identify relevant evaluations.

In addition, to assess the potential for bias among eligible evaluations in the meta-analysis research sample, we graphed the relationship between effect size and precision using funnel plots for each of the four main outcomes. (Precision is closely related to sample size; larger evaluations have more precise estimates, expressed as smaller standard errors) (Hastings et al., 1947). In these plots, the effect size is shown on the horizontal axis and standard error on the vertical axis; the diagonal lines represent the bounds of a 95 percent confidence interval. In general, larger evaluations appear at the top, where we expect effect sizes to be grouped around the mean effect size for these precisely-estimated impacts. Toward the bottom of the graph, for smaller evaluations, we expect the effect size estimates to be more dispersed. However, in the absence of publication bias the effect size distribution should be roughly symmetrical around the mean effect size.

Exhibits G-1 through G-5 present funnel plots for each of the four main outcomes, educational

**Exhibit G-1.** Funnel Plot for Educational Progress
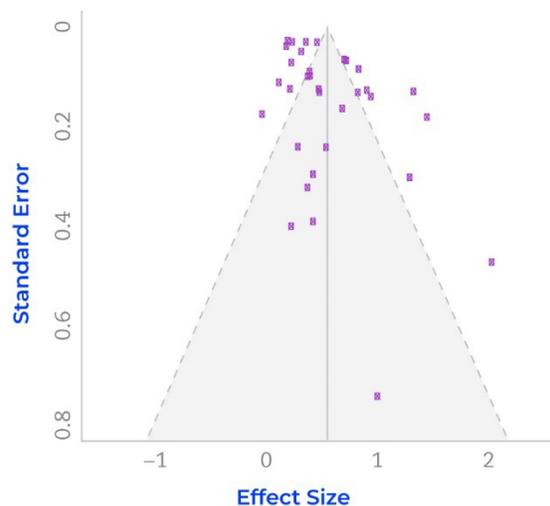
Notes: Results from 33 evaluations. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes are coded such that values greater than zero indicate a favorable effect of the program (i.e., more educational progress).
Source: Authors' computations from D&A CP Project meta-analysis dataset.

progress, employment, short-term earnings, and medium- and long-term earnings, respectively. All four of these funnel plots appear to be free of problematic bias, a conclusion we reach by making a subjective assessment that the dots are roughly symmetrically distributed on either size of the vertical midline.

Exhibit G-2. Funnel Plot for Employment
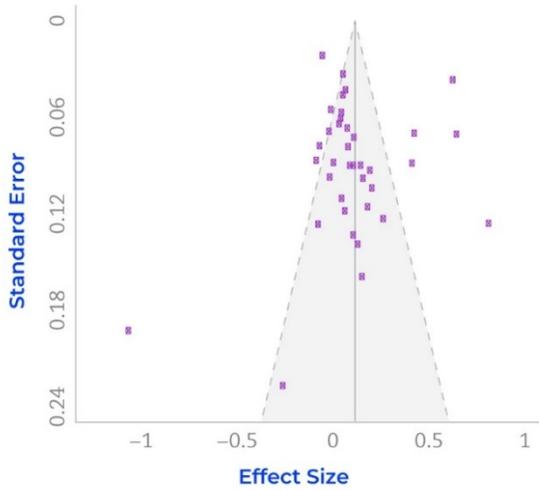
Notes: Results from 37 evaluations. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes are coded such that values greater than zero indicate a favorable effect of the program (i.e., higher employment).
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit G-3. Funnel Plot for Industry-Specific Employment
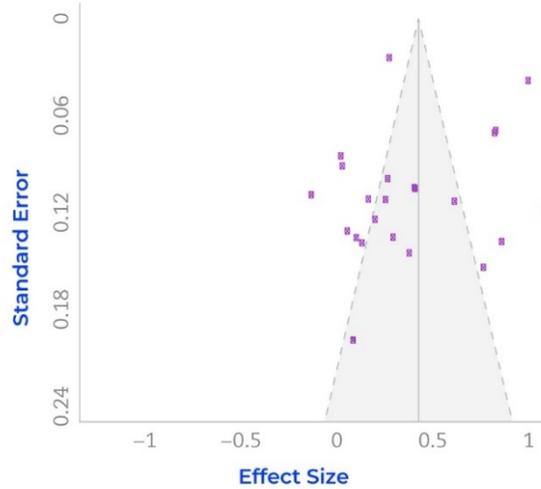
Notes: Results from 24 evaluations. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes are coded such that values greater than zero indicate a favorable effect of the program (i.e., higher industry-specific employment).
*Source:* Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit G-4. Funnel Plot for Short-Term Earnings
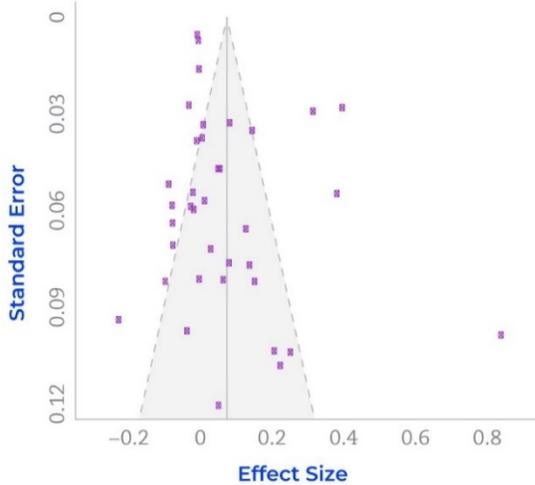
Notes: Results from 35 evaluations. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes are coded such that values greater than zero indicate a favorable effect of the program (i.e., higher short-term earnings).

