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CAAL-Skills: Study of Workforce Training Programs in California



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Abbreviations and acronyms

ABE	Adult Basic Education
AEFLA	Adult Education and Family Literacy Act
AJCC(s)	American Job Center(s) of California
ASE	Adult Secondary Education
CAAL- Skills	Cross-System Analytics and Assessment for Learning and Skills Attainment
CalWORKs	California Work Opportunity and Responsibility to Kids
CCCCO	California Community College Chancellor's Office
CDE	California Department of Education
CDSS	California Department of Social Services
CTE	Career and Technical Education
CWDB	California Workforce Development Board
DIR	Department of Industrial Relations
DOL	Department of Labor
DOR	Department of Rehabilitation
EDD	Employment Development Department
ESL	English as a Second Language
ETP	Employment Training Panel
FY(s)	Fiscal year(s)
LSOD	Level of Significance of Disability
SCA	State Certified Apprenticeship
SNAP	Supplemental Nutrition Assistance Program
T1A	WIOA Title I Adults
T1DW	WIOA Title I Dislocated Workers
T1Y	WIOA Title I Youth
T2AE	WIOA Title II Adult Education
T4VR	WIOA Title IV Vocational Rehabilitation
TAA	Trade Adjustment Assistance
TANF	Temporary Assistance for Needy Families
TRA	Trade Readjustment Allowance
UI	Unemployment Insurance
WIA	Workforce Investment Act

WIOA Workforce Innovation and Opportunity Act
WP Wagner-Peyser
WtW Welfare-to-Work

Executive Summary

The Cross-System Analytics and Assessment for Learning and Skills Attainment (CAAL-Skills) is an inter-agency partnership led by the California Workforce Development Board (CWDB). It compiles data from eleven programs administered by seven state agencies to support research and evaluation of workforce training programs in California. These programs serve a diverse population of over one million workers annually with the goal of developing and maintaining a skilled and resilient workforce. The agencies and programs include:

- California Community Colleges Chancellor's Office: Career and Technical Education (CTE)
- California Department of Education: Workforce Innovation and Opportunity Act (WIOA) Title II – Adult Education (T2AE)
- California Department of Social Services: Welfare-to-Work (WtW)
- Employment Development Department: WIOA Title I – Adults (T1A)
- Employment Development Department: WIOA Title I – Dislocated Workers (T1DW)
- Employment Development Department: WIOA Title I – Youth (T1Y)
- Employment Development Department: WIOA Title III – Wagner-Peyser (WP)
- Employment Development Department: Trade Adjustment Assistance (TAA)
- Department of Industrial Relations: State Certified Apprenticeship (SCA)
- Department of Rehabilitation: WIOA Title IV – Vocational Rehabilitation (T4VR)
- Employment Training Panel (ETP)

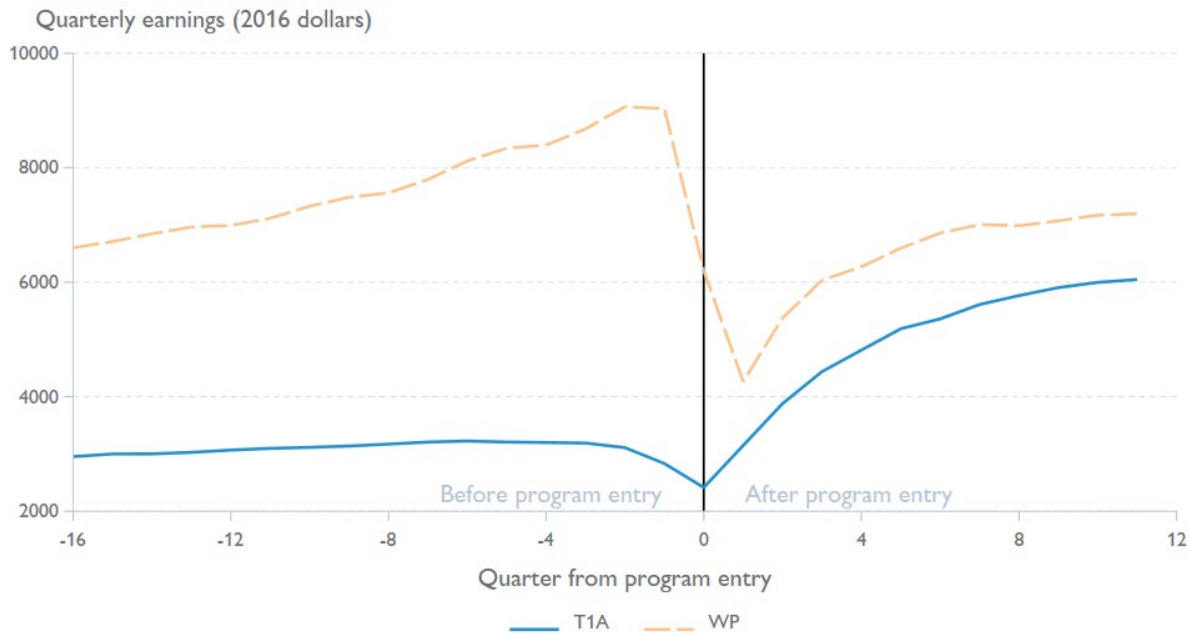
Given the need to repeatedly reference multiple programs, we will often rely on the indicated acronyms in parentheses above.

This study uses the CAAL-Skills data to provide evidence on whether receiving training in a program included in CAAL-Skills led to improved labor market outcomes for participants. To do this, the study compares outcomes for trainees from each program to those from an alternative group of individuals who did not receive training but are otherwise similar. Although the same research design was used to estimate the effects of training from each program, the key challenge was identifying the most credible comparison group available for each. This study focuses on estimating impacts for

those who entered a training program during fiscal years (FY) 2014–15 and 2015–16 and are measured at the quarterly level up to three years after program entry. These years were selected for the study based on available data to allow for three years of employment outcomes to be observed after program entry – a length of time that has been identified as relevant for impacts from training programs to materialize. Once these strategies are established, updates to these results for participants from later years should be available as additional data becomes available.

The research approach is a non-experimental design whereby outcomes for program trainees are compared to those for a group of comparable workers with similar demographics and pre-program work experiences from within the same labor market. For example, Figure ES.1 presents earnings trends for T1A and WP participants who entered their programs during FYs 2014–15 and 2015–16. The earnings trajectories are centered at the quarter of program entry for each participant so that quarter 0 represents the quarter of enrollment. Notice that four full years of quarterly earnings are available in this example, as for all programs included in this study. In this example, the T1A and WP groups have very different earnings trends before program entry. This makes a direct comparison of outcomes across the programs unbelievable as measures of impact because the populations are clearly different. Even several years before program entry, WP participants earned more than twice as much as the T1A group, on average. Moreover, while both groups experience an earnings dip before program entry (that is, a steep earnings loss), the WP dip is much more severe. As is, such differences make it impossible to know what portion of any post-program differences in outcomes is due to the effects of the programs versus reflecting the preexisting differences between their participants.

FIGURE ES.1. Quarterly earnings for T1A participants and WP participants from FYs 2014–15 and 2015–16



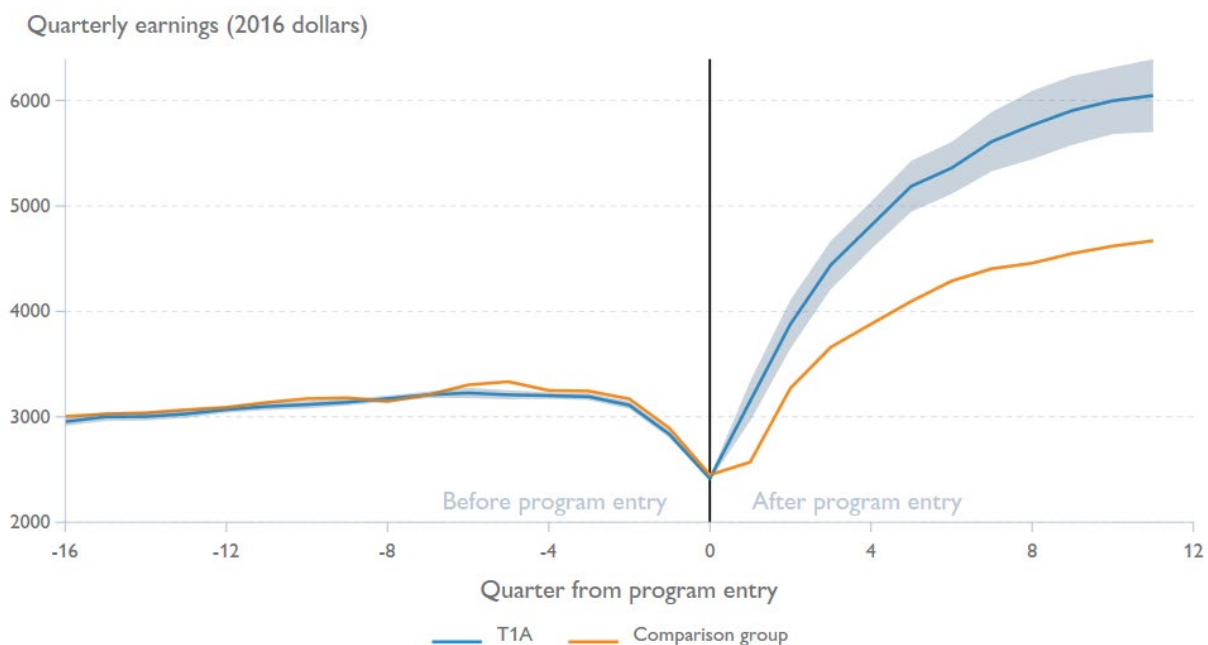
Notes: Authors' summaries of earnings data from the Unemployment Insurance Base Wage files.

The strategy implemented in this study addresses the comparison challenge in two steps. In the first step, the study authors attempted to identify for each program a sample of non-trainees that could be used to identify a credible comparison group. The broader group of potential comparison individuals can be thought of as a donor pool, and it is identified based on situational similarities. For example, individuals in the donor pool may have had access to the training program, or they may share similar attachments/barriers to the labor market. These donor pools could come from within the same program but from those who did not receive training, or they could come from another workforce program included in CAAL–Skills that did not provide training. For several programs, WP participants serve as a promising donor pool because the WP program is available to anyone with a legal right to work and the employment services provided – such as job search assistance – typically do not include job training. Further, WP serves a large and diverse set of works across California.

In the second step, the study design relies on statistical strategies to create subgroups of the donor pools to form comparison groups that are nearly indistinguishable from program trainees on demographics, timing and location of services, and the four years of pre-enrollment employment and earnings information. The goal of these statistical adjustments is to create comparison groups that are observationally equivalent before any comparison is made. The main assumption for producing evidence of a causal impact is that this similarity is sufficient to explain any differences between groups before outcomes are compared.

If the statistical strategy to identify an appropriate comparison group works, then evidence of these similarities could be visually presented. For example, Figure ES.2 demonstrates the results of this design when applied to T1A trainees and WP participants. The figure is similar to that displayed in ES.1, but it is distinct in a crucial aspect: the WP participants in ES.1 represent the full donor pool while the WP participants in ES.2 represent a comparison group specific for T1A trainees that resulted from statistical adjustment. Specifically, the figure presents outcomes for a subgroup of WP participants that were selected to match characteristics of T1A trainees prior to enrollment. The figure indicates the design was successful at identifying a quality match, with a nearly overlapping earnings trajectory over the four years before program entry among T1A trainees and the selected comparison group.

FIGURE ES.2: Quarterly earnings comparisons between T1A trainees from FYs 2014–15 and 2015–16 with a similar WP comparison group



Notes: Quarterly earnings are presented in 2016, quarter 1 prices using the consumer price index. The light-blue shaded region around the T1A trend line represents a 95% confidence band. See Chapter 4.1 for details.

Unfortunately, the research design did not work as well for all programs. Specifically, there were instances where no credible donor pool was available, as well as instances when statistical adjustment was unable to identify indistinguishable comparison groups from the donor pool. In these cases, the authors do not interpret outcome differences as reflective of program effects. For each program, the authors classified the comparisons as (1) being able to provide evidence; (2) being able to provide suggestive evidence – in cases where the design mostly works but has some remaining challenges; or (3) not able to provide evidence, due to remaining incomparability between the group of participants and the constructed comparison group. When the comparisons are classified as able to provide evidence or suggestive evidence, the authors interpret differences in earnings and employment outcomes between the two groups after program entry as the impact resulting from training. However, for comparisons classified as not being able to provide evidence, any measured differences are not interpreted as resulting from that program’s training. In such cases, the study still includes differences in outcomes because they may be useful as a

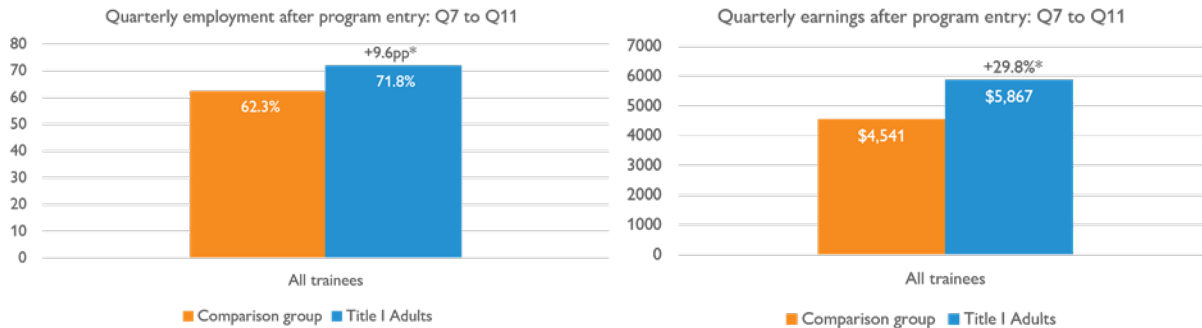
representation of what a study that could measure impacts would look like. However, these differences are not presented as findings related to estimated impacts.

It is important to note that the research design used in this study attempts to identify impacts for each program independently and is not intended to compare programs to each other. The populations served in each program vary considerably, and impacts from the analyses conducted should be interpreted as specific to that program. Further, the conclusions and level of available evidence vary by program. The research design was able to identify evidence of program impacts for some programs, while the conclusions are limited to suggestions for data enhancements for others. The main study findings for each program are summarized here:

The **WIOA Title I – Adults** program provides a combination of career, training, and supportive financial services to workers through American Job Centers of California (AJCCs). The program tends to serve middle-aged workers experiencing unemployment with some previous attachment to the labor force – although this attachment may not be strong. The main T1A group considered in this study is participants who received training services, such as occupational classroom training or on-the-job training.

- **Comparison group:** The main comparison group for T1A trainees comes from non-T1A participants who enrolled in WP. These participants tend to be mid-career, could have enrolled through AJCCs, and may have also been eligible to enroll in the T1A program. Further, statistical adjustment led to the identification of a comparison group of WP participants who closely matched the T1A trainees on pre-participation employment and earnings, geography, and other key characteristics. **The comparison between the two groups thus provides credible evidence about the causal effect of T1A training.**
- **Findings:** T1A produces large increases in quarterly employment and earnings for T1A trainees relative to the comparison group. Quarterly employment increases by 9.6 percentage points, while quarterly earnings increase 29.8%.

FIGURE ES.3: Program impacts for T1A trainees from FYs 2014–15 and 2015–16 compared with a similar WP group



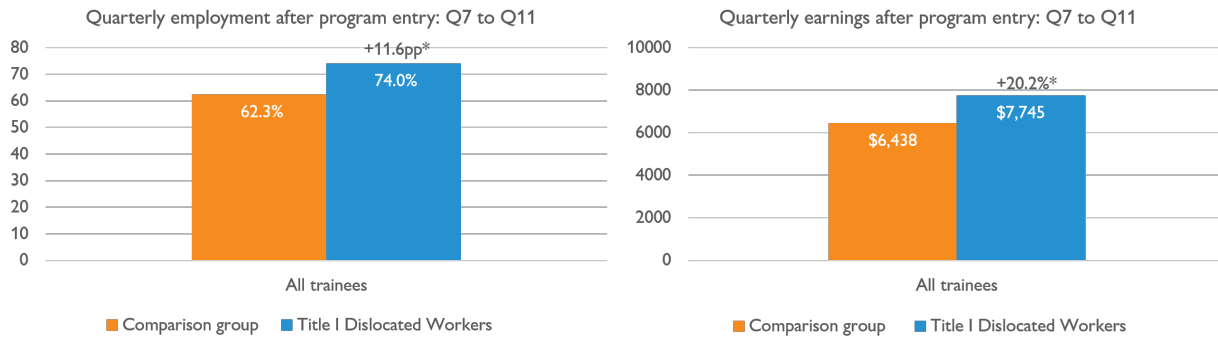
Notes: Figures represent unconditional means while the impact estimates listed above the program group’s bars are from a statistical model. Because of this, the impact estimate may not align with the difference in bars. See Chapter 4.1 for details.

* – represents statistically significant differences at a 95% level of confidence.

The **WIOA Title I – Dislocated Workers** program provides a combination of career, training, and supportive financial services to workers through AJCCs. Eligibility requirements include being laid off through no fault of one’s own, or expecting to be laid off due to declines in one’s occupation or industry. Because of this, the program tends to serve mid-career workers experiencing unemployment after having had stable attachment to the labor market. The main T1DW group considered in this study is participants who received training services, such as occupational classroom or on-the-job training.

- Comparison group:** The main comparison group comes from non-T1DW participants who enrolled in WP. These participants are mid-career, could have enrolled through AJCCs, and may have also been eligible to enroll in the T1DW program. Further, statistical adjustment led to the identification of a comparison group of WP participants that closely resembled the T1DW group’s pre-entry employment and earnings, geography, and other key characteristics. **Thus, the differences in outcomes between the two groups provides evidence about the causal effect of T1DW training.**
- Findings:** T1DW produces large increases in quarterly employment and earnings for T1DW trainees relative to the comparison group. Quarterly employment increases by 11.6 percentage points, while quarterly earnings increase by 20.2%.

FIGURE ES.4: Program impacts for T1DW trainees from FYs 2014–15 and 2015–16 compared with a similar WP group



Notes: Figures represent unconditional means while the impact estimates listed above the program group’s bars are from a statistical model. Because of this, the impact estimate may not align with the difference in bars. See Chapter 4.2 for details.

* - represents statistically significant differences at a 95% level of confidence.

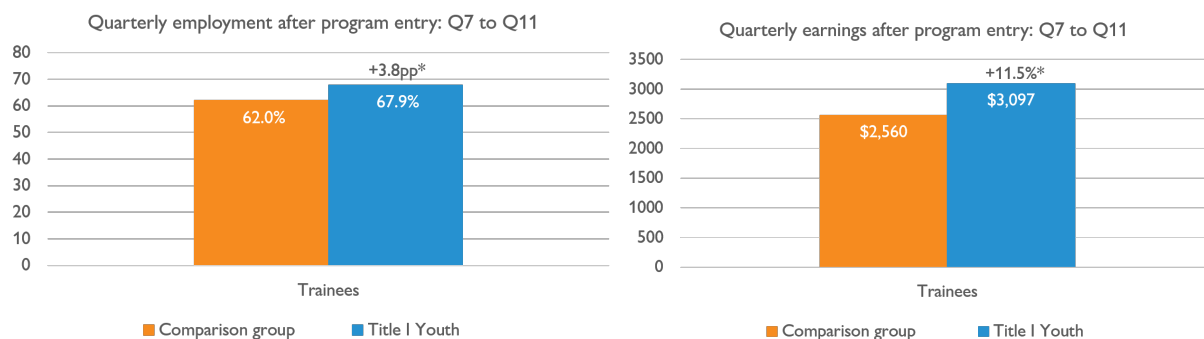
The **WIOA Title I – Youth** program provides career, training, and supportive financial services to youth (aged 14 to 24) who face barriers to employment. T1Y focuses on preparing participants for postsecondary education and employment opportunities. The main T1Y group considered in this study is participants who received training services, such as classroom training leading to a certificate or on-the-job training, and had previous labor market experience.

- Comparison group:** The study did not find a relevant donor pool to form a comparison group outside of the T1Y program given T1Y participants are young and lack stable earnings histories, and there is no comparable group of WP participants. Therefore, a within-program comparison was conducted between T1Y trainees and T1Y career service recipients with previous labor market experience who enrolled in the same quarter and labor market. Career services are activities such as one-on-one job counseling. Although they may be intensive, career services are not focused on the acquisition of basic or occupational skills.
- Suggestive evidence only:** Implementing the design resulted in a significant loss of over 60% of the T1Y trainees sample, individuals for whom a T1Y career services comparison group could not be found. Further, the identified comparison group still had evidence of differences before program enrollment. This reduces the credibility of the comparisons for this program. However,

since a reasonably similar subgroup of participants could be compared, the study authors classify this comparison as providing suggestive evidence about the causal effect of T1Y training for a subset of participants.

- **Findings:** Results provide suggestive evidence that participating in T1Y training services is beneficial. For the sample included in the comparisons, quarterly employment increases for trainees by 3.8 percentage points, while quarterly earnings increase by 11.5%.

FIGURE ES.5: Program impacts for T1Y trainees from FYs 2014–15 and 2015–16 compared with a similar T1Y career service only group



Notes: Figures represent unconditional means while the impact estimates listed above the program group’s bars are from a statistical model. Because of this, the impact estimate may not align with the difference in bars. See Chapter 4.3 for details.

* - represents statistically significant differences at a 95% level of confidence.

WIOA Title II – Adult Education provides adult education programs for individuals with barriers to employment, such as linguistic or cultural barriers. Specific programs include Adult Basic Education (ABE), English as a Second Language (ESL), and Adult Secondary Education (ASE). Because all T2AE programs provide skills training, all participants are considered trainees. However, previous earnings are required for the design to work, so the main T2AE participants considered for the study are those with previous labor market experience. Prior earnings were only available for 20% of the T2AE sample.

- **Comparison group:** The main comparison group comes from non-T2AE participants who enrolled in WP. This donor pool was selected because WP data include elements on being basic skills deficient, being an English language learner, or having cultural barriers that limit job opportunities – characteristics resembling T2AE eligibility requirements.

- **No evidence provided:** After inspection, the study team determined that the critical data elements on barriers to the labor market for WP participants were insufficient to form a comparison group for T2AE participants. Specifically, only 0.7% of the full WP sample had one of these indicators identified, which left a WP donor pool that was a small fraction of the T2AE study participants available for the design. Accordingly, the study authors concluded that no credible donor pool was available for the T2AE program. Therefore, no impact estimates for the T2AE program are provided in this study. Instead, the chapter includes outcome differences between T2AE and a group of WP participants without comparable labor market barriers, but these do not represent impacts from T2AE training.

The **WIOA Title IV – Vocational Rehabilitation** program supports workers with disabilities to prepare for and obtain employment at or above the minimum wage. It provides career, supportive and training services. Participants’ needs vary greatly and the program develops Individualized Plans for Employment to identify employment goals services that are consistent with those needs. The main T4VR group considered in this study is participants who received training services.

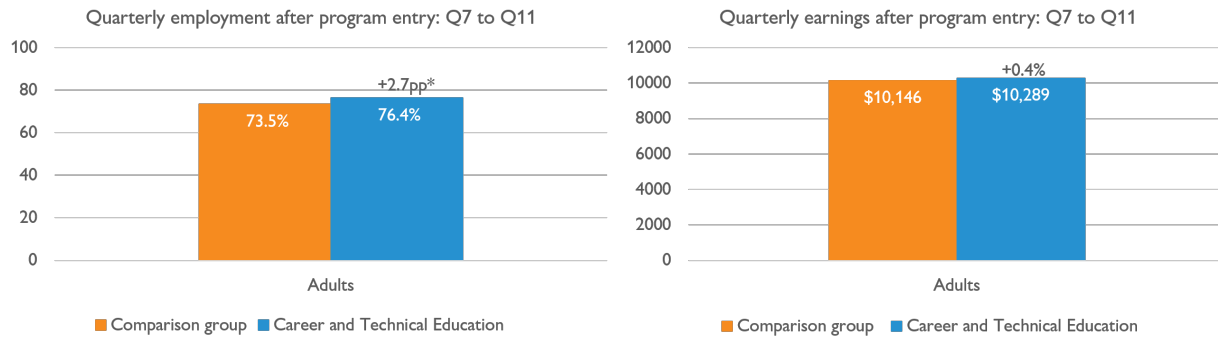
- **Comparison group:** The study did not find a relevant donor pool to form a comparison group outside of the T4VR program because no other programs had information on verified disability. Therefore, a within-group comparison was conducted between T4VR trainees and T4VR participants who did not participate in training activities.
- **No evidence provided:** T4VR participants are categorized into three levels of severity of disability and training can be directly related to an individual’s disability. These details are directly related to labor market opportunities, and may also be related to the receipt of training services, but they were unavailable to the study team. For that reason, the study authors concluded that no credible donor pool for T4VR trainees was available because it is not possible to ensure that a comparison group had similar disabilities or similar training needs. Therefore, no impact estimates for T4VR training are provided in this study. Instead, the chapter includes outcome differences across T4VR trainees and

non-trainees that ignores any differences in severity of disability, but these do not represent impacts from T4VR training.

Career and Technical Education refers to a multi-year sequence of courses that integrate core academics with technical and occupational knowledge. California's system of community colleges provides CTE courses, and all participants are considered trainees since the programs are designed to develop marketable skills. The program is designed for workers who need training in middle-skill careers to prepare them for postsecondary education degrees. For this study, adults, aged 25 to 49, who enrolled in at least one CTE course are considered program participants. This represents a broad definition of CTE participation and includes individuals who may not be committed to completing a sequence of CTE courses. Data limitations prevented the authors from using more refined definitions – such as those enrolling in a certain number of credits or courses – for this study.

- **Comparison group:** The main comparison group comes from non-CTE participants aged 25 to 49 who enrolled in WP in a previous year (FY 2013–14). Since CTE participation has no broad eligibility restrictions and participants are old enough to establish labor market histories, previous WP participants that have gone on to also establish stable earnings histories could serve as a reasonable comparison. Further, statistical adjustment led to the identification of a comparison group of previous WP participants that closely resembled the CTE groups' pre-entry employment and earnings, geography, and other key demographics. **Thus, the differences in outcomes between the two groups provides evidence about the causal effect of CTE participation.**
- **Findings:** CTE produces some gains in employment, but no gains in earnings. Quarterly employment increases by 2.7 percentage points for CTE participants, while quarterly earnings are nearly indistinguishable from those of the comparison group.

FIGURE ES.6: Program impacts for CTE participants from FYs 2014–15 and 2015–16 compared with a similar WP group



Notes: Figures represent unconditional means while the impact estimates listed above the program group’s bars are from a statistical model. Because of this, the impact estimate may not align with the difference in bars. See Chapter 4.6 for details.

* – represents statistically significant differences at a 95% level of confidence.

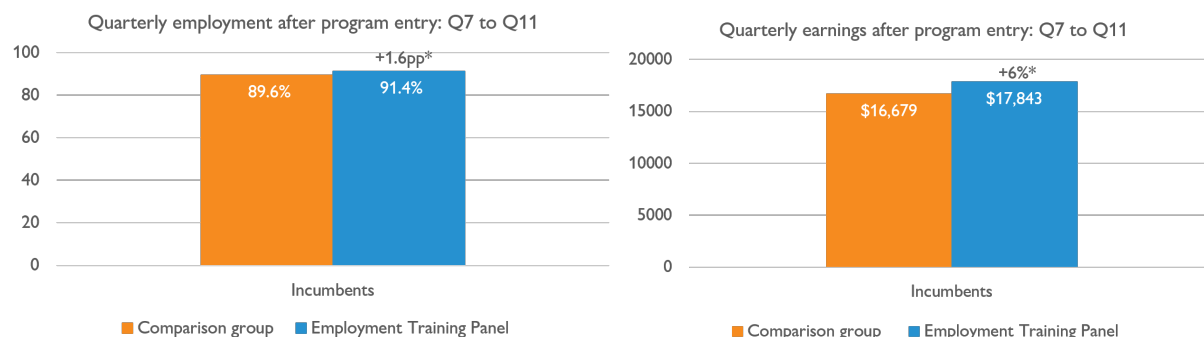
The **Employment Training Panel** funds employers to assist in upgrading the skills of their workers through training and to fill jobs that are challenged by out-of-state competition, primarily in the manufacturing and technology sectors. Funds are focused on incumbent workers – that is, those with an existing employer–employee history – but the program also covers new hires. The main ETP group considered in this study is incumbent workers enrolling in FY 2015–16. Incumbent workers are defined as having at least one year of continuous employment at the time of program entry because indicators for incumbent workers were unavailable for the study.

- **Comparison group:** The main comparison group comes from WP participants from FY 2013–14 who have at least one year of continuous employment at the time they are matched to ETP participants. Because WP participants typically have a negative employment shock at the time of enrollment, the study relies on past WP participants to allow for employment recovery after that shock. This results in two groups of workers who are both continuously employed for over a year at the time of comparison. Given these two groups, statistical adjustment led to the identification of a comparison group of previous WP participants that closely resembled ETP participants’ pre-entry employment and earnings, geography, and other key demographics.
- **Suggestive evidence only:** Despite statistical similarities, the study team noticed unexpected earnings trajectories for the comparison group. Specifically,

because the comparison group was comprised of WP participants that enrolled in FY 2013–14, the earnings trajectory should be smooth in the quarter when comparisons groups were formed. However, there is a visually identifiable change in the earnings trajectory for the comparison group exactly two years after WP enrollment. This suggests that the design may have been overcorrecting for differences between the groups. The study authors believe the comparison still provides some evidence, but the anomaly suggests the evidence should be interpreted with caution.

- **Findings:** ETP participation improves outcomes for incumbent workers. Quarterly employment is 1.6 percentage points higher, while quarterly earnings is 6% higher.

FIGURE ES.7: Program impacts for ETP incumbent-worker participants from FYs 2015–16 compared with a similar WP group



Notes: Figures represent unconditional means while the impact estimates listed above the program group’s bars are from a statistical model. Because of this, the impact estimate may not align with the difference in bars. See Chapter 4.7 for details.

* – represents statistically significant differences at a 95% level of confidence.

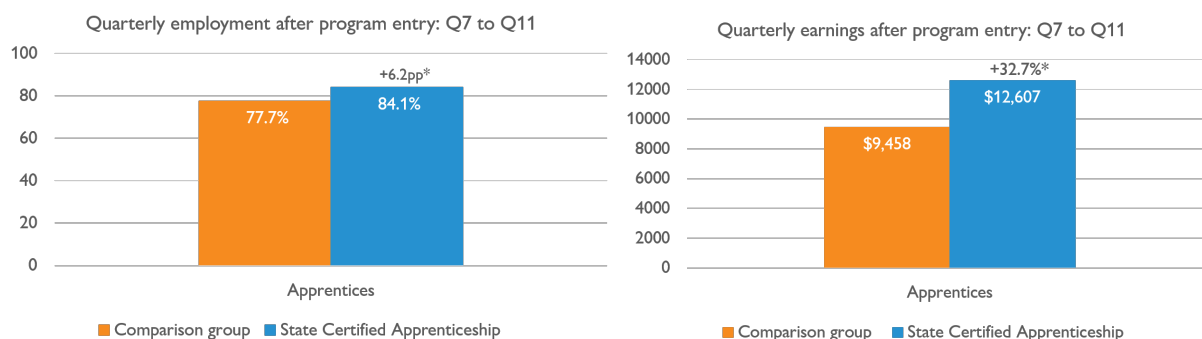
The **State Certified Apprenticeship** program trains apprentices for specified occupations according to the requirements and needs of employers. Apprenticeships are available for careers in construction, manufacturing and service sectors. Employers who sponsor programs can impose additional requirements, such as aptitude tests and minimum physical capabilities. Because these are directly related to acquiring skills, all SCA participants are considered trainees. The main SCA group considered in this study is participants with pre-enrollment earnings.

- **Comparison group:** The main comparison group comes from non-SCA participants who enrolled in WP in a previous year (FY 2013–14). Because SCA

participants may have had some employment history and the program itself could lead to direct on-the-job opportunities, previous WP participants that have gone on to also establish stable earnings histories since their WP participation could serve as a reasonable comparison. Further, statistical adjustment led to the identification of a comparison group of previous WP participants that closely resembled the SCA groups' pre-entry employment and earnings, geography, and other key demographics. **Thus, the differences in outcomes between the two groups provides evidence about the causal effect of SCA participation.**

- **Findings:** SCA produces large increases in quarterly employment and earnings for participants relative to the comparison group. Quarterly employment increases by 6.2 percentage points, while quarterly earnings increase by 32.7%.

FIGURE ES.8: Program impacts for SCA participants from FYs 2014–15 and 2015–16 compared with a similar WP group



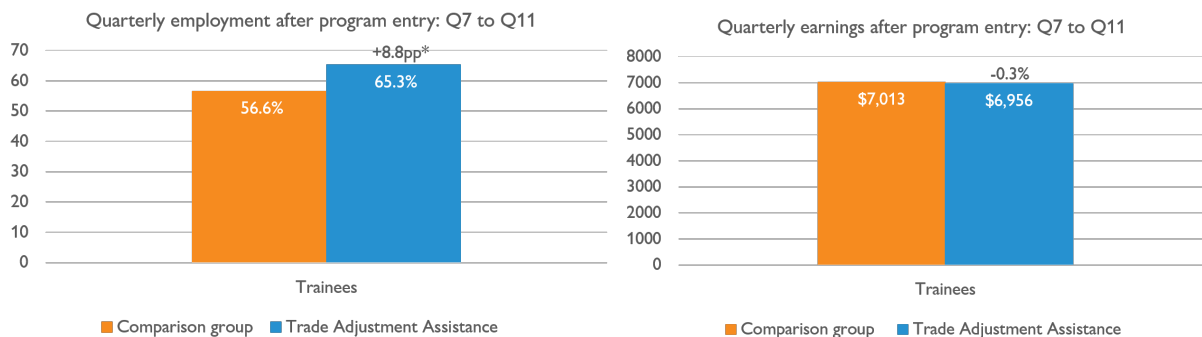
Notes: Figures represent unconditional means while the impact estimates listed above the program group's bars are from a statistical model. Because of this, the impact estimate may not align with the difference in bars. See Chapter 4.8 for details.

* - represents statistically significant differences at a 95% level of confidence.

The **Trade Adjustment Assistance** program offers career services, training services and financial support to workers experiencing job instability resulting from broad economic factors. Beyond these services, some workers are eligible to receive the Trade Readjustment Allowance (TRA) subsidy. TRA payments are available beyond exhaustion of Unemployment Insurance (UI) benefits and can be an income supplement while recipients work in jobs with lower incomes than their previous ones. The main TAA group considered in this study is participants who enrolled in training.

- Comparison group:** The main comparison group comes from non-TAA trainees who enrolled in WP. These participants are mid-career and could have experienced similar job losses from restructuring making them potentially eligible for TAA. Further, statistical adjustment led to the identification of a comparison group of WP participants who closely resembled the TAA trainees on pre-participation employment and earnings, geography, and other key characteristics. **Thus, the comparison between the two groups provides credible evidence about the causal effect of TAA training.**
- Findings:** TAA led to some positive gains in employment but no difference in earnings. Quarterly employment increased by 8.8 percentage points, while earnings were indistinguishable between the two groups.

FIGURE ES.9: Program impacts for TAA trainees from FYs 2014–15 and 2015–16 compared with a similar WP group



Notes: Figures represent unconditional means while the impact estimates listed above the program group’s bars are from a statistical model. Because of this, the impact estimate may not align with the difference in bars. See Chapter 4.9 for details.

* – represents statistically significant differences at a 95% level of confidence.

Welfare-to-Work is the workforce component of California’s Temporary Assistance for Needy Families (TANF) program, CalWORKs. It is targeted at qualifying pregnant women¹ and families with dependent children. WtW participants are able to attend training or education programs, participate in activities to remove work barriers, or engage with certain supportive services in order to satisfy work requirements for receipt of cash assistance. Since not all WtW participants receive training and the CAAL-Skills data do not include information on WtW-specific activities, the study authors could not rely on WtW data alone to identify a program group of trainees.

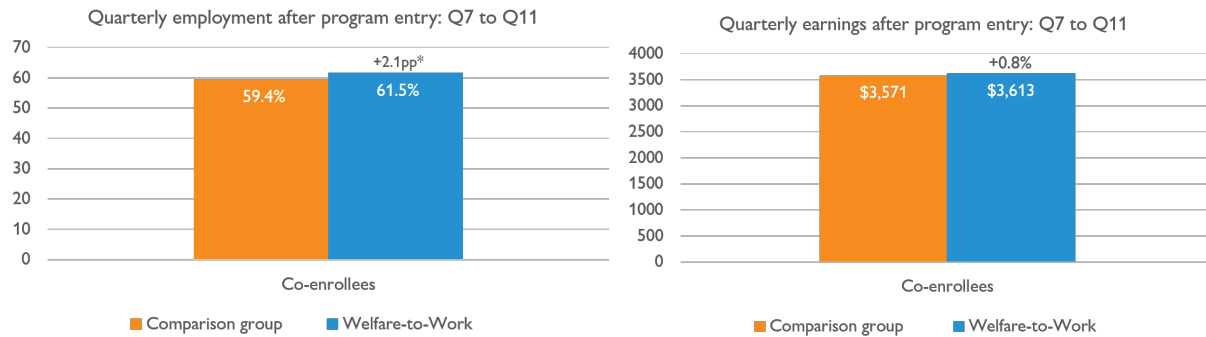
¹ Eligibility is for pregnant women who have reached the second trimester with no other qualifying children.

Instead, the study authors assume that a WtW participant received workforce services if they had enrolled in program services from another agency that reports to CAAL-Skills. Overall, 14% of WtW participants enrolled in another program reporting to CAAL-Skills while they were still enrolled in WtW. Further, since the design relies on earnings histories to construct comparison groups, the study authors focus only on the WtW participants with some previous employment history.

- **Comparison group:** Given the particular needs of WtW participants, the study did not find a relevant donor pool to form a comparison group outside of WtW. Instead, a within-program comparison was made between WtW participants who co-enrolled in another program included in CAAL-Skills and WtW participants that did not co-enroll in another program. Since these workforce programs are likely available for both groups, this forms a reasonable donor pool to create a comparison group. Further, statistical adjustment led to the identification of a comparison group of non-co-enrolling WtW participants that closely resembled the WtW co-enrolling group's pre-entry employment and earnings, geography, and other key demographics. **Thus, the differences in outcomes between the two groups provide evidence about the causal effect of WtW co-enrollment.**
- **Findings:** WtW co-enrollment had some positive impact on quarterly employment but no impact on quarterly earnings. Quarterly employment increased by 2.1 percentage points, while quarterly earnings are indistinguishable between the two groups. Note that over half of co-enrollment occurred in the WP program. Because WP does not provide training, limits on the magnitude of the impacts were expected. Also note that earnings are quite low and put annual earnings for the employed at around the federal poverty level for a family of four.²

² This is based on a 2016 annual poverty guideline of \$24,300 for a family of four and calculations for those who are employed using estimates from Figure ES.10.

FIGURE ES.10: Program impacts for WtW participants who co-enrolled in another program included in CAAL-Skills from FYs 2014-15 and 2015-16 compared with WtW participants who did not co-enroll in another program included in CAAL-Skills



Notes: Figures represent unconditional means while the impact estimates listed above the program group’s bars are from a statistical model. Because of this, the impact estimate may not align with the difference in bars. See Chapter 4.10 for details.

* – represents statistically significant differences at a 95% level of confidence.

Conclusions. This is the first study using the CAAL-Skills dataset to estimate the impacts of participation in included training programs on labor market outcomes. Hence, the findings here serve as a useful benchmark for future evaluations on workforce training programs in California. By comparing outcomes of trainees to selected comparison groups, the study authors found positive impacts on employment for the T1A, T1DW, CTE, SCA, TAA, and WtW programs. The study authors also found positive impacts on earnings for the T1A, T1DW, and SCA programs. In addition, the study found suggestive positive evidence for T1Y and ETP participants for both employment and earnings outcomes. Finally, the study authors were unable to draw conclusions for the T2AE and T4VR programs due to limitations in data or populations to create credible comparison groups.

The results outlined in this study are based on broad categorizations. Additional analyses are necessary to investigate more specific or nuanced aspects of any particular program. To extend this research further, the authors suggest:

- Investing in enhanced data collection to provide more detailed information on program participants, services, and employment information.

- Where possible, considering alternative research strategies such as randomized experiments and quasi-experimental designs to identify credible control groups.
- Identifying other populations that may serve as valid comparison groups.
- Proactively studying program improvement strategies.

1. Introduction

California maintains a robust network of workforce support and training programs that serve over one million workers annually. These programs are independently administered by multiple state agencies – each serving a diverse population with varying levels of skills and workforce attachment. Maintaining a resilient and skilled workforce is the primary goal of these programs, and California has begun to develop a unified framework across programs to allow for program evaluation and continuous quality improvement.³

To that end, the California Workforce Development Board has led a partnership of seven California agencies who administer workforce programs, ten of which were evaluated in this report. The partnership is called the Cross-System Analytics and Assessment for Learning and Skills Attainment (CAAL-Skills), and it has resulted in the creation of a unified administrative data system that can be used to study the effectiveness of these programs. The Workforce Metrics Dashboard Report, produced by the California Workforce Development Board, uses these data and provides descriptions of the included programs and data, as well as limited summaries of program and employment outcomes.⁴ As described in more detail below, this study builds on the Workforce Metrics Dashboard Report by expanding analyses to cover participants’ earnings before and after enrolling in programs and by leveraging that information to estimate causal impacts of training offered by these programs.

The CAAL-Skills data include two critical features that allow for estimating the impact of these programs on participants’ employment and earnings, referred to as “causal impact estimates.” First, unique identifiers that are consistent across programs were created, making it possible to identify individuals who participated in multiple programs.⁵ This overcomes a major challenge for estimating the impacts of training

³ The driving federal policy supporting these goals is the Workforce Innovation and Opportunity Act (2014).

⁴ The 2018 report is available here: <https://cwdb.ca.gov/wp-content/uploads/sites/43/2018/05/2148-Report-FINAL.pdf> (accessed 3/20/2021).