Source: Authors' computations from D&A CP Project meta-analysis dataset.

Exhibit G-5. Funnel Plot for Medium/Long-Term Earnings
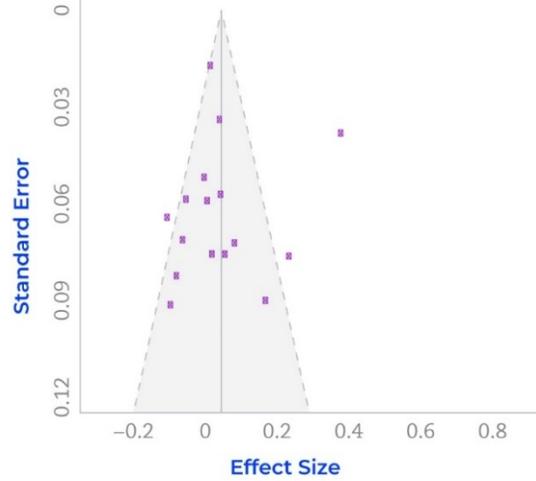
Notes: Results from 16 evaluations. Given that many evaluations reported multiple effect sizes, this figure displays the average (synthetic) mean effect size for each evaluation. All effect sizes are coded such that values greater than zero indicate a favorable effect of the program (i.e., higher medium/long-term earnings).

Source: Authors' computations from D&A CP Project meta-analysis dataset.

G.2 Evaluation Characteristics

This section provides additional detail on the relationships between evaluation methods and effect sizes. We assessed whether there were systematic relationships between effect sizes and the type of design (experiment or quasi-experiment), follow-up timing, and the type of outcome measure (continuous or binary).

Design type. The meta-analysis sample included both randomized experiments (k=27) and quasi-experiments (k=19). There is a widespread belief among researchers that randomized experiments are less prone to bias than quasi-experiments (Clearinghouse for Labor Evaluation and Research, 2015). To explore whether this may be true in the meta-analysis evaluation sample, we assessed whether there was a systematic relationship between design type (experiment or quasi-experiment) and effect sizes for each of the main outcomes.

Follow-up timing. The report's main analysis does not distinguish between various follow-up time points, except to report the overall program effect separately for short- and medium- and long-term earnings (<36 months and 36+ months, respectively). This decision was made for conceptual reasons before the final data analysis. To determine whether there was a systematic relationship between effect sizes and follow-up assessment timing for each of the three main outcome types (e.g., if programs were likely to be more effective in the long-term), we conducted additional analyses. First, we coded *follow-up assessment timing* as a series of dummy variables corresponding to different timing intervals. Then we conducted a single meta-regression analysis of this block for each outcome type.