⁵ The exception is the Employment Training Panel. Date of birth and therefore age was unavailable for participants in this program. This is considered critical for accurately identifying individuals, so no unique identifier across programs was created for these participants by CWDB.

programs. Impact analysis requires comparing the outcomes of training participants to a similar group who were not enrolled in training, typically referred to as a “comparison group.” Historically, data silos prevented researchers from knowing whether potential comparison group members were in fact accessing training from programs other than the one being studied. The availability of cross-program participation data allows us to ensure that our comparison group is not receiving training from any of the programs included in the CAAL-Skills data. The second critical feature is that the dataset was enhanced with ten years of administrative data on quarterly employment and earnings from California’s Unemployment Insurance (UI) Base-Wage file from the Employment Development Department. This allows for the selection of comparison groups designed to match the program participants in their labor market outcomes before program entry, which dramatically boosts the credibility of the comparison for identifying program effects.

This is the first study to rely on the CAAL-Skills dataset to produce causal impact estimates for included programs. Specifically, this study will attribute differences in participants’ labor market outcomes after enrolling in a program, relative to the selected comparison group, as the impact of those programs on employment and earnings resulting from participation. The study presents these findings as a benchmark for agencies and their programs to understand how well they are broadly serving their target populations. The agencies and programs include:⁶

- California Community Colleges Chancellor’s Office (CCCCO): Career and Technical Education (CTE)
- California Department of Education (CDE): Workforce Innovation and Opportunity Act (WIOA) Title II – Adult Education (T2AE)
- California Department of Social Services (CDSS): Welfare-to-Work (WtW)
- Department of Industrial Relations (DIR): State Certified Apprenticeship (SCA)
- Department of Rehabilitation (DOR): WIOA Title IV – Vocational Rehabilitation (T4VR)
- Employment Development Department (EDD): WIOA Title I – Adults (T1A)

⁶ Note that the federal law governing the Workforce Innovation and Opportunity Act changed from the Workforce Investment Act (WIA) in July 2016. We still refer to it as WIOA given the overall structure and implementation of these services stayed the same and the CAAL-Skills data span the time period of both laws.

- Employment Development Department: WIOA Title I – Dislocated Workers (T1DW)
- Employment Development Department: WIOA Title I – Youth (T1Y)
- Employment Development Department: WIOA Title III – Wagner–Peyser (WP)
- Employment Development Department: Trade Adjustment Assistance (TAA)
- Employment Training Panel (ETP)

Given the need to repeatedly reference the above programs, we will often rely on the indicated acronyms in parentheses.

This study relies on CAAL–Skills data to produce impact results using well–established and rigorous research designs. Although the study did not have access to the ideal design – an experiment based on random assignment to participate in one of these programs – the CAAL–Skills initiative has resulted in a rich administrative dataset to implement reliable non–experimental approaches. Specifically, the study used participant characteristics, the location of services, the timing of services, and four full years of pre–enrollment earnings to build comparison groups. This resulted in comparisons from within local labor markets where program participants and their respective comparison group all shared similar background characteristics and earnings trajectories before program entry.

This research design is useful for programs that target mid–career workers who have been displaced from their jobs. For these workers, others who have similar employment and earnings histories make good comparisons, allowing the study to infer the effects of the programs with some confidence. It is less well suited for programs that serve early–career workers or those facing other challenges, for which the study may not be able to form reliable comparison groups from the CAAL–Skills samples. For example, participants in the T4VR program are known to have a disability. The authors concluded that no reliable measure of disability – particularly severity of disability – could be identified for participants from other programs. As a result, the study does not identify a comparison group for Vocational Rehabilitation outside of the program. Another example is T1Y, which serves new labor market entrants for whom prior employment and earnings histories are not particularly informative about potential subsequent opportunities. While we report estimates for

these programs, we caution against interpreting them as reflecting the causal impacts of the programs.

In addition, while the methods used in this study yield estimates of the impacts of programs, they do not explain why there are impacts or what accounts for them. To understand this, the study would need richer qualitative data on program context and variation in implementation, as well as data on program components and participant experiences. Despite these limitations, the results presented here are an important first step in establishing a baseline estimate for each program, which may be useful for guiding further study.

This study is not designed to compare programs to each other since the research designs are focused on identifying impacts for each program independently; for each program, this study forms a comparison group, but these comparison groups are themselves not comparable across programs. Because the populations served across programs – in terms of both individual characteristics and attachment to the formal labor force – vary considerably, the impacts from any comparison are specific to that program’s context. This study makes no attempt to adjust these comparisons into measures of relative effectiveness for any given population.

The outline of the report is as follows. The second section presents information on cross-program participation to understand how workers enroll, train and navigate cross-program participation. The third section describes the general methods used to create comparison groups that identify impacts for all programs. The fourth section is split into ten sub-sections that present findings for programs included in the study (we exclude a sub-section for WP since it does not provide training services). Each of these sub-chapters include a brief description of the program, the participants served, how the comparisons groups are defined, and the findings. Finally, we provide overall concluding thoughts on options for future research to better understand the impact of these programs on the Californians who participate in them.

2. Participants and cross-program participation

This section provides an overview of participants in each program. When discussing program participants, this section presents both demographic characteristics as well as characteristics that can be considered for the research design. Since labor market participation before program enrollment is critical for identifying comparable groups, the section provides an initial assessment of labor market experiences of participants across programs. The section also presents details on the extent to which participants take part in multiple programs in order to contextualize potential comparisons. This is useful for better understanding the full set of services received. It is also important information to avoid incorrectly attributing the impact of one program to another. A long-standing limitation of impact studies of workforce programs, which typically have data for only one program at a time, is the dilution of impacts that could occur when any of the workers included in the comparison were actually recipients of alternative programs that are not being explicitly captured in the design. One of the strengths of the CAAL-Skills dataset is that it allows for an assessment of the prevalence of this type of co-enrollment for any of the programs covered.⁷

The top panel of Table 2.1 presents some demographic characteristics across programs for participants from Fiscal Years (FYs) 2014–15 and 2015–16 that were consistently observable across datasets.⁸ Throughout this report, the analyses will be broken down by key demographic features including age, gender, ethnicity, and race.

The features available for the study reflect how data are reported by the various programs. All programs report gender as a binary characteristic of either “Male” or “Female.” However, four of the programs include missing values for this characteristic, which are reported in Table 2.1: T2AE (0.02%), T4VR (0.01%), CTE (1.3%), and WP (7.8%). We report these rates when describing program participants, but given the low

⁷ Note: Employment Training Panel participants are not included in cross-program analyses due to unavailable data.

⁸ Program participants with missing geographic information (11% of Adult Education participants, 2% of Vocational Rehabilitation participants, and less than 1% of participants in the remaining programs) were excluded from all analyses.

rates of missing values, and given the importance of this characteristic for the design, those with missing values are not included in the impact analysis. In categorizing participants by race and ethnicity, we were faced with different coding schemes across programs. Some measured race and ethnicity as separate categories, and others as a single categorical measure; some had fine distinctions and others coarse ones. We settled on two approaches. For EDD and CCCCO programs, which coded race and ethnicity separately, we maintained that distinction: We used ethnicity information to code a binary Hispanic measure, and race information to assign racial groupings. For other programs, we coded participants as Hispanic if that was indicated, and if it was not, we coded the race. Thus, for these programs our various racial and ethnic categories are mutually exclusive. For both sets of programs, we used four racial groups that were consistently measured across all programs: White, Black, Other/Multiple, and Declined to State.⁹

The California workforce service and training programs included in CAAL–Skills serve very different populations. TAA has the highest average age (49), and T1Y, which focuses on youth, serves the youngest average age (19). There is also considerable variation across groups in terms of race and ethnicities served. Hispanic workers are much more represented in T2AE and T1Y programs, whereas Black workers are most represented in the T1A program. White workers are most highly represented in the T1DW program. For gender, the most notable difference across programs is the overrepresentation of males in SCA programs (93%) and ETP (68%), and their underrepresentation in WtW (29%). Finally, self-reported disability is generally less than 10% for all programs except T4VR, which focuses on serving participants with diagnosed disabilities. (Disability information was not available to study authors for ETP or SCA participants.)

As will be described in the Methods section (Ch. 3), this study’s research design relies on the availability of earnings information before program entry to identify the impacts of training programs on a participant’s post–entry labor market outcomes. The programs vary considerably in the availability of this critical information. The bottom

⁹ Note that the flexible coding strategy for Hispanic participants in EDD programs still allows for comparisons to programs that were not coded in this way because the majority of Hispanic participants in EDD programs did not select a race in addition to identifying as Hispanic.

panel of Table 2.1 presents characteristics that are relevant to the research design, including the percent that have any positive pre-entry earnings (as recorded in the UI Base Wage earnings file) across a four-year window before entering the program. In programs that cater to those with strong workforce attachment, such as T1DW, the ETP, or TAA, nearly all participants in the sample have pre-entry earnings. However, many fewer participants have pre-entry earnings for programs catering to younger workers, such as T1Y (45%) or CTE (67%). Finally, some programs, such as T2AE, where only around a quarter of participants had pre-entry earnings (25%), serve participants who may be tenuously connected to formal employment.

The bottom panel of Table 2.1 also presents statistics on the percent of participants in each program who receive training. Many participants receive other services but not training, and there is wide variation in training receipt across programs. For those where enrollment is tied directly to educational or occupational services – T2AE, CTE, ETP, and SCA – we consider enrollment as receiving training by definition. For the remaining programs, the share participating in training ranged from 24% for T1A to 58% for T1Y. Note that based on conversations with the California Department of Social Services, participation in WtW can include other job readiness activities besides training. Because no data on training through WtW was available, the authors identify WtW “trainees” as those who co-enrolled in or cross-trained with another program reporting to CAAL-Skills.

Finally, the bottom panel of Table 2.1 presents the prevalence of co-enrollment or cross-training in the other programs included in the CAAL-Skills data.¹⁰ This is done using a cross program ID in the CAAL-Skills dataset to match records across programs, allowing us to identify unique individuals who participate in more than one program. The study defines co-enrollment as enrollment in a second program while still being enrolled in the first program. By this definition, there is considerable variation in co-enrollment, ranging from 7% of WP participants enrolled in another program to 52% for TAA participants. The small percentage of co-enrollment for WP is expected given it serves over a million workers, many more than most of the other programs. However,

¹⁰ The California Workforce Development Board created consistent and unique cross-program IDs that could be used for the purpose of linking individuals across files. This was done using names, dates of birth, and social security numbers. These links were unavailable for the ETP program.

even some medium-sized programs did not have significant co-enrollment, for example WtW (14%). Some cases where we do see high rates of co-enrollment are programs administered by the same agency – particularly the Employment Development Department (WIOA Title 1 programs, WP, and TAA).

Again, enrollment in a second program does not imply receipt of training from that program. Thus, we also identified those who cross-trained (that is, received training from a second program while enrolled in a first program). Overall, the percentage of individuals who cross-trained is relatively small – generally under 10% across programs. The exception is the SCA program, with 17% of participants cross-training. However, one of the services offered by the CTE program is “apprenticeship” courses, and, as shown below, co-enrollment between SCA and CTE programs is relatively large, so this likely reflects a component of one program being accessed as part of the other program.

TABLE 2.1. Demographic and potential design characteristics of program participants considered for the study from FYs 2014–15 and 2015–16

	T1A	T1DW	T1Y	T2AE	WP	T4VR	CTE	ETP	SCA	TAA	WtW
Age (average years)	37	43	19	35	39	33	28	.u	29	49	31
Gender ^a											
Male	48%	49%	47%	44%	48%	58%	51%	68%	93%	52%	29%
Female	52%	51%	53%	56%	44%	42%	48%	32%	7%	48%	71%
Binary gender not selected	0%	0%	0%	0%	8%	0%	1%	0%	0%	0%	0%
Ethnicity ^b											
Hispanic	40%	40%	60%	63%	35%	36%	41%	33%	52%	32%	44%
Identified as not Hispanic	52%	48%	36%	37%	38%	64%	56%	67%	48%	53%	56%
Race ^b											
Black	24%	12%	20%	5%	9%	18%	9%	5%	8%	5%	15%
White	39%	43%	38%	13%	31%	37%	42%	35%	34%	30%	25%
Combined-groups	11	13	8	18	10	9	20	27	7	31	16
Hispanic; race unknown	21	23	33	n.a.	26	n.a.	30	n.a.	n.a.	n.a.	n.a.
Declined to state race/ethnicity	8%	12%	4%	1%	26%	0%	3%	0%	0%	15%	0%
Disability (self-identified)	8%	4%	9%	1%	5%	100%	4%	.u	.u	1%	5%
Research design characteristics											
Has pre-entry earnings ^c	78%	98%	45%	25%	89%	49%	67%	98%	85%	99%	71%
Trained in program	24%	26%	58%	100%	.u	48%	100%	100%	100%	58%	0%
Co-enrolled after entry	39%	41%	50%	6%	7%	13%	6%	.u	17%	52%	14%
Cross-trained after entry	4%	5%	7%	2%	3%	7%	2%	.u	14%	8%	7%
Number of participants	77,183	38,250	24,827	400,476	1,138,313	44,348	930,327	170,152	47,662	1,272	311,670

Notes: Data come from separate agency files shared with the California Workforce Development Board for CAAL-Skills. Number of participants refers to unique participants (identified by identifiers in the CAAL-Skills data) who entered one of the listed programs between calendar quarters 2014.Q3 through 2016.Q2 and their geographic location was known (which is needed for the research design). “Co-enrolled” is defined as enrolling in another CAAL-Skills program while still enrolled in the focal program. “Cross-trained” is defined as receiving training from one of the other CAAL-Skills programs while still enrolled in the focal program.

a - Only binary gender selections of Male and Female were available across all programs. However, this characteristic had missing values for T2AE (.02%), WP (7.8%), T4VR (.01%), and CTE (1.3%).

b – Programs administered by EDD (T1A, T1DW, T1Y, WP) and CCCCCO (CTE) allowed individuals to self-identify Hispanic ethnicity separately from race. Ethnicity rows do not sum to 100 because some individuals decline to self-identify and are therefore not classified into a group. For EDD and CCCCCO, the race classification includes Hispanic individuals who do not identify another race.

c – based on four years preceding program enrollment from the Unemployment Insurance System’s Base Wage earnings files.

n.a. – not applicable because individuals who self-identified as Hispanic in this program were not allowed to also select race.

.u – data are unavailable.

To better understand cross-program participation, this study presents a full accounting of co-enrollment and cross-training for each CAAL-Skill program. The top panel of Table 2.2 presents the percent of the program participants that enroll in a second program while still enrolled in the first program. The bottom panel presents the percent of program participants that are trained by a second program while still enrolled in the first program. The results for each program are:

WIOA Title 1 Adult, Dislocated Worker, and Youth (T1A, T1DW, T1Y) participants are frequently co-enrolled with WP, but they do not receive large amounts of training from other programs. This is not surprising given WP may represent an “entry program” to workforce services across American Job Centers in California. The next most commonly co-enrolled program is CTE, which is also relevant for cross-training. This is also unsurprising given that CTE may represent training services supported by WIOA Title 1.

WIOA Title 2 Adult Education (T2AE) participants are not meaningfully co-enrolled or cross-trained.

WIOA Title 3 Wagner-Peyser (WP) participants represent the largest sample of workers. Given this, the rate of cross-program participation for the full pool of WP participants is low, though the small share of co-enrolled participants can still constitute large shares of co-enrolled participants in other programs (like WIOA T1).

WIOA Title 4 Vocational Rehabilitation (T4VR) participants are not meaningfully co-enrolled or cross-trained in any of the other CAAL-Skills programs, with the exception of 5% being enrolled in CTE courses.

Career and Technical Education (CTE) participants are not meaningfully co-enrolled or cross-trained.

Employment Training Panel (ETP) participants could not be compared to other programs due to data unavailability. However, these participants are working for employers and are likely not co-enrolled.

State Certified Apprenticeship (SCA) participants are meaningfully co-enrolled and cross-trained in CTE programs at 15%, consistent with the notion that CTE provides courses relevant for the apprenticeship program.

Trade Adjustment Assistance (TAA) participants are meaningfully co-enrolled in WP and T1DW, but not any of the other programs, and do not meaningfully receive training from any other program.

Welfare-to-Work (WtW) participants are not largely co-enrolled by any one program. The largest co-enrolled program is WP at 8%, which is a light-touch program that does not regularly provide training.

Overall, the rates of cross-program participation are not as high as initially expected. Moreover, in instances where co-enrollment is more sizable, this appears to reflect coordination among programs that are intended to overlap rather than simultaneous participation in wholly distinct programs. Given these patterns, the study will not exclude participants from the study of any one program based on co-enrollment or cross-training received in another program.

TABLE 2.2. Co-enrollment and cross-training at time of enrollment for participants from FYs 2014–15 and 2015–16

	Observations	Across programs	T1A	T1DW	T1Y	T2AE	WP	T4VR	CTE	SCA	TAA	WtW
Co-enrolled after entry												
WIOA Title I: Adults	77,183	39%	n.a.	0.2%	0.2%	1.3%	34.3%	0.8%	2.2%	0.9%	0.0%	1.8%
WIOA Title I: Dislocated Workers	38,250	41%	0.4%	n.a.	0.0%	1.0%	36.5%	0.3%	2.2%	0.6%	1.2%	1.3%
WIOA Title I: Youth	24,827	50%	0.5%	0.0%	n.a.	1.9%	45.2%	0.7%	4.4%	0.1%	0.0%	1.6%
WIOA Title II: Adult Education	400,476	6%	0.4%	0.1%	0.2%	n.a.	2.4%	0.2%	1.7%	0.1%	0.0%	1.8%
WIOA Title III: Wagner–Peyser	1,138,313	7%	2.5%	1.7%	1.0%	0.4%	n.a.	0.1%	0.9%	0.1%	0.0%	0.9%
WIOA Title IV: Vocational Rehabilitation	44,348	13%	1.4%	0.2%	0.4%	1.4%	5.0%	n.a.	5.0%	0.2%	0.0%	0.7%
Career and Technical Education	930,327	6%	0.4%	0.1%	0.1%	0.9%	2.9%	0.3%	n.a.	0.5%	0.0%	0.9%
State Certified Apprenticeship	47,662	17%	1.0%	0.4%	0.0%	0.4%	3.3%	0.1%	12.8%	n.a.	0.0%	0.4%
Trade Adjustment Assistance	1,272	52%	2.1%	34.1%	0.0%	2.5%	23.3%	0.3%	2.0%	0.0%	n.a.	0.9%
Welfare-to-Work	311,670	14%	1.3%	0.2%	0.2%	2.8%	7.4%	0.2%	3.2%	0.2%	0.0%	n.a.
Cross-trained after entry												
WIOA Title I: Adults	77,183	4%	n.a.	0.1%	0.1%	1.3%	0.0%	0.2%	2.2%	0.9%	0.0%	0.0%
WIOA Title I: Dislocated Workers	38,250	5%	0.1%	n.a.	0.0%	1.0%	0.0%	0.1%	2.2%	0.6%	0.7%	0.0%
WIOA Title I: Youth	24,827	7%	0.2%	0.0%	n.a.	1.9%	0.0%	0.5%	4.4%	0.1%	0.0%	0.0%
WIOA Title II: Adult Education	400,476	2%	0.2%	0.1%	0.1%	n.a.	0.0%	0.1%	1.7%	0.1%	0.0%	0.0%
WIOA Title III: Wagner–Peyser	1,138,313	3%	0.6%	0.4%	0.5%	0.4%	n.a.	0.0%	0.9%	0.1%	0.0%	0.0%
WIOA Title IV: Vocational Rehabilitation	44,348	7%	0.2%	0.0%	0.2%	1.4%	0.0%	n.a.	5.0%	0.2%	0.0%	0.0%
Career and Technical Education	930,327	2%	0.1%	0.1%	0.1%	0.9%	0.0%	0.1%	n.a.	0.5%	0.0%	0.0%
State Certified Apprenticeship	47,662	14%	0.5%	0.2%	0.0%	0.4%	0.0%	0.0%	12.8%	n.a.	0.0%	0.0%
Trade Adjustment Assistance	1,272	8%	0.2%	3.3%	0.0%	2.5%	0.0%	0.0%	2.0%	0.0%	n.a.	0.0%
Welfare-to-Work	311,670	7%	0.4%	0.1%	0.1%	2.8%	0.0%	0.1%	3.2%	0.2%	0.0%	n.a.

Notes: Data come from separate agency files shared with the California Workforce Development Board for CAAL–Skills. Participants are included in the files if they entered one of the listed programs between calendar quarters 2014.Q3 through 2016.Q2, were shared with the research team, and had participant location available. The Employment Training Panel program is excluded from this table because a unique identifier for this program across programs was unavailable for the study.

3. Methods

This section presents an overview of the research design as well as challenges and solutions. The overall goal of the design is to identify comparison groups for each program so that impacts of program participation can be estimated by comparing mean outcomes after program entry. The study does so by identifying comparison groups that are observationally similar to program participants from a donor pool before program entry. To implement this approach, the study has to address various design challenges. These challenges include variation across programs in the composition of participants, the availability of relevant comparison groups, and making correct statistical inferences.