Type of outcome measure. Evaluation reports estimated program effects using a combination of continuous outcome measures (e.g., earnings in dollars) and binary measures (e.g., employment at the time of follow-up). To compare across outcomes, we coded all measures as Hedges' *g* effect sizes, with binary measures converted to Hedges' *g* effect sizes using a Cox transformation. We assessed whether there was a systematic relationship between effect sizes and the type of measure (continuous or binary) for each of the main outcomes.

Exhibit G-6 presents findings for each of these evaluation characteristics, for each of the main outcomes. (Exhibit G-6 combines short- and long-term earnings into a single category to facilitate the analysis of follow-up timing.) Exhibit G-6 shows the estimated average difference in effect sizes between levels of evaluation characteristics (the column labeled "coefficient"), the 95 percent confidence interval on that estimate, and the *p*-value from a test of statistical significance.

Exhibit G-6. Relationships between Evaluation Characteristics and Average Effect Sizes, by Outcome

Evaluation/Effect Size Characteristic	Coefficient	[95% Confidence Interval]	*p*-Value
Outcome: Educational Progress			
Design Type			
Quasi-experiment	Ref.		
Randomized experiment	0.13	[-0.12, 0.39]	0.28
Intercept	0.46***	[0.27, 0.64]	0.00
Follow-Up Timing			
0 < x < 12 months	0.00	[-0.14, 0.13]	0.96
12 < x < 36 months			
36 months or more	Ref.		
Intercept	0.38***	[0.25, 0.51]	0.00
Outcome Type			
Continuous outcome	Ref.		
Cox-transformed binary outcome	0.47***	[0.29, 0.66]	0.00
Intercept	0.12***	[0.06, 0.18]	0.00
Outcome: Employment			
Design Type			
Quasi-experiment	Ref.		
Randomized experiment	-0.14	[-0.41, 0.12]	0.27
Intercept	0.20	[-0.07, 0.48]	0.13
Follow-up Timing			
0 < x < 12 months	0.12	[-0.03, 0.28]	0.11
12 < x < 36 months			
36 months or more	Ref.		
Intercept	0.06**	[0.01, 0.11]	0.02
Outcome Type			
Continuous outcome	Ref.		
Cox-transformed binary outcome	0.01	[-0.14, 0.16]	0.89
Intercept	0.10*	[-0.01, 0.21]	0.08
Outcome: Earnings			
Design Type			
Quasi-experiment	Ref.		
Randomized experiment	-0.10*	[-0.23, 0.02]	0.09
Intercept	0.15**	[0.03, 0.27]	0.02
Follow-up Timing			
0 < x < 12 months	0.03	[-0.10, 0.16]	0.64
12 < x < 36 months			
36 months or more	Ref.		
Intercept	0.05	[-0.03, 0.14]	0.21
Outcome Type			
Continuous outcome	Ref.		
Cox-transformed binary outcome	-0.01	[-0.17, 0.14]	0.80
Intercept	0.09***	[0.03, 0.14]	0.00

These findings provide some evidence that effect sizes differed systematically between the two types of evaluation designs in this sample, experiments and quasi-experiments, for the earnings outcome. On average, evaluations using experiments had smaller effects than evaluations using quasi-experiments. Because there is evidence that evaluation design affects the findings, Exhibit G-7 presents meta-analysis findings for only the sample of 25 experiments for researchers who find this to be a more credible analysis.

The findings for follow-up timing in Exhibit G-7 show no measurable differences between post-test assessment timing and effect sizes for employment or earnings. However, there does appear to be such a relationship for educational attainment, with longer-term follow-ups yielding smaller effect sizes on average than medium-term follow-ups.

Likewise, we found no systematic relationships between the type of outcome measure (binary or continuous) and effect sizes for earnings or employment outcomes. For educational outcomes, effect sizes reported using binary measures (e.g., credential receipt) were larger on average than those reported using continuous measures (e.g., number of credentials earned).