Main Approach. This study attempts to measure the effectiveness of CAAL-Skills programs using a non-experimental research design. The main approach followed throughout the study uses administrative data available from CAAL-Skills to compare the short- and long-term outcomes of participants of a given program to the outcomes of individuals that have not received the program. We will refer to the latter as a comparison group. The impact of the program is measured as the difference in mean outcomes between program participants and the comparison group. The credibility of this approach rests on the choice of the comparison group. Ideally, the comparison would reflect what would have happened to program participants, had they not entered the program.

For each program, we choose a comparison group of individuals that (1) have similar demographic characteristics, (2) had similar employment and earnings histories, and (3) lived in the same area as program participants in the period before the program. The credibility of the resulting estimates of program impact relies on whether it is plausible that non-participants with similar demographic and career backgrounds reflect what would have happened to participants had they not enrolled in the program. For many training programs in the CAAL-Skills data, the richness of the available administrative data allows for matching program participants to similar non-participants along many dimensions. In particular, a strength of this study is that four years of pre-program earnings trends are available for requiring observational

equivalence, where other studies have relied on as few as two years of pre-program quarterly earnings from UI Base Wage files (e.g., Mueser et al. 2007).

The use of demographic characteristics and career history to choose appropriate comparison groups has a rich history when studying workforce support and training programs. Although the specific assumption has been referred to by different names, it has been invoked by some of the earliest rigorous studies on job-training programs that rely on administrative earnings data (Ashenfelter and Card, 1985; Card and Sullivan, 1988), and continues to be used to study programs in CAAL-Skills. This includes WIOA's Title I predecessor, the Workforce Investment Act's Adult and Dislocated Workers programs (Andersson et al. 2016; Heinrich et al., 2013), as well as the Trade Adjustment Assistance program (Schochet et al. 2012). In these examples, the research designs relied on having more than one year of employment and earnings histories before program enrollment that was then used to ensure compared groups were similar. The importance of this over-one-year time window is related to the instability of employment and earnings that generally presents as a dip in earnings immediately preceding entry into employment support and training programs (Ashenfelter 1978; Heckman and Smith 1999). The intuition for using the longer earnings history is that it more accurately reflects the long-term earnings potential of individuals entering training programs.

Implementation of main approach. To form comparison groups that best match the characteristics of program participants, this study relies on a strategy called "entropy balancing" (Hainmueller, 2012). This is a state-of-the-art approach that is able to consider many pre-enrollment characteristics and hence is particularly well-suited for a data-rich environment such as CAAL-Skills. The details are discussed in the Methods Appendix. To obtain the best possible comparison groups, the study chooses a separate comparison for each program. Program-specific aspects that determined the choice of the best comparison group will be discussed in the chapters devoted to each program. In addition, the following empirical requirements were implemented throughout: (1) comparisons should be made within the same labor markets to ensure workers had access to similar jobs, and (2) comparison groups should be balanced on characteristics before program entry. Both of these requirements have been specifically identified as important for implementing credible non-experimental approaches when estimating labor market impacts of training programs (Heckman et al. 1997;

Glazerman et al. 2003), including a recent example that applies similar methods to the predecessor of WIOA T1 programs (Andersson et al. 2016).

To satisfy the first requirement on similar labor markets, this study limits all comparisons to be between individuals who are identified within the same time and place. For *time*, this study only made comparisons between groups of individuals that had entered one of the programs in the CAAL–Skills dataset in the same calendar quarter. For example, participants who started the TAA program in 2014Q4 were compared to people who entered WP in 2014Q4, not in any other quarter. To simplify the analysis and presentation of results across two fiscal years, this study indexes the quarter of entry as quarter 0 for all comparisons. For *place*, the study attempted to identify the smallest geographic regions that would allow for comparison groups to be formed. The smallest geographic regions considered by the study were either counties or one of 8 Los Angeles County Workforce Regions.¹¹ The largest geographic regions considered by the study were economic markets defined by 8 groupings of counties in California by the Labor Market Information Division within EDD.¹² Using these definitions, this study created local labor markets by place and time and pursued comparisons only within these strata.¹³

The second requirement is that comparisons should only be made between groups that are similar based on characteristics that are relevant for both program participation and outcomes at the time of program entry. This study includes both demographic and labor market characteristics to assess similarities across groups, which is often

¹¹ These regions are defined by the Los Angeles Workforce Development Board, and include: (1) Antelope Valley, (2) Central LA, (3) Gateway Cities, (4) San Fernando Valley, (5) San Gabriel Valley, (6) Santa Clarita, (7) South Bay, and (8) Western Cities.

¹² The report used to group counties into economic markets is available here (last accessed 5/22/2021): https://www.edd.ca.gov/jobs_and_training/pubs/wsd20-01att1.pdf. Since the programs included in CAAL–Skills varied in size, this study used a simple and flexible rule to define labor markets: if, on average, a geographic area had a minimum of 5 program participants enrolling per quarter, that area was deemed sufficiently large for identifying a comparison group. Whenever this condition did not hold, the study expanded the geographic labor market to include neighboring regions until the condition was satisfied, though markets were never expanded to be larger than the economic markets defined by EDD.

¹³ Given the central role of local labor markets for the study, any participant without information on quarter of entry or location was excluded from all analyses. This exclusion was only meaningful for Adult Education participants since 11% were missing location. Only 2% of Vocational Rehabilitation participants were missing location, and fewer than 1% of participants in all other programs were excluded due to missing location.

referred to as “baseline equivalence” or “balance.” Demographic variables include age, gender, race/ethnicity, and a self-reported measure of disability. Labor market characteristics all come from the UI Base Wage file and include (1) binary indicators for six industry groupings of the longest held job in the year before program entry; (2) tenure in quarters of the longest-held job in the year before program entry; (3) earnings by quarter in the quarter of program entry and each of the preceding four quarters before entry; (4) average quarterly earnings in the second year before entry, in the third year before entry, and the fourth year before entry; and (5) average quarterly employment in the second year before entry, the third year before entry, and the fourth year before entry. Combined, these variables constitute a rich set of variables related to labor market outcomes that are flexibly constructed to capture dynamic measures of labor market participation before program entry.

Although the data available for this study are extensive, there are data elements that are often included in similar studies that were not available. The most obvious missing characteristic is education levels, which has a long history of importance for understanding earnings (Mincer 1958; Mincer 1974). The main lesson from that (and subsequent studies) is that earnings trajectories are important, and this study overcomes this deficiency by requiring similar earnings trajectories on a dynamic set of earnings indicators for four full years before program entry.¹⁴

Program groups. This study focuses on participants in California workforce training programs during FYs 2014–15 and 2015–16 that have shared their data with CAAL–Skills. Impact estimates were attempted for all programs except for WP, which is being reserved as a source for the identification of comparison groups given it provides employment services but not training.

Donor pools for comparison groups. Using the above framework, this study proposes two sources of donor pools to identify comparison groups. The first source is WP participants. The WP program, which is also referred to as “Employment Services,” is a program that provides assistance for finding a new job. It is often thought of as a light-touch program because it does not itself provide training services to build

¹⁴ There are other important data elements that have been explored in other contexts, such as detailed employer information in Europe (Lechner and Wunsch 2013), but work in the United States that had some firm-level data did not find much benefit (Andersson et al. 2016).

marketable skills. At the same time, the only eligibility requirement for WP services is the legal right to work, and the number of workers it serves is much larger than most other programs in the CAAL–Skills dataset. Further, individuals who are receiving Unemployment Insurance benefits are sometimes encouraged or required to enroll in WP services, which increases the base of workers who participate in the program. Combined, these features lead the program to serve a large and diverse group of workers – from those who are just entering the labor market to those with strong labor market attachment who had recently been displaced. The size and diversity of this population increases the chances that similar workers can be identified for each of the other programs reporting to CAAL–Skills. WP participants are also relevant as a comparison group since they are generally also experiencing labor market instability at the time of program enrollment and sought employment services – which is a similar experience across many of the programs with data in the CAAL–Skills database. Since this last point is not true of all programs, we discuss an alternative adjustment at the end of this section. In general, however, these reasons make WP participants a relevant donor pool for other programs where workers are experiencing labor market instability.

The second source of comparison groups is within–program comparisons that are available in certain cases. Examples include those who participate in or complete a training program versus those who do not. The authors do not prefer these types of comparisons because the motivation for participation may relate to the outcome, and this motivation cannot be distinguished from the eventual receipt of training with this design. However, these comparisons are considered when preferred alternatives are unavailable. For example, the WP sample is less relevant for TIY participants since youth are less likely to have the level of workforce attachment experienced by many WP participants. Because of that, a within–group comparison is more credible for the TIY trainees.

Demonstrating success of the design. The study assesses success of the design for each program by demonstrating baseline equivalence. Specifically, group means of all characteristics that were used to create comparison groups, and their differences between trainee and comparison groups are reported in a table. For continuous variables, this study also reports these differences as an effect size, which divides the difference in means by the pooled standard deviation. This standardization allows for

differences across characteristics with varying magnitudes to be more readily compared. When reporting these differences, the study is looking to see that these differences are close to zero in magnitude. According to a federal systematic review that is relevant for at least one of the programs (the What Works Clearinghouse), effect sizes that are smaller than 0.05 reflect similar samples, and effect sizes smaller than 0.25 reflect samples that would be similar with additional statistical adjustment.¹⁵ In addition to this, we present earnings trends before program enrollment to provide visual evidence of similarity across groups.

Outcomes to measure impacts. The two main outcomes used for this study are quarterly employment and quarterly earnings from the UI Base Wage file. Employment is a binary indicator set to 1 whenever the individual has positive earnings in the quarter, and earnings are adjusted to 2016 dollars using the Consumer Price Index.¹⁶ Data across all study cohorts are available up to 11 quarters after the quarter of entry, so this study standardizes all analyses to have the same 3-year follow-up time period so that impacts can be pooled for entrants across all quarters. In addition to measuring quarterly employment and earnings, this study also calculates average quarterly employment and earnings from quarters 7 through 11 after program entry to represent stabilized outcomes after the program is completed. This is to avoid the problems of a “lock-in” effect where training programs have initially shown decreases in earnings due to program participation before earnings gains are realized (Card et al. 2018).

Estimating impacts. This study assesses impacts using two strategies according to how outcomes are measured. For outcomes that are measured for each quarter from the time of entry, this study calculates mean differences between treatment and comparison groups of each outcome within labor markets and then averages those impacts across labor markets according to the size of the program group.¹⁷ For

¹⁵ The specific systematic review with this standard is the What Works Clearinghouse (WWC), which covers the Career and Technical Education program under its Postsecondary topic area. Review standards can be identified on the WWC website (last accessed 5/24/2021): <https://ies.ed.gov/ncee/wwc/Handbooks>

¹⁶ Earnings larger than the 97.5th percentile from all WP participants with positive earnings were set to that threshold to protect against outliers for all programs and quarters.

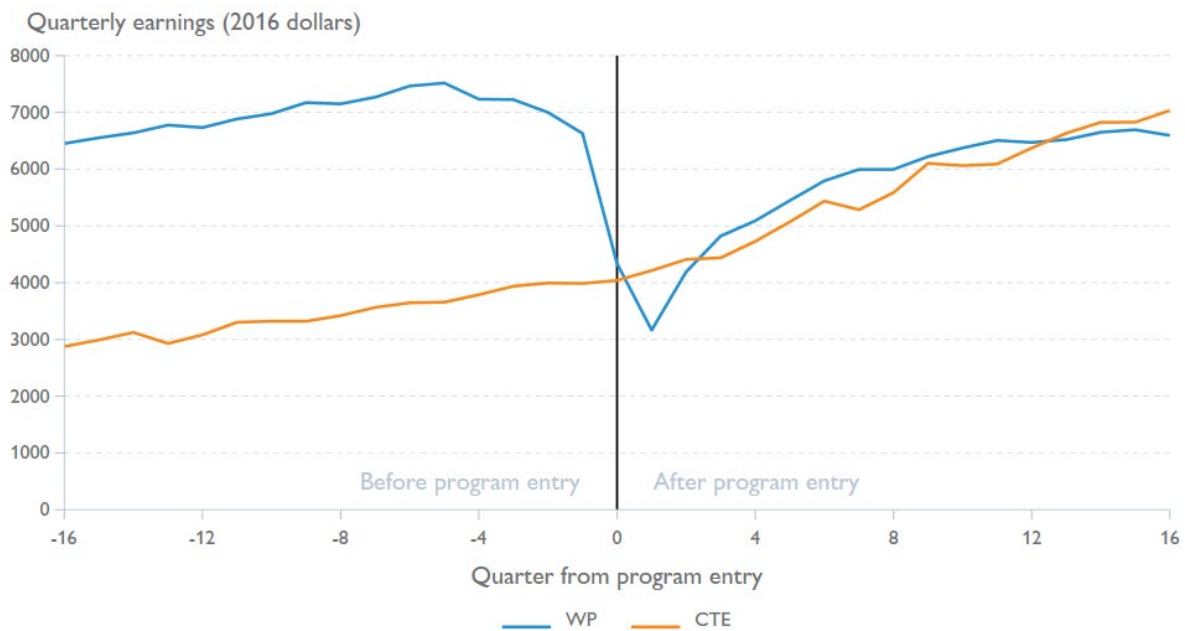
¹⁷ This is implemented using regression models with indicators for program group and labor markets but no comparisons. Cluster-robust standard errors are estimated across labor markets that share the same geographic area,

outcomes that are averaged over quarters, this study estimates impacts using a regression model of the outcome onto a treatment indicator, indicators for each labor market, and all of the covariates included in the weighting procedure. This is often referred to as “doubly-robust” estimation (Robins et al. 1994), which has also been shown to be a property of entropy balancing (Zhao and Percival 2017).

Challenges and Solutions. There are a few additional design challenges that are addressed in Appendix A, but there is one that is necessary to expand upon here. Specifically, on average, WP participants experience a substantial labor market transition at the time of program entry, but not all programs share that pre-enrollment “dip.” This includes CTE, ETP, and SCA, where many participants experience smooth or increased earnings at the time of program enrollment. For these programs, additional adjustments are needed before WP participants can represent a valid donor pool. As an example of this, Figure 3.1 plots earnings trajectories for two programs (WP and CTE) where the study team had access to data from FY 13–14 participants. On average, WP participants experienced a dip in earnings that likely led to program enrollment. However, CTE participants did not experience this pre-program dip. The non-dipping pattern also holds for participants in programs where enrollment is specifically tied to employment or on-the-job training, including SCA and ETP. For these programs, attempting to identify a comparison group among workers in the WP program that are known to experience earnings instability around the time of program enrollment is unlikely to provide a meaningful comparison group.

but no corrections were made for using the entropy balancing weights as analytic weights in the models. Therefore, inference from these models is not correct, although in analyses not shown, they are generally conservative.

FIGURE 3.1. Example of earnings trends for FY 2013–14 program participants based on earnings disruptions/dipping around the time of program entry



Notes: Authors' summaries of earnings data from the Unemployment Insurance Base Wage files.

To adjust for the existence of dipping and non-dipping programs, this study used two distinct strategies when WP was selected as the donor pool to form the comparison group. For programs where a dip in earnings is expected to precede enrollment, WP participants were compared to non-WP participants according to the quarter of entry into each respective program. However, for “non-dipping” programs, this study relied on WP participants who experienced their labor market instability and enrolled in the program during FY 2013–14. Specifically, this study allowed WP participants from FY 2013–14 to be compared to participants from a program included in CAAL–Skills from FYs 2014–15 and 2015–16 by shifting the comparison quarter forward by either one or two years. For example, a WP participant from calendar quarter 2013.Q3 could be compared to a CTE entrant from either 2014.Q3 or 2015.Q3. Although this required the creation of comparison groups that included obvious historic earnings fluctuations for shifted WP participants, if entropy balancing is still able to produce balanced samples, this is preferred to making comparisons to concurrent WP participants who are known to experience an earnings dip at the time of program entry. In other words,

it is fine for WP participants to have a previous job fluctuation as long as they have since stabilized their earnings in a way that they resemble participants from other programs preceding the enrollment decision.

4. Program designs and results

This chapter defines comparisons and provides results for all programs included in the CAAL–Skills dataset. For each program, the chapter describes the program and population it serves, along with a strategy for defining comparison groups meant to capture participants’ likely outcomes in the absence of the program. Impact results are then presented for program participants during FYs 2014–15 and 2015–16 along with a discussion to contextualize the findings.

4.1. WIOA Title I: Adults

The T1A program provides a combination of career, training, and supportive services to workers who need help obtaining unsubsidized employment. These services are provided by local Workforce Development Boards through a coordinated delivery system composed of American Job Centers of California (AJCCs). At these centers, workers are offered a range of services depending on their needs. Lighter–touch services are referred to as “basic career services” and include activities such as job information and online tools to help customers plan their careers through self–directed activities. Some basic career services can also include modest staff assistance, but more meaningful staff assistance, such as through assessment and direct counseling, is referred to as “individualized career services.” Further, caseworkers can also offer training opportunities for participants – either directly or through funds to pay for pre–approved programs. In addition to these services, caseworkers can also offer supportive services, which cover costs for items that help workers become employed, such as for transportation or childcare.

Characteristics of all T1A enrollees during FYs 2014–15 and 2015–16 are provided in column (1) of [Table 4.1.1](#).¹⁸ On average, participants are 38 years old, 46% are male, 40% are Hispanic, and 39% are white. On average, 45% were employed in a given quarter in the second year before program entry and average quarterly earnings was only \$2,709. The typical duration of T1A services is 2.9 quarters. This implies that

¹⁸ Note that the federal law governing this program changed from the Workforce Investment Act (WIA) to WIOA in July 2016. We still refer to it as WIOA given the services remained largely the same. One change was that WIA required tiered services where basic services would need to be completed before individualized services before training services.

participants are middle-aged workers who are experiencing unemployment with some previous attachment to the labor force – although this attachment may not be strong.

Comparisons to estimate impacts. The research design is based on identifying a valid comparison group that resembles the T1A population but experiences less intensive services (see Ch.3 Methods for a full discussion). Since T1A participants are generally middle-aged working adults who connect to services through AJCCs, WP participants represent a relevant donor pool of potential comparison group members to estimate impacts because they are mid-career, could have also enrolled through an AJCC, and may have also been eligible to enroll in the T1A program. The challenge is whether there are WP participants that can be identified that resemble the T1A population within each local labor market. All workers included in these comparisons had at least one quarter of positive earnings in the four years preceding program entry. The comparisons made in this study are:

- **Main comparison – T1A trainees vs. WP:** The main comparison contrasts all T1A participants that received training to WP participants with similar demographics and employment and earnings histories as described in Chapter 3 (Methods). As shown in column (2) of Table 4.1.1, the trainee sample is slightly younger and has higher pre-program earnings compared to the full T1A population, but the remaining demographics stay largely the same.
- **Additional comparisons:** The study compares three additional subgroups of T1A trainees to similar WP comparison groups. The second comparison is based on T1A trainees who completed training, and the next two comparisons are for males and females separately – to see if impacts vary by gender. Table 4.1.1 presents characteristics for these additional program groups. Overall, about 79% of T1A trainees completed a training program (not shown) and the characteristics of these completers are essentially the same as the full group of trainees. However, there are demographic differences by gender which are given in column (3) for males and column (4) for females. The male sample has more participants who are White and quarterly earnings that are around 15% higher (not shown) compared to female participants.

TABLE 4.1.1: Characteristics of T1A participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	T1A participants	Main group: T1A trainees	T1A completed training	T1A male trainees	T1A female trainees
	(1)	(2)	(3)	(4)	(5)
Age	37	34	34	34	33
Male	48%	49%	49%	100%	0%
Female	52%	51%	51%	0%	100%
Binary gender not selected	0%	0%	0%	0%	0%
Hispanic	40%	43%	43%	42%	44%
Black	24%	22%	21%	21%	23%
White	39%	42%	42%	43%	41%
Declined to state race/ethnicity	8%	7%	7%	7%	6%
Disability (self-identified)	8%	5%	5%	7%	4%
Quarterly earnings before entry	\$2,709	\$3,196	\$3,222	\$3,443	\$2,960
Quarterly employment before entry	45%	58%	58%	57%	58%
Program experience					
Quarters participated (mean)	2.9	3.7	3.7	3.4	4.0
Observations	77,183	15,009	11,805	7,333	7,676

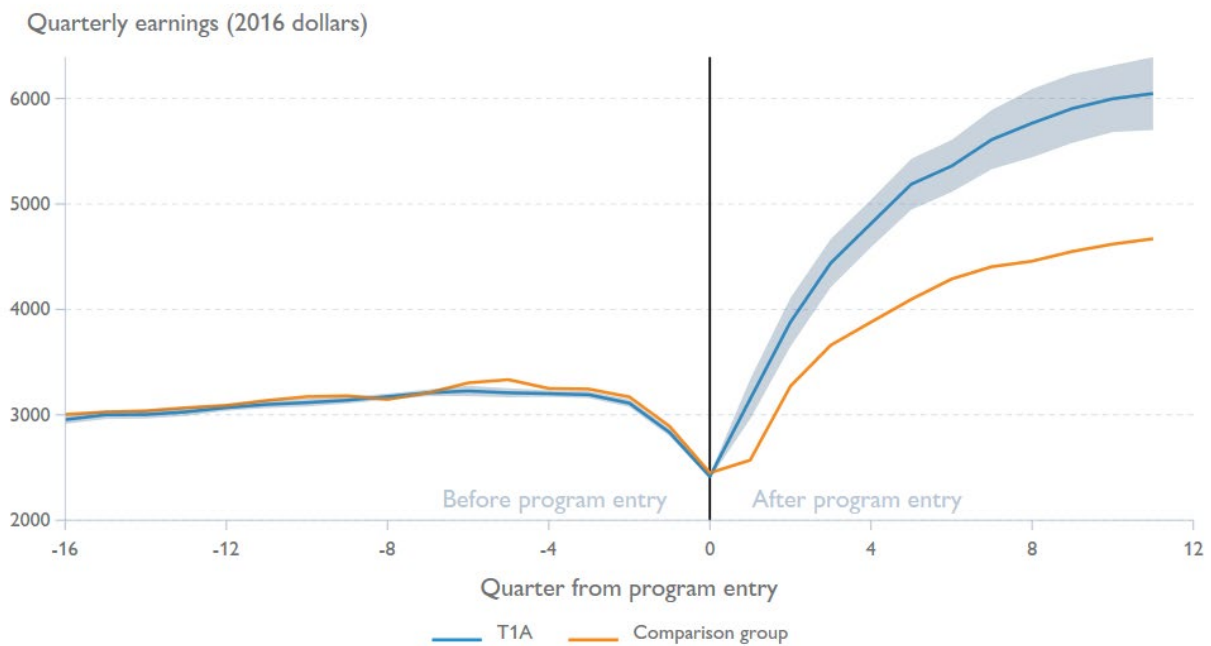
Notes: Quarterly earnings and employment are taken from the 2nd year before program entry.

Design Results. Across all four comparisons, the implemented design resulted in comparison groups that were nearly indistinguishable to their respective groups of T1A trainees prior to the entry into the training program. For each of the comparisons, Appendix section B.1.1 contains four tables (one for each comparison) that present means and differences in means for baseline characteristics. Across all four tables, the differences across groups are close to zero for all demographic characteristics presented in Table 4.1.1 as well as 16 labor market measures covering four full years before program entry. Further, fewer than 5% of T1A trainees were excluded due to poor comparisons within local labor markets (see Chapter 3 for a full discussion). **Taken together, this provides evidence that the comparisons represent the causal effect of T1A training on employment outcomes.**

Impact results. There are statistically significant and economically meaningful differences in labor market outcomes after program entry between all T1A trainee groups and their respective comparison groups. Figure 4.1.1 provides a visual representation of this for the main comparison. It plots quarterly earnings trends from

4 years before program entry up to 3 years after program entry. The trend line for T1A trainees includes a shaded 95% confidence interval to provide a sense of the degree of statistical uncertainty about the estimates. The nearly overlapping trend in earnings across groups before program entry is evidence that the research design worked as intended. Earnings differences are not meaningfully different from zero during the pre-period – although they are sometimes statistically significantly different due to the precision of the estimates (not shown). However, there is a divergence in the earnings trend that starts immediately after program entry where T1A trainees earn more, and this earnings gap grows throughout the study period.

FIGURE 4.1.1: Quarterly earnings comparisons between T1A trainees from FYs 2014–15 and 2015–16 with a similar WP comparison group



Notes: Quarterly earnings are presented in 2016 dollars. The light-blue shaded region around the Adults trend line represents a 95% confidence band for weighted group differences from within-local labor market comparisons that do not control for covariates and take the weights as given. This shaded region is also present in the pre-enrollment quarters but is not visually apparent due to precise estimates.

Across all four comparisons, T1A trainees earned significantly more than their respective WP comparison groups after program entry. Impacts on employment and earnings are presented in Table 4.1.2 as quarterly averages from 1.5 to 3 years after program entry (that is, Q7 to Q11) to present stabilized impacts. All impacts in the table are positive, economically meaningful, and statistically significant at a 95%

confidence level. Overall, T1A trainees are 9.6 percentage points more likely to be employed than the WP comparison group (with an employment rate of 62.3%), and they earn \$1,351 (29.8%) more. Each of these impacts were slightly larger for those who completed training, and the overall positive impacts remained similar in magnitude for both male and female T1A trainees. A detailed version of the impacts table with statistics from the design and estimates of statistical significance is given in Appendix B, Table B.1.3.1.

TABLE 4.1.2: Labor market impacts for T1A trainees from FYs 2014–15 and 2015–16

	Main group: T1A trainees	T1A completed training	T1A male trainees	T1A female trainees
	vs. WP	vs. WP	vs. WP Males	vs. WP Females
	(1)	(2)	(3)	(4)
Quarterly employment: Q7 to Q11				
Treatment group mean	71.8%	73.7%	70.0%	73.7%
Comparison group mean	62.3%	62.6%	61.3%	63.7%
Impact in percentage points	9.6*	11.1*	8.8*	10.0*
Quarterly earnings: Q7 to Q11				
Treatment group mean	\$5,867	\$6,173	\$6,127	\$5,577
Comparison group mean	\$4,541	\$4,567	\$4,888	\$4,302
Impact in 2016 dollars	1,351*	1,628*	1,285*	1,326*
Impact as percent	29.8%*	35.6%*	26.3%*	30.8%*
Sample Characteristics				
Participants in full sample	15,009	11,805	7,333	7,676
Participants included in analysis	14,755	11,461	7,042	7,385
Excluded due to poor comparison	1.7%	2.9%	4.0%	3.8%

Notes: See Appendix Table B.1.1.2 for model and design details. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* - represents statistically significant differences at a 95% level of confidence.

Contextualizing results. These estimates indicate that T1A participants experience meaningful labor market gains from participating in a training program. The range of estimates found by this study are larger than those found in previous literature. For example, using similar designs to this one, recent research has found positive impacts on training for the T1A population ranging from \$500 to \$900 in 2016–adjusted

dollars (Andersson et al, 2016, Heinrich et al, 2013).¹⁹ Although these studies sometimes use different donor pools to form the comparison group (e.g. TIA participants who did not participate in training), the results are consistent in direction although the impacts here are larger. Given the availability of a reasonable comparison group that was found to be empirically similar to the TIA trainee groups, the authors conclude that impacts for TIA training in California were large and positive.

¹⁹ Although these studies were conducted on TIA adults from WIOA's predecessor, the Workforce Investment Act, both policy regimes offer training in a similar way.

4.2. WIOA Title I: Dislocated Workers

The T1DW program provides a combination of career, training, and supportive services to workers who have been laid off through no fault of their own, or are expecting to be laid off due to declines in their occupation or industry. These services are provided by local Workforce Development Boards through a coordinated delivery system composed of American Job Centers of California (AJCCs). At these centers, workers are offered a range of services depending on their needs. In particular, caseworkers can offer training opportunities for participants – either directly or through funds to pay for pre-approved programs. In addition, caseworkers can also offer supportive services, which cover costs for items that help workers become employed, such as for transportation or childcare.

Characteristics of all T1DW enrollees during FYs 2014–15 and 2015–16 are shown in column (1) of Table 4.2.1. On average, participants are 43 years old, 49% are male, and they are predominantly White (43%) and Hispanic (40%). Participants show high levels of previous employment, with 80% being employed in a given quarter in the second year before program entry and quarterly earnings of \$8,869. The average length of participation was 3.2 quarters. This implies participants are mid-career workers with strong previous attachment to the labor force, but they are currently experiencing a loss of employment at the time of enrollment due to no fault of their own.

Comparisons to estimate impacts. The research design is based on identifying a valid comparison group that may have access to the T1DW program and resembles the T1DW population, but experiences less intensive services (see Ch.3 Methods for a full discussion). WP participants represent a good donor pool for T1DW participants since they are also mid-career working adults, have strong previous attachments to the labor force, are eligible for unemployment insurance (UI) benefits, and may also connect to services through AJCCs. Further, since WP participation is partially linked to the UI system, many of these workers are eligible for T1DW services. For this reason, it is likely that there are many WP participants that resemble T1DW participants within each local labor market. The comparisons pursued in this study are:

- **Main comparison – T1DW trainees vs. WP:** The main comparison contrasts T1DW participants that received training to WP participants with similar demographics

and employment and earnings histories as described in Chapter 3 (Methods). As shown in column (2) of Table 4.2.1 the sample is slightly younger and more male compared to the overall sample of T1DW participants, but the remaining demographics stay largely the same. On average, trainees were enrolled in the program for a longer period at 4.2 quarters.

- **Additional comparisons:** The study compares three additional subgroups of T1DW trainees to similar WP comparison groups. The second comparison is based on T1DW trainees who completed training, and the next two comparisons are for males and females separately – to see if impacts vary by gender. Table 4.2.1 presents characteristics for these additional program groups. Overall, 81% of T1DW trainees completed a training program and the characteristics of these completers are very similar to the full group of trainees. However, there are demographic differences by gender which are given in column (3) for males and column (4) for females. The male sample has more participants who are Hispanic and quarterly earnings are 3% lower (not shown) compared to female participants.

TABLE 4.2.1: Characteristics of T1DW participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	T1DW participants	Main group: T1DW trainees	T1DW completed training	T1DW male trainees	T1DW female trainees
	(1)	(2)	(3)	(4)	(5)
Age	43	41	41	40	43
Male	49%	54%	54%	100%	0%
Female	51%	46%	46%	0%	100%
Hispanic	0%	0%	0%	0%	0%
Black	40%	42%	42%	45%	38%
White	12%	12%	12%	11%	13%
Declined to state race/ethnicity	43%	46%	45%	46%	46%
Disability (self-identified)	12%	10%	11%	9%	11%
Quarterly earnings before entry	4%	4%	4%	5%	3%
Quarterly employment before entry	\$8,869	\$8,810	\$8,847	\$8,704	\$8,934
Program experience	80%	81%	82%	78%	85%
Quarters participated (mean)	3.2	4.2	4.2	3.9	4.6
Observations	38,250	9,525	7,729	5,117	4,408

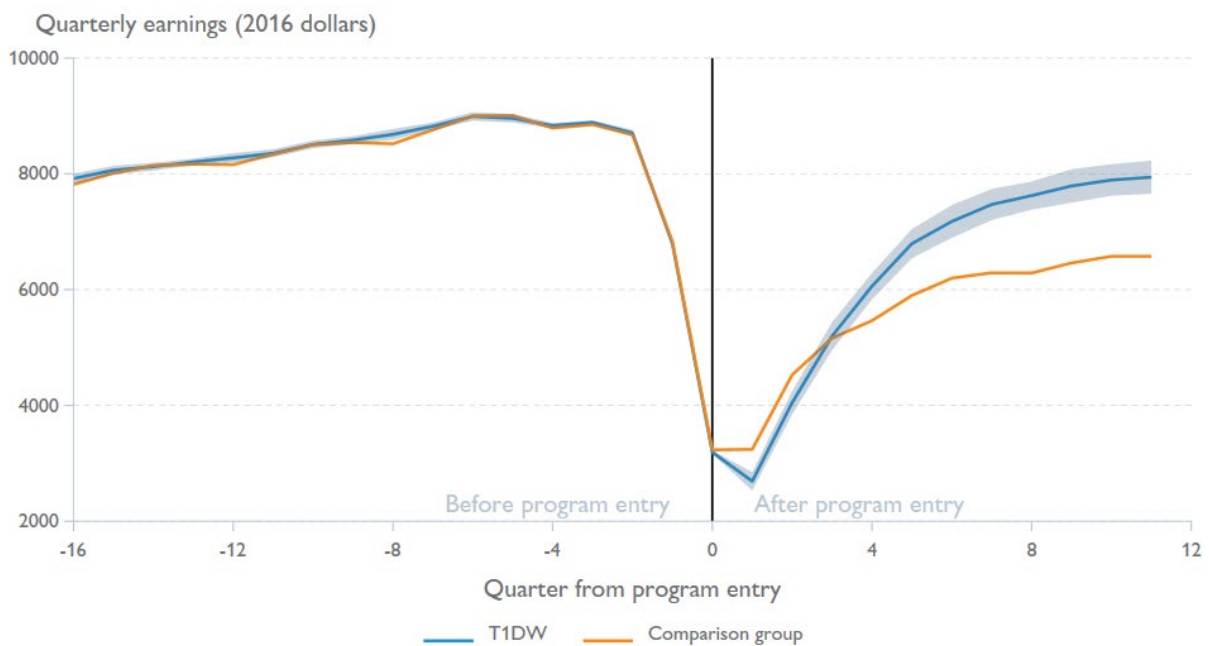
Notes: Quarterly earnings and employment are taken from the 2nd year before program entry.

Design Results. Across all four comparisons, the implemented design resulted in comparison groups that were nearly indistinguishable from their respective groups of T1DW trainees. For each of the comparisons, Appendix section B.2.1 contains four tables (one for each comparison) that present means and differences in means for baseline characteristics. Across all four tables, the differences across groups are close to zero for all demographic characteristics presented in Table 4.1.1 as well as 16 labor market measures covering four full years before program entry. Further, fewer than 6% of T1DW trainees were excluded due to poor comparisons within local labor markets (see Chapter 3 for a full discussion). **Taken together, this provides evidence that the comparisons represent the causal effect of T1DW training on employment outcomes.**

Impact results. There were statistically significant and economically meaningful differences in labor market outcomes after program entry between T1DW trainees included in the study and their comparison groups. To provide a visual presentation of

this, Figure 4.2.1 contains quarterly earnings trends for the main comparison from 4 years before program entry up to 3 years after program entry. The trend line for T1DW trainees includes a 95% confidence interval to provide a sense of the degree of statistical uncertainty about the estimates. The nearly overlapping trend in earnings across groups before program entry is evidence that the research design worked as intended since earnings differences were close to zero over that time period. However, there is a divergence in the earnings trend after program entry where, after initially dipping, the T1DW trainee group starts earning more by the 4th quarter. This positive earnings gap grows and persists throughout the study period.

FIGURE 4.2.1: Quarterly earnings comparisons between T1DW participants from FYs 2014–15 and 2015–16 with a similar WP comparison group



Notes: Quarterly earnings are presented in 2016 dollars. The light-blue shaded region around the T1DW trend line represents a 95% confidence band for weighted group differences from within-local labor market comparisons that do not control for covariates and takes the weights as given. This shaded region is also present in the pre-enrollment quarters but is less visually apparent due to precise estimates.

Across all four comparisons, T1DW trainees earned significantly more than their respective WP comparison groups. Impacts on employment and earnings are presented in Table 4.2.2 as quarterly averages from 1.5 to 3 years after program entry (that is, Q7 to Q11) to present stabilized impacts. All impacts in the table are positive,

economically meaningful, and statistically significant at a 95% confidence level. T1DW trainees are 11.6 percentage points more likely to be employed off a base of 62.3%, and they earn \$1,302 (20.2%) more than the WP comparison group. These impacts were similar in magnitude for those who completed training as well as for both male and female T1DW trainees. A detailed version of the impacts table with statistics from the design and estimates of statistical significance is given in Appendix B, Table B.2.3.1.

TABLE 4.2.2: Labor market impacts for T1DW trainees from FYs 2014–15 and 2015–16

	Main group: T1DW trainees	T1DW completed training	T1DW male trainees	T1DW female trainees
	vs. WP	vs. WP	vs. WP Males	vs. WP Females
	(1)	(2)	(3)	(4)
Quarterly employment: Q7 to Q11				
Treatment group mean	74.0%	74.9%	72.4%	75.2%
Comparison group mean	62.3%	62.9%	62.1%	62.5%
Impact in percentage points	11.6*	12.0*	10.3*	12.7*
Quarterly earnings: Q7 to Q11				
Treatment group mean	\$7,745	\$7,897	\$8,122	\$7,379
Comparison group mean	\$6,438	\$6,526	\$6,773	\$6,107
Impact in 2016 dollars	1,302*	1,372*	1,347*	1,278*
Impact as percent	20.2%*	21.0%*	19.9%*	20.9%*
Sample Characteristics				
Participants in full sample	9,525	7,729	5,117	4,408
Participants included in analysis	9,318	7,439	4,802	4,143
Excluded due to poor comparison	2.2%	3.8%	6.2%	6.0%

Notes: See Appendix Table B.2.3.1 for model and design details. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* - represents statistically significant differences at a 95% level of confidence.

Contextualizing results. These estimates indicate that T1DW participants experienced meaningful labor market gains from participating in a training program. This is a somewhat different finding from impacts found in the literature for this group. For example, a recent study using a similar design to this one found statistically significant

and positive impacts on being employed at 5 percentage points, but close to negligible impacts on earnings (Heinrich et al. 2013). When comparing T1DW trainees to T1DW participants that did not train, another study found a range of impacts on quarterly earnings from +\$400 (in 2016 dollars; Andersson et al. 2016) to -\$200 over a similar follow-up period as this study.²⁰ The positive impacts on both employment and earnings found by this study are larger than what was found in those contexts, which excluded California. Given the availability of a reasonable comparison group that was found to be empirically similar to the T1DW trainee groups, the authors conclude that impacts for TDW training in California were large and positive.

²⁰ Although these studies were conducted on T1A adults from WIOA's predecessor, the Workforce Investment Act, both policy regimes offer training in a similar way.

4.3. WIOA Title I: Youth

The T1Y program provides a combination of career, training, and supportive services to youth aged 14 to 24 who face a specified barrier to employment. While both in-school and out-of-school participants are eligible, the program emphasizes services for out-of-school youth with a focus on preparing participants for post-secondary education and employment opportunities. Career services are generally individualized and could include activities such as tutoring, adult mentoring, financial literacy education, comprehensive guidance, and counseling. Training services could include activities such as internships, job shadowing, or subsidized work experience. Finally, supportive services are provided to youth to cover the costs of goods or services that would help participants meet their specified goals in the program.

Characteristics of all T1Y enrollees during FYs 2014–15 and 2015–16 are shown in column (1) of Table 4.3.1. On average, participants are 19 years old, 47% are male, and 60% are Hispanic. Since program participants are at the beginning of their careers, on average, only 15% were employed in a given quarter in the second year before program entry, and average quarterly earnings was \$363. The typical participation for T1Y is 3.3 quarters.

Comparisons to estimate impacts. The research design is based on identifying a valid comparison group that may have access to T1Y training opportunities and resembles the T1Y training population, but does not receive T1Y training (see Ch.3 Methods for a full discussion). The reason why it is important for the comparison group to resemble T1Y training youth is to build credibility in the idea that the post-program experiences of these youth would reflect what T1Y training youth would have experienced had they not received training. The challenge here is that past labor market experiences of youth may not reflect access to future economic opportunities. This study initially considered identifying comparison individuals from the pool of WP participants of the same age, but historic earnings are not strongly predictive of future earnings for youth, and T1Y participants have eligibility requirements related directly to economic barriers that are not visible from youth who participate in WP. Specifically, although program data for WP participants has data fields that reflect barriers to employment opportunities, such as (1) basic skills deficient, (2) English-language learner, and (3) cultural barriers, fewer than 1% of the WP sample had any of these barriers identified,

which made it impossible to match on the presences of these barriers. For these reasons, the authors of this study do not find comparisons between T1Y and WP participants of the same age to be credible.

Instead, this study attempts to estimate the impact of T1Y training by comparing T1Y participants who trained to those who did not train. This is credible given all T1Y participants should have had access to training services, but the challenge is whether there are sufficient samples to identify valid comparison groups within local markets. All youth included in these comparisons had at least one quarter of positive earnings in the four years preceding program entry. The comparisons pursued are:

- **Main comparison – T1Y trainees vs. T1Y career service participants:** This comparison is made between T1Y participants who enrolled in a training service and those who received career services but not training. Individualized career services may still reflect intensive interactions with the program, but they are not dedicated services to build basic or occupational skills like the training programs. Characteristics of the T1Y trainee group are provided in column (2) of Table 4.3.1. Approximately 53% of all T1Y participants enrolled in training services (not shown), and their demographic characteristics are fairly similar to the overall sample. On average, only 17% of this sample was employed in a given quarter in the second year before program entry, and wages remain low at approximately \$430.
- **Additional comparisons:** The study includes two additional comparisons based on subgroups of the T1Y trainees. The two subgroups are based on T1Y participants that received either basic skills training or occupation-specific training, and both of these groups are again compared to the T1Y career service participants.²¹ Characteristics of the two additional trainee groups are given in columns (3) and (4) of Table 4.3.1. Slightly more youth received basic skills training (58%, not shown) compared to occupational skills training (42%, not shown). The characteristics across all groups are broadly similar, with those

²¹ Each training program is categorized into one of 13 types of training service. For this study, most categories are assumed to be occupation-specific training, but the following four categories are classified as “basic skills” training: (1) Adult Basic Education or English as a Second Language, (2) Remedial Training, (3) Prerequisite Training, or (4) Other Basic Skills Training.

receiving occupational training having somewhat higher earnings and employment and more likely to be White.

TABLE 4.3.1: Characteristics of T1Y participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	T1Y participant s (1)	Main group: T1Y trainees (2)	T1Y receiving basic skills training (3)	T1Y receiving occupational training (4)
Age	19	19	19	19
Male	47%	46%	46%	45%
Female	53%	54%	54%	55%
Binary gender not selected	0%	0%	0%	0%
Hispanic	60%	65%	65%	64%
Black	20%	17%	17%	18%
White	38%	39%	38%	42%
Declined to state race/ethnicity	4%	4%	4%	3%
Disability (self-identified)	9%	8%	7%	8%
Quarterly earnings before entry	\$363	\$429	\$359	\$526
Quarterly employment before entry	15%	17%	15%	21%
Program experience				
Quarters participated (mean)	3.3	3.4	3.5	3.3
Observations	24,827	13,143	7,627	5,516

Notes: Quarterly earnings and employment are taken from the 2nd year before program entry.