G.3 Robustness of Mean Effect Size Estimates

The approach used in our analysis to create composite effect sizes for each type of outcome requires an assumed average correlation between effect size estimates within evaluations (ρ), which we conservatively assumed to be 0.80 (Tanner-Smith & Tipton, 2014). Exhibit G-7 presents sensitivity analyses using various assumed values of this parameter, ranging from 0.10 to 0.90. Findings presented in Exhibit G-7 show that results were robust across assumed values of ρ.

With few exceptions, results were also robust to other analysis assumptions: excluding Cox-transformed effect sizes, Winsorizing outliers, assuming various correlation values, restricting the analysis to the 27 evaluations using experimental evaluation designs, and various alternative prior specifications. The alternative prior specifications we tested were as follows:

- Alternate Prior 1: $\mu \sim N(0.0, 0.3)$; τ unchanged
- Alternate Prior 2: $\mu \sim N(0.2, 0.3)$; τ unchanged
- Alternate Prior 3: $\mu \sim N(0.5, 0.3)$; τ unchanged
- Alternate Prior 4: $\mu \sim N(0.8, 0.3)$; τ unchanged
- Alternate Prior 5: $\mu \sim N(0.0, 0.3)$; $\tau \sim Halfnorm(0.1)$

Each of these priors specifies the average effect size, μ, as having a normal distribution. The average effect's mean (the first number in parentheses) changes across priors, but the standard deviation (the second number in parentheses) is fixed. The purpose of assessing sensitivity to priors is to test whether the results are stable across a range of priors—if they are not, we might worry about whether our prior expectations are biasing the results. Because informative priors (i.e., beliefs specified with certainty) have the biggest influence on the results (Gelman, 2006), we specified very small standard deviations for μ

that imply much more certainty about prior beliefs. (The standard deviation of 0.3 is much smaller than the standard deviation of 4.0 in the main analysis).

The first four of these priors test the effect of adopting increasingly optimistic prior beliefs about the mean impact (i.e., increasing the first number in parentheses, the distribution's mean, reflects a prior belief that the impact is more positive. The mean of 0.8 in the fourth prior is more than twice as large as what we have categorized elsewhere as a "large" effect size). As Exhibit G-7 shows, this had little effect on the findings, possibly because the large amount of data overwhelmed even these informative priors.

The fifth alternative prior reflects a tighter distribution (the "half normal"), around approximately the observed mean for τ; for this sensitivity analysis we specified 0.1 instead of the 4.0 used in the main analysis. Adopting this prior results in a small narrowing of the estimated credible intervals, i.e., an increase in precision (which would be expected), but not enough to change our characterization of the findings.

Restricting the analysis to experimentally-designed evaluations has a notable effect on the short-term earnings estimate (the average effect size for short-term earnings is smaller in the experiment-only sample (.01 vs. 07)). Excluding Cox-transformed effect sizes has a notable effect on the educational progress estimate (the average effect size is smaller in the sample without Cox-transformed effect sizes (.24 vs.55), i.e., restricting the sample to effect sizes measured using continuous outcomes). Both observations complement the findings from the sensitivity analysis reported in Exhibit G-7.

Exhibit G-7. Sensitivity Analyses Examining Robustness of Mean Effect Size Estimates