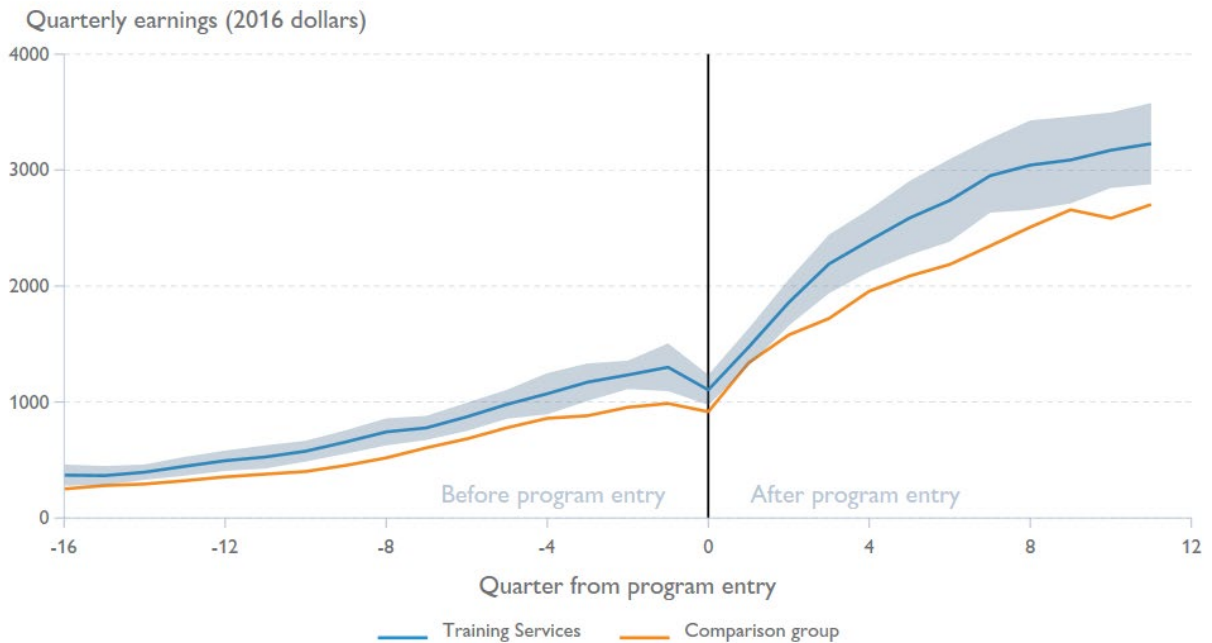
Design Results. Across all three comparisons, the design could not identify adequately matched groups. Specifically, empirically similar comparison groups from the same local labor markets could not be identified for over 60% of the T1Y trainees that were attempted to be included in the study for each of the three comparisons (see Ch.3 Methods for a full discussion).²² That is the biggest signal that the design did not work well for this program. Even for those labor markets where comparison groups could be identified, the comparisons are not particularly good with meaningfully different demographic and previous labor market differences. For example, T1Y trainees were 9.7 percentage points more likely to be Hispanic than the matched comparison, and

²² Because comparison groups were formed within local labor markets, entire markets were excluded when no comparable comparison group could be identified. As can be seen in the B.3.1 appendix tables and Table 4.3.2, this resulted in over 60% of the T1Y participants being excluded from any of the comparisons.

differences in earnings before entry were over 0.05 standard deviations for most quarters (these results are reported in Appendix Table B.3.1.1). **Given that the differences between these groups are not negligible, the study authors conclude that the resulting differences should be interpreted as suggestive of impacts.**

Impact results. To provide a visual presentation of the analysis for the main comparison, Figure 4.3.1 presents quarterly earnings trends from 4 years before program entry up to 3 years after program entry. The trend line for the T1Y training group includes a 95% confidence interval to provide a sense of the degree of statistical uncertainty about the estimates. The earnings trends for the two groups before program entry reveal a gap in pre-program earnings between T1Y trainees and their identified comparison group. Because the two lines are readily distinguishable, this is evidence that the design could not identify appropriate comparisons. Both groups exhibit a slight dip in earnings at the time of program entry, and while they both show an increase in earnings after program participation, the training group's earnings rise at a steeper rate when compared to the group that received only career or supportive services, which is particularly evident a year or more after program entry. This may be suggestive of a positive impact, but the authors do not believe it is conclusive given pre-program differences in earnings apparent from the figure.

FIGURE 4.3.1: Quarterly earnings comparisons between T1Y participants in training services from FYs 2014–15 and 2015–16 with T1Y participants in career or supportive services



Notes: Quarterly earnings are presented in 2016 dollars. The light-blue shaded region around the training services trend line represents a 95% confidence band for weighted group differences from within-local labor market comparisons that do not control for covariates and takes the weights as given.

Estimates for each of the comparisons are provided in Table 4.3.2. These results are presented as quarterly averages from 1.5 to 3 years after program entry (that is, Q7 to Q11) in order to represent stabilized impacts. For both employment and earnings, two of the three analyses are statistically significant at a 95% level of confidence and show positive impacts. The impacts for T1Y who received basic skills training is not statistically significant for either outcome. At 6.2 percentage points for employment and \$675 (30.1%) for quarterly earnings, the largest impacts come from T1Y who participated in occupational training. A detailed version of the impacts table with statistics from the design and estimates of statistical significance is given in Appendix B, Table B.3.3.1.

TABLE 4.3.2: Labor market impacts for groups of TIY participants from FYs 2014–15 and 2015–16

	T1Y trainees vs. T1Y career service (1)	T1Y receiving basic skills training vs. T1Y career service (2)	T1Y receiving occupational training vs. T1Y career service (3)
Quarterly employment: Q7 to Q11			
Treatment group mean	67.9%	66.8%	69.0%
Comparison group mean	62.0%	62.4%	60.5%
Impact in percentage points	3.8*	2.9	6.2*
Quarterly earnings: Q7 to Q11			
Treatment group mean	\$3,097	\$2,859	\$3,249
Comparison group mean	\$2,560	\$2,673	\$2,246
Impact in 2016 dollars	295*	91	675*
Impact as percent	11.5%*	3.4%	30.1%*
Sample Characteristics			
Participants in full sample	13,143	7,627	5,516
Participants included in analysis	5,055	2,797	2,150
Excluded due to poor comparison	61.5%	63.3%	61.0%

Notes: See Appendix Table B.3.3.1 for model and design details. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* - represents statistically significant differences at a 95% level of confidence.

Contextualizing results. Although the estimated impacts are suggestive of a positive impact of training for TIY participants on employment and earnings outcomes, the study authors do not find these impacts to be credible. The results are based on within-program comparison groups to estimate the effect of training services when compared to those who did not receive training but received career services. However, the design was unable to find empirically similar comparison groups for the majority of TIY trainees (over 60%). Taken literally, the impacts from occupational training suggest large gains from training, but this could also reflect positive selection into training where the highest-skilled participants sought these services. At the same time, there is no evidence that participation led to lower labor market outcomes. There are two further limitations of this analysis. First, the data do not allow for us to distinguish between in-school and out-of-school youth, which represent two groups with distinct eligibility criteria, and possibly different outcome goals. This implies that the comparison groups cannot be made comparable by in-school classification. The

second is that continued education is a valid outcome for youth participants that is captured in performance measures. Because of that, the benefits of the program may not be fully reflected in earnings over this shorter time period, and what appears to be a negative impact on earnings in the medium-term may reflect a positive impact on further education. That said, the research design was not grounded on identifying impacts on further education outcomes since education data at program entry is unavailable. Given these findings, the study authors recommend interpreting these results with caution and considering alternative research designs and strategies to more appropriately attribute effectiveness to T1Y training.

4.4. WIOA Title II: Adult Education

The T2AE program provides adult education programs for workers with barriers to employment, including English language learners, low-income individuals, and immigrants. It is funded by the Federal Adult Education and Family Literacy Act (AEFLA) and was enacted as Title II of WIOA. The specific programs include Adult Basic Education (ABE), English as a Second Language (ESL), and Adult Secondary Education (ASE). The goals of these programs are to help participants (a) gain employment or better their current employment; (b) obtain a high school diploma or high school equivalency certificate; (c) attain skills necessary to enter postsecondary education and training; (d) become self-sufficient to no longer need income supports; (e) learn to speak, read, and write the English language; (f) master basic academic skills to help their children succeed in school; and (g) become U.S. citizens, exercise their civic responsibilities, and participate in a democratic society. Although all T2AE participants face barriers to employment, it is important to note that they still represent a population with a diverse set of skills. For example, ESL students may be highly educated with high literacy in their native language while ABE students have low literacy. Because all programs provide skills training, all participants are considered trainees for this study.

Characteristics of all T2AE enrollees during FYs 2014–15 and 2015–16 are given in column (1) of Table 4.4.1. On average, participants are 35 years old, 45% are male, and 63% are Hispanic. The high share of Hispanic participants reflects both California's population as well as one of the target audiences of training: English language learners. A particularly noteworthy feature across participant characteristics is that employment in UI-covered jobs before program entry is very low: on average only 14% are employed in any given quarter in the second year before program entry. This presents immediate challenges for measuring the effectiveness of the Adult Education program on labor market outcomes since the UI base wage file is the primary source of information for both creating comparable groups as well as measuring outcomes from the program.

Comparisons to estimate impacts. The research design is based on identifying a valid comparison group that may have access to T2AE and resembles the T2AE population, but does not receive T2AE services (see Ch.3 Methods for a full discussion). The first challenge is that past labor market experiences for this population may not accurately

reflect previous work or future labor market opportunities. Specifically, it is known that low-income workers do not have their earnings accurately captured in administrative data (Hotz and Scholz 2001), and this study relies on administrative data from the UI Base Wage file. Another challenge is that the intended T2AE population includes workers who have significant barriers to employment, yet a potential comparison sample that shares these barriers was unavailable. The authors initially sought to use WP participants to identify a non-T2AE sample of workers that shared similar employment barriers, but such a sample is not well identified. Although program data for WP participants has data fields that reflect barriers to employment opportunities – such as (1) basic skills deficient, (2) English-language learner, and (3) cultural barriers – fewer than 1% of the WP sample had any of these barriers identified. Given the prevalence of these barriers in California, the study authors concluded that these data elements are not accurate reflections of employment barriers for the WP sample and were therefore excluded from the research design.²³

Given no available alternative, this study continues to use the WP sample as a potential comparison group but the authors interpreted the findings cautiously. This study presents four comparisons for T2AE workers all aged 20 to 55.²⁴ As discussed in the methods section, comparisons are required to be made within local labor markets and only participants with positive earnings before program entry were included. Because of this, the analysis is restricted to the 25% of program participants (see Table 2.1) who satisfied this requirement. The comparisons pursued are:

- **Main comparison – T2AE vs. WP:** The main comparison contrasts T2AE participants that received training to WP participants with similar demographics and employment and earnings histories as described in Chapter 3 (Methods). Characteristics for the T2AE sample in this main comparison are provided in column (2) Table 4.4.1. The sample is slightly younger and more Hispanic when

²³ Importantly, this study period aligns with transitions in data collection based on new WIOA requirements. It is possible that data collection – for both T2AE and WP – improved in later years, but these changes in quality were not assessed for this study.

²⁴ The age range excluded approximately 17 percent of the participants. For those less than 20, this was done because of the need to build comparisons on previous earnings. For those older than 55, this was done to focus on those who are still expected to engage in the workforce for an extended period of time.

compared to the full sample of T2AE participants, but the other demographics are largely the same.

- **Additional comparisons:** The study includes three additional comparisons that are all subgroups of the main comparison. The first two are analyses by gender, and Table 4.4.1 presents participant characteristics for males in column (3) and females in column (4). The male sample has more participants who are White and quarterly earnings that are around 16% higher (not shown) compared to female participants. The final comparison is for those who are co-enrolled in one of the other programs included in CAAL-Skills dataset – including WP. Overall, only about 6% of T2AE participants also co-enrolled in another program, so the sample size for this analysis is relatively small (Table 2.1). The study also includes this comparison because it was one of the original comparisons of interest given T2AE does not focus on occupation-specific skills. The co-enrolled group has pre-program earnings that are 11% higher (not shown) compared to the main T2AE sample.

TABLE 4.4.1: Characteristics of T2AE participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	T2AE participants (1)	Main group: T2AE in design (2)	T2AE males (3)	T2AE females (4)	T2AE Co- enrolled (5)
Age	35	32	31	33	32
Male	44%	44%	100%	0%	40%
Female	56%	56%	0%	100%	60%
Binary gender not selected ^a	0%	0%	0%	0%	0%
Hispanic	63%	65%	63%	67%	65%
Black	5%	8%	8%	7%	9%
White	13%	14%	16%	12%	15%
Declined to state race/ethnicity	1%	1%	2%	1%	0%
Disability (self-identified)	1%	1%	1%	1%	1%
Quarterly earnings before entry	\$750	\$3,247	\$3,527	\$3,028	\$3,610
Quarterly employment before entry	14%	59%	58%	60%	61%
Program experience					
Quarters participated (mean)	4.2	3.7	3.6	3.8	4.7
Observations	400,476	83,658	36,758	46,884	11,412

Notes: Quarterly earnings and employment are taken from the 2nd year before program entry. Average quarters participated is based on exit dates captured in the administrative data for Adult Education participation, even though no rule to capture program exit was well defined prior to the FY 2016–17 year.

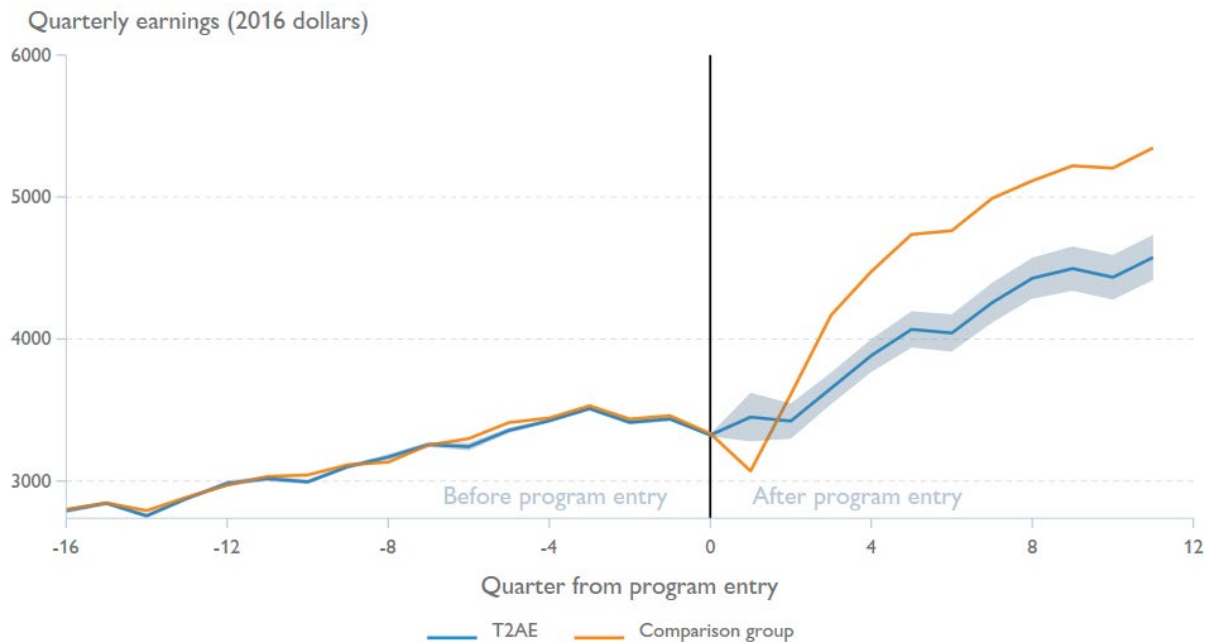
a - Binary gender was not selected for 0.02% of participants in column (1) only.

Design Results. Across all four comparisons, although the implemented design resulted in comparison groups that were nearly indistinguishable to their respective groups of T2AE trainees, relevant variables on employment barriers are missing. For each of the comparisons, Appendix section B.4.1 contains four tables (one for each comparison) that present means and differences in means for baseline characteristics. Across all four tables, the differences across groups are close to zero for all demographic characteristics presented in Table 4.4.1 as well as 16 labor market measures covering four full years before program entry. Further, fewer than 4% of T2AE trainees that were attempted in these comparisons were excluded due to poor comparisons within local labor markets (see Chapter 3 for a full discussion). However, even though similar groups were found based on available data, the study authors do not believe the necessary data were available to build comparable groups on barriers

to the labor market. For this reason, the resulting comparisons do not provide evidence on program impacts.

Descriptive results. There are statistically significant and sizeable differences in labor market outcomes after program entry between T2AE participants and their respective comparison groups. To provide a visual presentation of this, Figure 4.4.1 contains quarterly earnings trends for the main comparison from 4 years before program entry up to 3 years after program entry. The trend line for the Adult Education group includes a 95% confidence interval to provide a sense of the degree of statistical uncertainty about the estimates. The nearly overlapping trend in earnings across groups before program entry is evidence that the research design worked in identifying a WP comparison group with similar earnings trends before program entry. However, there is a divergence in the earnings trend after program entry where, after initially dipping, the comparison group starts earning more after 3 quarters, and this gap grows and persists throughout the study time period.

FIGURE 4.4.1: Quarterly earnings comparisons between T2AE participants from FYs 2014–15 and 2015–16 who were aged 20–55 with a similar WP comparison group



Notes: Quarterly earnings are presented in 2016 dollars. The light-blue shaded region around the Adult Education trend line represents a 95% confidence band for weighted group differences from within-local labor market

comparisons that do not control for covariates and takes the weights as given. This shaded region is also present in the pre-enrollment quarters but is not visually apparent due to precise estimates.

The lower earnings of T2AE participants from the main figure are generally reflected for all four of the comparisons. Employment and earnings impacts are provided in Table 4.4.2. These results are presented as quarterly averages from 1.5 to 3 years after program entry (that is, Q7 to Q11) in order to represent stabilized impacts. All impacts in the table are negative and statistically significant at a 95% level of confidence. T2AE participants were 1.9 percentage points less likely to be employed relative to their comparison groups. They also earned \$725 (14.0%) less than the comparison group for the main comparison. These differences were generally reflected across all four comparisons. A detailed version of the impacts table with statistics from the design and estimates of statistical significance is given in Appendix B, Table B.4.3.1.

TABLE 4.4.2: Labor market impacts for groups of T2AE participants from FYs 2014–15 and 2015–16 who were aged 20–55

	T2AE vs. WP (1)	T2AE males vs. WP males (2)	T2AE females vs. WP females (3)	T2AE co-enrolled vs. WP (4)
Quarterly employment: Q7 to Q11				
Treatment group mean	63.9%	62.3%	65.1%	65.3%
Comparison group mean	65.9%	64.8%	66.8%	66.2%
Impact in percentage points	-1.9*	-2.5*	-1.7*	-0.9*
Quarterly earnings: Q7 to Q11				
Treatment group mean	\$4,439	\$4,819	\$4,122	\$4,388
Comparison group mean	\$5,175	\$5,557	\$4,874	\$5,242
Impact in 2016 dollars	-725*	-712*	-734*	-840*
Impact as percent	-14.0%*	-12.8%*	-15.1%*	-16.0%*
Sample Characteristics				
Participants in full sample	83,658	36,758	46,884	11,412
Participants included in analysis	82,294	35,944	45,966	11,073
Excluded due to poor comparison	1.6%	2.2%	2.0%	3.0%

Notes: See Appendix Table B.4.3.1 for model and design details. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* - represents statistically significant differences at a 95% level of confidence.

Contextualizing results. Although the research design was effective at identifying similar comparison group samples based on available characteristics, the study authors do not believe that the differences in outcomes for these groups reflect program impacts. Specifically, although WP participants are a promising group to identify comparison groups for T2AE, the authors concluded that the available data on employment barriers were insufficient for the WP population. These data would be critical to find a similar WP sample since these barriers reflect important eligibility requirements for participating in T2AE programs.²⁵ Because of this alone, the study is unable to claim similarity between T2AE participants and any WP comparison group – even if observed labor market experiences before program entry were similar.

²⁵ Given the data system was transitioning during the period of this study, if data collection on these specific program elements improved over time, attempting this analysis in later years may yield a credible design.

Specifically, even if WP participants' earnings in the base period are as low as T2AE participants – something that the design ensures – they may have higher potential earnings after receiving WP services for reasons unrelated to the effectiveness of the services.

There are two additional considerations for the future study of the effectiveness of T2AE programs that are important to highlight. The first relates to the availability of earnings in the UI base wage files. For the sample considered in this study, over 75% of the T2AE participants were ineligible for the design based on no previous earnings in the base wage file. The study authors do not have data to assess exactly why this is, but it is likely related to missing Social Security numbers (SSNs) which were used to obtain earnings records. However, since T2AE programs cannot require SSNs to be collected, this may be a problem moving forward. Two strategies that could be worth exploring include (1) alternative matching strategies to the base wage file that do not require SSN, or (2) strategies to increase SSN reporting amongst T2AE participants. Otherwise, an alternative measure of income may need to be used, but this would have to be available for both program and comparison groups. The second consideration for evaluating T2AE is that it is comprised of multiple programs that serve a diverse set of workers with different goals. For example, the goal of some programs might be further education, and some workers might already be highly educated in their native language. If possible, program impacts should be identified for each program – such as ESL and ABE – separately.

4.5. WIOA Title IV: Vocational Rehabilitation

The T4VR program provides career, supportive, and training services for individuals with disabilities to assist them in preparing for and obtaining employment at or above the minimum wage. T4VR participants are unemployed or under-employed youth, students, and adults with various disabilities that may include visual and hearing loss, traumatic brain injury, cognitive, learning, intellectual, developmental, physical, psychiatric, or other disabilities that pose impediments to employment. The distinct needs of these participants vary greatly, and Individualized Plans for Employment are developed for each participant through a collaborative process. These plans identify employment goals and the T4VR services required to prepare for and achieve those goals that are consistent with each participant's unique strengths, resources, priorities, concerns, abilities, capabilities, interests, and informed choice. Career services include activities that help participants find a job, such as counseling and guidance, or job search and placement assistance. Supportive services include activities that support accessing and maintaining a job, such as help obtaining assistive technology services and devices, or other supports and services to help the individual succeed in their plan. Finally, training services are activities around developing required skills for jobs, such as occupation-specific training. This may include tuition, the purchase of textbooks, and potentially other supportive services related to skill acquisition.

Characteristics of all T4VR participants during FYs 2014–15 and 2015–16 can be found in column (1) of Table 4.5.1. On average, participants are 33 years old, and 58% are male. White and Hispanic participants are the most predominantly represented at 37% and 36%, respectively. Recent connections to the labor force are not high for this sample with an average of 21% of participants being employed in a UI-covered job before entry. Participants are engaged with the program for 5.6 quarters on average, which is one of the longer durations for programs included in CAAL-Skills.

Comparisons to estimate impacts. The intended research design is based on identifying a valid comparison group that may have access to T4VR training opportunities and resembles the T4VR training population, but does not receive T4VR training (see Ch.3 Methods for a full discussion). The reason why it is important for the comparison group to resemble T4VR training participants is to build credibility in the idea that the post-program experiences of these workers would reflect what T4VR

training participants would have experienced had they not received training. The primary challenge here is that there is variation in the type and severity of disabilities experienced by T4VR participants, yet these measures were unavailable for this study. Specifically, T4VR participants have information on the type of disability as well as a Level of Significance of Disability (LSOD) indicator in their program records. Because these characteristics represent factors that are directly related to employability, without these indicators, the study authors were unable to identify a potential comparison group that shared these characteristics. The study authors had initially planned on comparing T4VR participants with the lowest LSOD to WP participants with a self-reported disability, but this was not possible. Further, because the disabilities reported by WP are not broadly verified, relying on that indicator would leave questions remaining on the comparability between groups. For these reasons, the authors of this study do not believe there are currently valid comparison groups available for T4VR participants within the CAAL-Skills database.

Since the study team was unable to find any valid comparison groups to estimate impacts, the analyses presented for this program focus on comparisons of different program components and are purely descriptive – meaning they do not represent causal impacts. Specifically, the study team applied the research design to T4VR program components to assess whether those who participated in different activities also experienced different labor market outcomes. These within-program analyses are purely descriptive because they still include participants with different disabilities and LSOD values so they do not reflect impacts from program participation. The comparisons are:

- **Main comparison – T4VR trainees vs. T4VR participants not receiving training:** This comparison is made between T4VR participants who received training against those that did not receive training. Column (2) of Table 4.5.1 presents baseline characteristics for training sample. Overall, 20% of T4VR participants trained and had any earnings before program enrollment (not shown). Demographically, this group is similar to the overall group of T4VR participants, although they are more attached to the labor market with 39% being employed in any given quarter prior to program entry.

- **Additional comparisons:** The study includes two additional comparisons based on the other two program components: career services and supportive services. The first analysis compares outcomes between participants who did and did not receive career services, and the second analysis compares outcomes between participants who did and did not receive supportive services. Participant characteristics for these subgroups are presented in columns (3) and (4) of Table 4.5.1. Both career and supportive service recipients are older on average than training recipients, but are otherwise similar to those who received training services. The duration of program participation averaged around 5.6 quarters across all groups.

TABLE 4.5.1: Characteristics of T4VR participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	T4VR participants (1)	Main group: T4VR trainees (2)	T4VR career service recipients (3)	T4VR supportive service recipients (4)
Age	33	31	38	37
Male	58%	57%	58%	54%
Female	42%	43%	42%	46%
Binary gender not selected ^a	0%	0%	0%	0%
Hispanic	36%	36%	31%	33%
Black	18%	18%	19%	20%
White	37%	37%	42%	39%
Declined to state race/ethnicity	0%	0%	0%	0%
Disability (self-identified)	100%	100%	100%	100%
Quarterly earnings before entry	\$968	\$1,532	\$2,138	\$2,115
Quarterly employment before entry	21%	39%	44%	42%
Program experience				
Quarters participated (mean)	5.6	5.7	5.5	5.7
Observations	44,348	8,786	13,861	8,088

Notes: Quarterly earnings and employment are taken from the 2nd year before program entry.

a – Binary gender was not selected for 0.01% of participants in column (1) only.

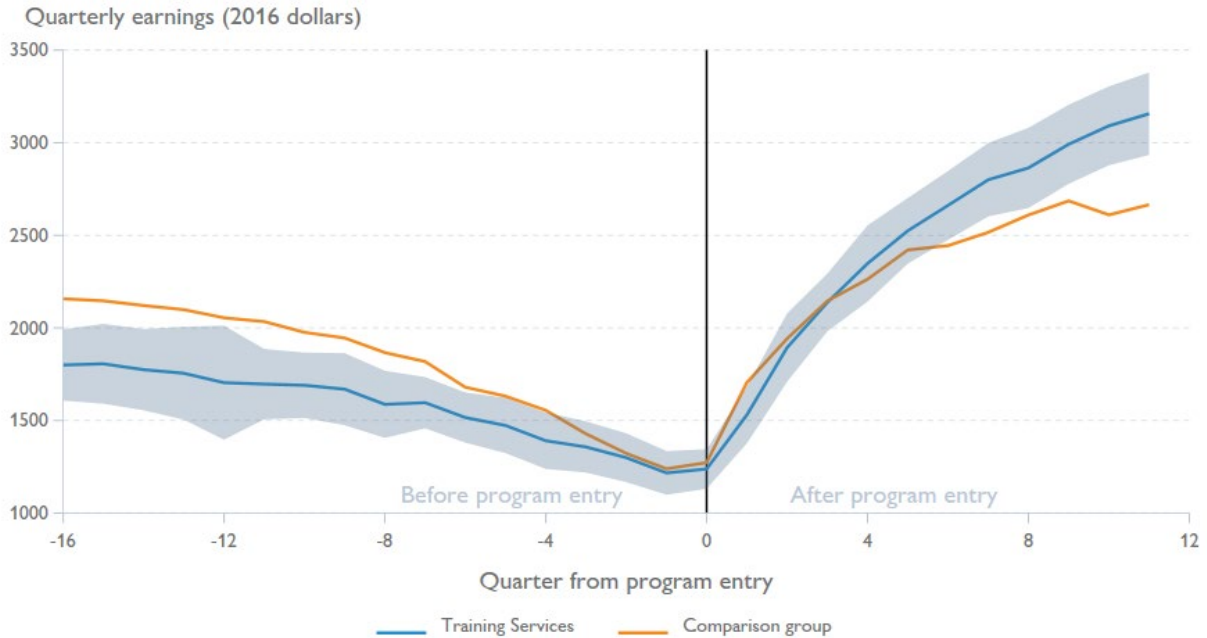
Design Results. Across all three comparisons, the design could not identify adequately comparable groups. Specifically, similar comparison groups for each of the three services could not be found for over 20% recipients (see Ch.3 Methods for a full discussion). For the remaining sample, the design resulted in comparison groups that were relatively similar to their respective groups of T4VR participants, though

moderate differences remained – particularly for labor market characteristics.²⁶ It is worth noting that the difficulty in finding similar comparisons across service recipients could relate to measures of significance of disability – something the study team could not verify. Appendix section B.5.1 contains three tables (one for each comparison) showing the differences across all demographic characteristics presented in Table 4.5.1 as well as 16 labor market measures covering four full years before program entry. **For these reasons, the resulting comparisons do not provide evidence on program impacts.**

Descriptive results. To provide a visual representation of the earnings trajectories for the main comparison, Figure 4.5.1 presents quarterly earnings trends from 4 years before program entry up to 3 years after program entry. The trend line for the T4VR training group includes a 95% confidence interval to provide a sense of the degree of statistical uncertainty about the estimates. The two groups show some similarities in the slope of their earnings trajectories before program entry, though there is a persistent wage gap between the groups, with the non–trainees having consistently higher wages pre–entry. The gap present here is evidence that the design was unsuccessful in finding non–trainees that were similar to the training group. Both groups exhibit a steady increase after program entry, with trainees experiencing higher levels of earnings through the study period.

²⁶ Because comparison groups were formed within local labor markets, entire markets were excluded when no comparable comparison group could be identified. As can be seen across the B.5.1 appendix tables, this resulted in fewer than 29% of the Vocational Rehabilitation participants being excluded from any of the comparisons.

FIGURE 4.5.1: Quarterly earnings comparisons between T4VR participants who received training with T4VR participants who did not receive training from FYs 2014–15 and 2015–16



Notes: Quarterly earnings are presented in 2016 dollars. The light-blue shaded region around the training services trend line represents a 95% confidence band for weighted group differences from within-local labor market comparisons that do not control for covariates and takes the weights as given.

Employment and earnings differences for each of the three comparisons are provided in Table 4.5.2. These results are presented as quarterly averages from 1.5 to 3 years after program entry (that is, Q7 to Q11) in order to represent stabilized impacts. For the main comparison between those who received training services versus those who did not, training participants were 6.9 percentage points more likely to be employed and earned \$376 (14.4%) more per quarter relative to those who did not train. There were no differences in employment for those receiving the other services, but those receiving career services earned \$342 (11.4%) less than those that did not receive those services. A detailed version of the impacts table with statistics from the design and estimates of statistical significance is given in Appendix B, Table B.5.3.1.

TABLE 4.5.2: Labor market impacts for groups of T4VR participants from FYs 2014–15 and 2015–16

	T4VR trainees vs. T4VR no training (1)	T4VR career service recipients vs. T4VR no career services (2)	T4VR supportive service recipients vs. T4VR no supportive services (3)
Quarterly employment: Q7 to Q11			
Treatment group mean	59.5%	52.5%	51.5%
Comparison group mean	50.4%	54.0%	54.2%
Impact in percentage points	6.9*	0.4	-2.0
Quarterly earnings: Q7 to Q11			
Treatment group mean	\$2,981	\$2,798	\$3,006
Comparison group mean	\$2,618	\$3,013	\$2,814
Impact in 2016 dollars	376*	-342*	74
Impact as percent	14.4%*	-11.4%*	2.6%
Sample Characteristics			
Participants in full sample	8,786	13,861	8,088
Participants included in analysis	6,882	10,622	5,811
Excluded due to poor comparison	21.7%	23.4%	28.2%

Notes: See Appendix Table B.5.3.1 for model and design details. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* - represents statistically significant differences at a 95% level of confidence.

Contextualizing results. Given the study team did not have access to a valid comparison group for T4VR participants, the differences presented here represent a descriptive analysis for the program and do not reflect impacts or effectiveness for the program. From these comparisons, those who participated in training ended up having a higher level of employment and earned more compared to those who did not train. Those who received career services experienced lower earnings relative to those who did not receive these services – although the comparison group in this case could include those who trained.

It is important to note that there are particular challenges to evaluating the effectiveness of DOR services relative to the other programs that report to CAAL–Skills.

In particular, some of the training services available to T4VR participants relate directly to having a disability. For example, training can include how to travel to a job site, identification and training to use assistive technology, disclosure of disability, and reasonable accommodation in the workplace. For such disability-related training, comparison groups need to be formed around individuals who share those disabilities. Moving forward, to improve the evaluability of services offered by DOR, specific effort needs to be made to identify how training and services should be evaluated depending on the relevant population. For example, should the evaluation be focused on services that are relevant for a broader group of disabled DOR clients, or should it be focused on training/services for specific groups of individuals with specific disabilities. In either case, the specific groups of individuals or specific services/training need to be identified in the CAAL-Skills dataset. Further, improving the classification of participants by type of disability and severity of disability would allow for more appropriate program and comparison groups to be identified. This is true both within the DOR data as well as across data shared from other programs.

4.6. Career and Technical Education

CTE refers to a multi-year sequence of courses that integrate core academic knowledge with technical and occupational knowledge. Since they are offered through California's Community College system, they are broadly available to the public. The intended population for the program is workers who need training for middle-skill careers that require training beyond high school but less than a four-year degree. That said, a wide range of students with varying goals can enroll in these courses. For those focused on a sequence of CTE courses, the goal of the program is to provide students with a pathway to postsecondary education and careers. CTE instruction is offered in fifteen distinct industry sectors (or "career clusters"), and objectives include hands-on learning linked to careers of interest. Courses may emphasize instruction in soft skills such as teamwork, time management, and communication.

Characteristics of individuals enrolling in at least one CTE course during FY 2014–15 and 2015–16 are provided in column (1) of Table 4.6.1.²⁷ On average, participants are 28 years old, which is relatively young for the working-age population. Males comprise 51% of participants, 41% are Hispanic, and 42% are White. Note that 1% of participants did not report a gender, so 48% are female. A notable feature is that formal connections to the workforce appear low, with only 43% of participants being employed in any given quarter before program entry and average quarterly earnings of \$3,544. This may understate the actual pre-program employment rate, as it is possible that missing identifiers in the CTE data prevented linkage to the student's wage records.²⁸ The average participation duration was 6.5 quarters.

Comparisons to estimate impacts. The research design is based on identifying a valid comparison group that may have access to the CTE program and resembles the CTE population, but experiences less intensive services (see Ch.3 Methods for a full discussion). For this study, all students who enrolled in at least one CTE course are considered program participants. This represents a broad definition of CTE

²⁷ CTE courses were identified as those with Student Accountability Model (SAM) code A (Apprenticeship), B (Advanced Occupational), or C (Clearly Occupational).

²⁸ Note that no identifiers were available to the study team, so the absence of this information was not verified.

participation and includes individuals who may not be committed to completing a sequence of CTE courses. More refined definitions – such as those enrolling in a certain number of credits or courses – were unavailable for this study.

Since CTE participants represent a mix of youth and prime-age working adults, it is important to consider these two groups separately. For older participants (that is, those aged 25 to 49), WP participants of a similar age represent a reasonable population to identify a comparison group since there are no broad eligibility restrictions to participate in either program and their older ages allow sufficient time to have accumulated labor force experience prior to program entry.²⁹ For younger participants, using WP as a comparison poses some challenges. Specifically, the past labor market experiences of youth may not reflect access to future economic opportunities. Information on educational attainment would provide a useful metric to improve the credibility of comparisons between youth in CTE and WP, but education measures were unavailable for the study. That said, for those with some attachment to the labor market, the comparisons may be valid. Further, since there are no eligibility requirements that would obviously skew the sample of youth who participate in CTE, this study attempts to identify comparison groups from WP participants who are also youth – although the study authors are less confident in these comparison groups and interpret the findings with caution.

Before comparing CTE and WP participants, there is another empirical challenge addressed by this study. Unlike other programs, the average CTE participant does not experience a pre-program dip in employment or earnings at program entry. Thus, to avoid comparing WP participants who *had* experienced such a dip, comparison groups are formed by identifying individuals who had entered the WP program at an earlier time (FY 13–14) in the same geographic location. CTE participants' post-entry outcomes are still compared to WP participants' outcomes in the same time periods, but this represents a longer time from WP participation. See Chapter 3 for a complete discussion.

²⁹ We limit the definition of adults to those under 49 because discussions with CCCCCO revealed a concern that older adults may not be participating in programs for the purpose of re-employment. This resulted in the exclusion of 15% of the CTE participant sample.

All workers included in the following analyses had at least one quarter of positive earnings in the four years preceding program entry. The comparisons pursued in this study are:

- **Main comparison – CTE adults vs. WP adults:** This comparison is limited to participants between 25 and 49 years old. Characteristics of the CTE adult population are provided in column (2) of Table 4.6.1. Compared to all CTE participants, the CTE adults included in this comparison are much more likely to have been employed before program entry (75%) and had higher quarterly earnings (\$8,031). The other demographic characteristics are largely the same.
- **Additional comparisons:** The study includes three additional comparisons. The second analysis compared CTE adults who enrolled in at least one advanced occupational course to WP adults in order to test whether impacts were larger for those participating in more intensive CTE training.³⁰ The advanced-course CTE group represents an important distinction from the main CTE group given it likely includes individuals who were more vested in the CTE program. The third and fourth comparisons repeat the analyses for adults that compare CTE participants to WP participants, but for youth aged 14 and 24 years old. Although the analyses for youth are considered less credible by the research team, the results can provide suggestive evidence. Table 4.6.1 presents participant characteristics for CTE adults in advanced occupational courses in column (3), CTE youth in column (4) and CTE youth in advanced occupational courses in column (5).

³⁰ Advanced occupational courses are identified using SAM codes equal to B.

TABLE 4.6.1: Characteristics of CTE participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	CTE participants (1)	Main group: CTE adults (2)	CTE adults in advanced courses (3)	CTE youth (4)	CTE youth in advanced courses (5)
Age	28	33	34	20	20
Male	51%	52%	56%	52%	54%
Female	48%	48%	44%	48%	46%
Binary gender not selected	1%	0%	0%	0%	0%
Hispanic	41%	37%	34%	49%	49%
Black	9%	10%	9%	8%	8%
White	42%	45%	46%	42%	43%
Declined to state race/ethnicity	3%	3%	5%	1%	1%
Disability (self-identified)	4%	4%	3%	4%	4%
Quarterly earnings before entry	\$3,544	\$8,031	\$10,644	\$1,170	\$1,309
Quarterly employment before entry	43%	75%	78%	36%	39%
Program experience					
Quarters participated (mean)	6.5	5.7	6.3	7.1	7.9
Observations	930,327	287,242	70,365	414,484	66,528

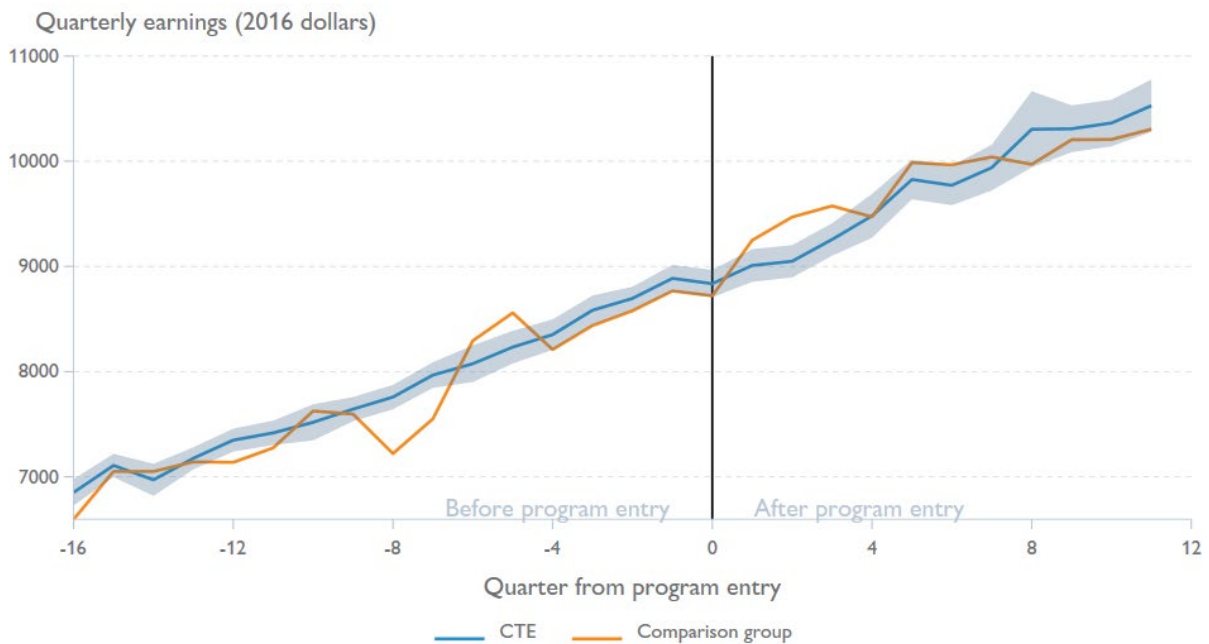
Notes: Quarterly earnings and employment are taken from the 2nd year before program entry.