Mean Effect Size [95% Credible Interval]	Education	Employment	Employment in Industry Trained for	Short-Term Earnings	Long-Term Earnings
Primary Analysis					
	0.55 [0.41, 0.69]	0.11 [0.03, 0.20]	0.42 [0.26, 0.59]	0.07 [0.02, 0.13]	0.04 [-0.03, 0.12]
Sensitivity Analyses					
Excluding Cox-transformed effect sizes (i.e., continuous outcomes only)	0.24 [0.08, 0.41]	0.08 [-0.07, 0.22]	0.08 [-0.07, 0.22]	0.07 [0.02, 0.13]	0.04 [-0.03, 0.12]
Winsorizing outliers	0.55 [0.41, 0.69]	0.11 [0.02, 0.19]	0.42 [0.26, 0.59]	0.07 [0.02, 0.12]	0.04 [-0.03, 0.12]
Assuming ρ = .10	0.56 [0.42, 0.70]	0.11 [0.03, 0.20]	0.42 [0.26, 0.59]	0.08 [0.01, 0.14]	0.04 [-0.03, 0.12]
Assuming ρ = .20	0.56 [0.42, 0.70]	0.11 [0.03, 0.20]	0.42 [0.26, 0.59]	0.08 [0.01, 0.14]	0.04 [-0.03, 0.12]
Assuming ρ = .30	0.55 [0.42, 0.69]	0.11 [0.03, 0.20]	0.42 [0.26, 0.59]	0.08 [0.01, 0.14]	0.04 [-0.03, 0.12]
Assuming ρ = .40	0.55 [0.41, 0.69]	0.11 [0.03, 0.20]	0.42 [0.26, 0.59]	0.08 [0.01, 0.14]	0.04 [-0.03, 0.12]
Assuming ρ = .50	0.55 [0.41, 0.69]	0.11 [0.03, 0.20]	0.42 [0.26, 0.59]	0.08 [0.02, 0.14]	0.04 [-0.03, 0.12]
Assuming ρ = .60	0.55 [0.41, 0.69]	0.11 [0.03, 0.20]	0.42 [0.26, 0.59]	0.07 [0.02, 0.13]	0.04 [-0.03, 0.12]
Assuming ρ = .70	0.55 [0.41, 0.69]	0.11 [0.03, 0.20]	0.42 [0.26, 0.59]	0.07 [0.02, 0.13]	0.04 [-0.03, 0.12]
Assuming ρ = .90	0.55 [0.41, 0.69]	0.11 [0.03, 0.20]	0.42 [0.26, 0.59]	0.07 [0.02, 0.13]	0.05 [-0.03, 0.12]
Restricting to randomized experiments	0.59 [0.41, 0.78]	0.05 [0.00, 0.09]	0.33 [0.17, 0.48]	0.01 [-0.02, 0.05]	0.04 [-0.03, 0.12]
Prior 1	0.52 [0.39, 0.66]	0.11 [0.03, 0.20]	0.40 [0.24, 0.55]	0.07 [0.02, 0.13]	0.04 [-0.03, 0.12]
Prior 2	0.53 [0.40, 0.67]	0.12 [0.03, 0.20]	0.41 [0.25, 0.57]	0.08 [0.02, 0.13]	0.05 [-0.03, 0.12]
Prior 3	0.55 [0.41, 0.68]	0.12 [0.04, 0.21]	0.43 [0.27, 0.59]	0.08 [0.02, 0.14]	0.05 [-0.02, 0.12]
Prior 4	0.56 [0.43, 0.70]	0.13 [0.04, 0.21]	0.45 [0.30, 0.61]	0.08 [0.02, 0.14]	0.06 [-0.02, 0.13]
Prior 5	0.54 [0.43, 0.66]	0.12 [0.04, 0.19]	0.43 [0.30, 0.56]	0.07 [0.02, 0.13]	0.05 [-0.02, 0.11]

Notes: ρ (rho) = assumed average correlation between effect sizes. Results from analyses in the Bayesian statistical framework.
Source: Authors' computations from D&A CP Project meta-analysis dataset.

Appendix H: Templates for Evaluation Information Needed for Meta-Analyses

Exhibit H-1 provides a template for the data needed to consistently code effect sizes, as described in section 4.2.3 **Improving the Consistency of Evaluation Reporting.**

Exhibit H-1. Sample Table Shell for Reporting Impact Analysis Results

A	B	C	D	E	F	G	H	I	J	K	L
Outcome Measure	Treatment Group N	Unadjusted Treatment Group Mean	Unadjusted Treatment Group SD	Comparison Group N	Unadjusted Comparison Group Mean	Unadjusted Comparison Group	Unadjusted Comparison Group SD	Impact Estimate	How was Impact Estimate Computed?	Standardized Difference	*p*-value

Also commonly needed in systematic evidence reviews is an assessment of attrition (Clearinghouse for Labor Evaluation and Research, 2015). Exhibit H-2 provides a template for the data needed to do so.

Exhibit H-2. Table Shell for Reporting Sample Sizes Needed to Assess Attrition

A	B	C	D	E
Outcome Measure	Treatment Group N Assigned	Treatment Group N Observed	Comparison Group N Assigned	Comparison Group N Observed