Design Results. The research design resulted in well-matched comparison groups for the adult comparisons but poorly-matched comparison groups for the youth comparisons. For each of the analyses, Appendix section B.6.1 contains four tables (one for each comparison) that present means and differences in means for baseline characteristics (Tables B.6.1.1–4). For the main comparison of CTE adults versus WP adults, the groups are nearly indistinguishable. For CTE adults in advanced courses versus WP adults, there are small differences in baseline characteristics – particularly for previous earnings (effect size differences up to 0.06) – but the groups are reasonably similar. Further, fewer than 7% of the CTE adult sample is excluded from either analysis based on poor comparisons within local labor markets (see Ch.3 Methods for a full discussion). The design was not as successful identifying comparison groups for the CTE youth analyses. For included labor markets, the two groups were very similar, however, over 34% of the CTE youth sample had to be excluded from both analyses because a similar comparison group could not be locally identified. Therefore, for the youth analyses, the comparisons that are included are still valid, but the resulting impacts may not be generalizable to the full population of CTE youth. **Overall, the study authors conclude that the comparisons for adults represent**

the causal effect of CTE training on employment outcomes, but only provides suggestive evidence of impacts for youth.

Impact results. For the main comparison group of CTE Adults, there does not appear to be a positive earnings impact from participating in CTE. Figure 4.6.1 provides a visual presentation of this with earnings trends from four years before program entry through 3 years after program entry. The figure shows that the design was successful in creating a relatively well-balanced comparison group in the pre-enrollment period. Specifically, the comparison group trend follows the CTE trend before program entry – although oscillations corresponding to earlier WP enrollment are apparent. After the indexed point of comparison (Q = 0), however, the comparison group briefly experiences higher earnings before the trend line becomes statistically indistinguishable.

FIGURE 4.6.1: Quarterly earnings comparisons between CTE participants from FYs 2014–15 and 2015–16 with a similar WP comparison group



Notes: Quarterly earnings are presented in 2016 dollars. The light-blue shaded region around the Career and Technical Education trend line represents a 95% confidence band for weighted group differences from within-local labor market comparisons that do not control for covariates and takes the weights as given.

There are positive impacts on employment for the main comparison group of CTE Adults, and the exploratory analyses demonstrate other positive findings for CTE. Table 4.6.2 presents quarterly employment and quarterly earnings impacts averaged over quarters 7 through 11 after program entry. For the main comparison, CTE adults are 2.7 percentage points more likely to be employed, a statistically significant impact – despite this not being reflected in positive earnings impacts over the same time period. However, for CTE adults in advanced courses, the impact on employment is +4.2 percentage points and the earnings impact is a statistically significant increase in earnings of \$600 (5%). Both CTE Youth comparisons also demonstrated meaningful and statistically significant positive impacts on employment and earnings, with earnings impacts as high as \$522 (11.1%) per quarter for CTE youth in advanced courses. That said, the high percentage of excluded CTE youth due to poor local comparisons makes these findings less generalizable. A detailed version of the impacts table with statistics from the design and estimates of statistical significance is given in Appendix B, Table B.6.3.1.

TABLE 4.6.2: Labor market impacts for groups of CTE participants from FYs 2014–15 and 2015–16 relative to WP comparison groups

	Main group: CTE adults vs. WP adults (1)	CTE adults in advanced courses vs. WP adults (2)	CTE youth vs. WP youth (3)	CTE youth in advanced courses vs. WP youth (4)
Quarterly employment: Q7 to Q11				
Treatment group mean	76.4%	79.9%	75.7%	76.5%
Comparison group mean	73.5%	74.9%	69.8%	69.7%
Impact in percentage points	2.7*	4.2*	5.3*	6.5*
Quarterly earnings: Q7 to Q11				
Treatment group mean	\$10,289	\$13,192	\$4,693	\$5,151
Comparison group mean	\$10,146	\$12,009	\$4,576	\$4,696
Impact in 2016 dollars	37	600*	210*	522*
Impact as percent	0.4%	5.0%*	4.6%*	11.1%*
Sample Characteristics				
Participants in full sample	287,242	70,365	414,484	66,528
Participants included in analysis	276,937	65,720	249,532	43,939
Excluded due to poor comparison	3.6%	6.6%	39.8%	34.0%

Notes: See Appendix Table B.6.3.1 for model and design details. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* - represents statistically significant differences at a 95% level of confidence.

Contextualizing results. These estimates suggest that for adults aged 25 to 49, CTE has a positive impact on employment, and the study team concludes that these findings are credible. Although the design relies on a past WP comparison sample that is known to have faced economic instability before the comparisons are made, these adults have had a substantial amount of time to engage in the labor market and the design was successful at making the groups comparable over the long pre-participation period. Despite the evidence of impacts on employment, these results do not provide evidence of a corresponding positive effect on average earnings. Importantly, these impacts are for a definition of CTE participation based on having enrolled in at least one CTE course. Since a broad group of individuals engage with CTE courses, these overall impacts may not reflect the impact of CTE programs on those who complete them, or even on those who enter them with the intention of completing.

This study also finds the impacts from the exploratory analysis of CTE adults who enrolled in advanced courses to be largely credible. Again, the design performed well for this comparison with relatively few program participants needing to be excluded due to poor labor market comparisons. The one caveat is that this group might also reflect higher-ability individuals since they reached an advanced level, and that might be reflected in improved labor market outcomes as well. Although exploratory, these advanced-course enrollees demonstrated statistically significant employment gains of +4.2 percentage points and earnings gains of \$600 (5.0%). This suggests that those who end up enrolling in advanced courses have improved labor market outcomes relative to similar individuals who do not enroll in these courses.

The study team finds suggestive evidence that CTE youth participants experience meaningful employment and earnings gains. The estimated impacts are all positive, statistically significant, and economically meaningful. However, the design had to exclude many of the program participants due to poor within-labor market comparisons which limits the generalizability of these findings. Further, administrative data on earnings may not be sufficient to make credible matches for youth, and the

similarity of groups based on education levels could not be verified. Although these facts detract from the credibility of these comparisons, the positive impacts are large. Alternative strategies to measure impacts such as within-program comparisons based on education levels that are available for CTE participants may be more appropriate.

The study authors believe these analyses could be adjusted to identify impacts for the intended CTE population with improved data. Specifically, the authors were unable to investigate program differences based on intended coursework, actual coursework, or training program codes. Improved data on participants' intentions for enrolling in a sequence of CTE courses, data on credits for enrolled courses, or data on number of enrolled courses would allow for more refined definitions of CTE program participants that would align more closely with the intended CTE population. These data may also provide opportunities to create more credible research designs for CTE youth.

4.7. Employment Training Panel

Funded through a California payroll tax, the ETP program provides funding to employers to support training for their workforce. To qualify for these funds, employers must demonstrate that there is a need to train workers to fill jobs that are challenged by competition from out of state, primarily in the manufacturing and technology sectors. ETP works by reimbursing employers for training costs, and agency staff provide assistance to employers through application assistance, proposal development, and the monitoring of contract progress. ETP funds training for currently-employed incumbent workers as well as individuals who are unemployed or have received a layoff notice at the start of training so that they are able to re-enter the workforce.

Characteristics of all participants entering an ETP program during FYs 2014–15 and 2015–16 that are included in CAAL–Skills are presented in column (1) of [Table 4.7.1](#). On average, 68% of the participants are male; 35% are White, and 33% are Hispanic. These workers have relatively high labor force attachment with 87% being employed in a given quarter in the second year prior to program entry, which is expected given the program’s focus on incumbent workers. Note that data on age, disability, and participation length were not available for this study.

Comparisons to estimate impacts. The research design is based on identifying a valid comparison group that may have access to the ETP program and resembles the ETP population, but does not participate in the ETP program (see Ch.3 Methods for a full discussion). It is necessary for the comparison group to resemble ETP participants in order to build credibility in the idea that their post-program experiences would reflect those of ETP participants had they not received training. Because of this, and the fact that ETP participants represent a mix of potentially new and incumbent workers, the study team considered comparison groups for new and incumbent workers separately. This is critical because earnings histories and trajectories are expected to be different at the time of program enrollment across these two groups. A primary challenge for this study is that the data elements needed to identify incumbent workers were unavailable.³¹

³¹ The study team considered using identifying information on employers over time, but unique employer IDs were unavailable and employer names varied over time.

The study team proceeded by making comparison groups using a proxy for incumbent workers. Specifically, being continuously employed for 5 quarters – 4 quarters prior to entry as well as the quarter of ETP enrollment – was considered a proxy for being an incumbent worker. Although this proxy measures incumbent workers with error, it is an important requirement for generating a viable comparison group. In fact, we know our proxy is not precise because it is known that approximately 90% of ETP participants are incumbent workers while our strategy identifies only 49% as incumbent workers (not shown). That said, continuous employment is a strong indicator of incumbent workers and represents an important characteristic to identify a valid comparison group. Although this is a strategy to identify likely incumbent workers, as suggested above, those flagged as non-incumbent workers likely represent a mix of actual new and incumbent workers.

Given the two groups of ETP workers, an incumbent-proxy and a non-incumbent-proxy group, the study considered WP participants as potential comparisons. For the incumbent-proxy group, another challenge is exposed when attempting comparisons to WP. Specifically, unlike ETP incumbent workers who are stably employed by definition, most WP participants enter the program while unemployed and experience a pre-program dip in employment and earnings at program entry. Thus, to avoid comparing WP participants who *had* experienced such a dip, comparison groups are formed by identifying individuals who had entered the WP program at an earlier time (FY 2013–14) in the same geographic location. This allows for the same rule to identify incumbent workers to be applied to WP participants at the time comparisons are made. This results in two groups of workers that are both continuously employed for over a year yet have different exposure to the ETP program. The intuition is that individuals with employment shocks from the past can serve as credible counterfactuals as long as their recovery resembles the earnings trajectory of ETP workers leading up to program enrollment (see Ch. 3 Methods). One limitation of this approach, however, is that these comparisons are only possible for ETP entrants from FY 2015–16.

Finally, for the ETP non-incumbent-proxy group, the study team considered whether WP participants could also represent a potential comparison group and concluded it was not advisable. Specifically, ETP workers essentially going to be employed at the time of program entry based on the nature of the program while WP entrants will be out of work during that same period. Further, although this particular group of ETP

participants does not have a strong signal that they are incumbents, the group could still include incumbent workers, making it continue to be a mix of incumbent and new workers. Because it is unclear how to form the comparison group from WP participants, this comparison was not included in the study.

The comparisons pursued for ETP are:

- **Main comparison – ETP incumbent proxy vs. WP incumbent proxy:** This comparison is made between ETP participants from FY 2015–16 and WP participants from FY 2013–14. Although, as explained above, program participation occurred at different times, labor market outcomes were compared within the same quarters. Both groups were continuously employed for 5 quarters at the time the comparison groups were identified. Characteristics of the ETP incumbent–proxy sample are given in column (2) of Table 4.7.1. Demographic characteristics of this ETP sample are largely similar to the overall sample, although at 95%, this group is more likely to be employed in any given quarter before program entry, which is expected given the sample requirements.
- **Additional comparisons:** The study includes two additional comparisons that conduct the main comparison by gender. Characteristics of the ETP incumbent–proxy male sample and the ETP incumbent–proxy female sample are given in columns (3) and (4) of Table 4.7.1, respectively. The female ETP group has a lower percentage of Hispanic participants and lower average quarterly earnings before program entry.

TABLE 4.7.1: Characteristics of ETP participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	ETP participants (1)	Main group: ETP incumbent proxy (2)	ETP incumbent proxy males (3)	ETP incumbent proxy females (4)
Age	.u	.u	.u	.u
Male	68%	66%	100%	0%
Female	32%	34%	0%	0%
Binary gender not selected	0%	0%	0%	0%
Hispanic	33%	33%	35%	29%
Black	5%	5%	4%	6%
White	35%	35%	36%	33%
Declined to state race/ethnicity	0%	0%	0%	0%
Disability (self-identified)	.u	.u	.u	.u
Quarterly earnings before entry	\$13,620	\$15,406	\$15,860	\$14,516
Quarterly employment before entry	87%	95%	95%	95%
Program experience				
Quarters participated (mean)	.u	.u	.u	.u
Observations	170,152	83,262	55,103	28,159

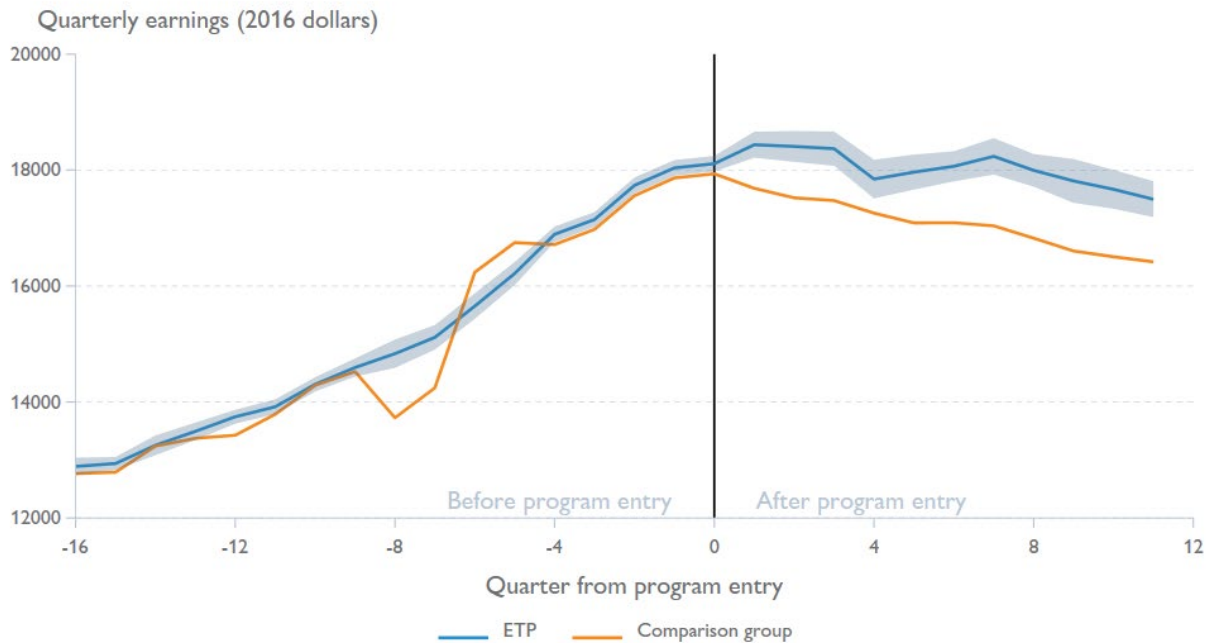
Notes: Quarterly earnings and employment are taken from the 2nd year before program entry. “Incumbent proxy” is defined as being employed for 5 continuous quarters, including the quarter of program enrollment. Columns (2), (3), and (4) are limited to participants from FY 2015–16.

Design Results. The research design was able to identify similar comparison groups for each of the three comparisons in the study. For each of the comparisons, Appendix section B.7.1 contains three tables (one for each comparison) that present means and differences in means for baseline characteristics. In all three tables, the differences across groups are close to zero with a few exceptions for all demographic characteristics as well as 16 labor market measures covering four full years before program entry. Further, fewer than 9% of ETP participants who were attempted for the study were excluded due to poor comparisons within local labor markets (see Chapter 3 for a full discussion). Based on the similarity between groups before program entry, it would appear that outcome comparisons would provide evidence of the causal effect of ETP training for incumbent workers. **However, as discussed below, the study authors have reservations about these comparisons and believe the differences in outcomes are only suggestive of program impacts.**

Impact results. To provide a visual representation of the main comparison between ETP incumbent-proxy participants and their WP counterparts, Figure 4.7.1 contains

quarterly earnings trends from 4 years before program entry up to 3 years after program entry. The trend line for the ETP group includes a 95% confidence interval to provide a sense of the degree of statistical uncertainty about the estimates. Overall, the figure shows that the design was successful in creating a relatively well-balanced comparison group in the pre-enrollment period. Specifically, the comparison group trend follows the ETP trend before program entry – although oscillations corresponding to earlier WP enrollment are apparent. After the indexed point of comparison ($Q = 0$), however, the comparison group earnings amounts start to decline while the trend for ETP participants is relatively stable. This suggests ETP participation leads to earnings increases, but the gap in earnings is driven by the downward trend for the comparison group. This is conspicuous given the WP comparison group was purposefully selected to not experience labor market instability at the time of the comparison. In other words, had the research design worked as intended, one would expect to find a smooth trend through program entry for the comparison group – an observation that is discussed further below.

FIGURE 4.7.1: Quarterly earnings comparisons between continuously employed ETP participants from FY 2015–16 with a similar WP comparison group



Notes: Quarterly earnings are presented in 2016 dollars. Continuous employment is determined by five quarters of ongoing employment with an employer at the time of ETP participation. The light-blue shaded region around the ETP trend line represents a 95% confidence band for weighted group differences from within-local labor market comparisons that do not control for covariates and takes the weights as given.

Impacts on employment and earnings for each of the three comparisons are provided in Table 4.7.2. These results are presented as quarterly averages from 1.5 to 3 years after program entry (that is, Q7 to Q11) in order to represent stabilized impacts. All three of the impacts on earnings are positive, economically meaningful, and statistically significant at a 95% level of confidence. Taken literally, these results suggest that ETP participants were 1.6 percentage points more likely to be employed relative to their comparison group and earned \$1,005 (6.0%) more. A notable finding in the table is that the positive impacts on employment and earnings are twice as large for males as they are for females even though females still experience a positive impact on earnings from ETP participation. A detailed version of the impacts table with statistics from the design and estimates of statistical significance is given in Appendix B, Table B.7.3.1.

TABLE 4.7.2: Labor market impacts for groups of ETP participants from FYs 2015–16

	Main group: ETP incumbent proxy vs. WP incumbent proxy (1)	ETP incumbent proxy males vs. WP incumbent proxy males (2)	ETP incumbent proxy females vs. ETP incumbent proxy females (3)
Quarterly employment: Q7 to Q11			
Treatment group mean	91.4%	91.3%	91.2%
Comparison group mean	89.6%	88.8%	90.3%
Impact in percentage points	1.6*	2.3*	0.7
Quarterly earnings: Q7 to Q11			
Treatment group mean	\$17,843	\$18,356	\$16,577
Comparison group mean	\$16,679	\$16,889	\$15,636
Impact in 2016 dollars	1,005*	1,202*	621*
Impact as percent	6.0%*	7.1%*	4.0%*
Sample Characteristics			
Participants in full sample	83,262	55,103	28,159
Participants included in analysis	81,378	53,034	25,717
Excluded due to poor comparison	2.3%	3.8%	8.7%

Notes: See Appendix Table B.7.3.1 for model and design details. “Incumbent proxy” is defined as being employed for 5 continuous quarters from the quarter the study is indexed. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* – represents statistically significant differences at a 95% level of confidence.

Contextualizing results. The study authors conclude that these results are suggestive of ETP having a positive impact on labor market outcomes for incumbent workers, but some questions on the credibility of the findings remain. Previous studies conducted have found overall positive labor market impacts from the ETP program (Moore et al. 2003) as well as other incumbent training programs (Negoita and Goger 2020). The impact estimates presented here support those findings and would seem to indicate that participation in an ETP-funded training program improves employment and earnings outcomes when compared to the longer-term effects of the less intensive services offered by the WP program – particularly for likely incumbent workers. However, the study authors have lingering concerns over the credibility of the results given that fewer baseline characteristics were used to build comparison groups (with specific age and disability status not available in the data), and the slight downward

trajectory of earnings for the WP group in the main comparison. The downward trajectory was unexpected given the WP incumbent-proxy group should not have experienced any shocks to their earnings at the time the comparison groups were formed. One explanation directly related to the previous-WP strategy is that more time simply needs to pass between the employment shock experienced by WP participants and the time at which comparison groups are formed. However, there are two specific features of ETP that accentuate this observed challenge.

First, ETP participants are the highest earners of all programs. Because of this, their earnings trajectories may be more difficult to match. High-earning workers who experience employment shocks and end up enrolling in WP may experience longer-lasting consequences of these shocks relative to those with lower baseline earnings, perhaps explaining why this is the only program where we see this downward trend in the matched comparison group.

Second, ETP participants experience very large earnings gains preceding program enrollment. This is evident from Figure 4.7.1 where there is an approximately 40% earnings increase (\$13,000 to \$18,000) in the four years before program entry. This could relate to age and transitions from education to the workforce, but it is unknown because CAAL-Skills data do not exist on either of these variables for ETP participants. The weighting strategy is able to identify an empirically similar population of workers before program entry by design, but it may simply be successful at pulling out individuals who are matching these steep earnings trajectories only temporarily.

4.8. State Certified Apprenticeship

The SCA program trains apprentices for specified occupations according to the requirements and needs of employers. Apprenticeships combine work experience and classroom training to give workers the opportunity to learn skills on the job while gaining the theoretical knowledge behind their profession or trade. While the majority of approved apprenticeships are in the construction sector, there are also programs in the service sector, manufacturing, information technology, transportation and utilities, and health care. Apprentices must be at least 16 years old to be eligible, though most programs require participants be at least 18. The additional qualifications for each apprenticeship program are set by the program sponsor and may include basic math and literacy skills, physical capabilities such as hand-eye coordination and agility, as well as aptitude tests or previous work experience.

Characteristics of all SCA enrollees during FYs 2014–15 and 2015–16 are presented in column (1) of Table 4.8.1. On average, participants are 29 years old and males comprise the overwhelming majority at 93%. Overall, 52% of participants are Hispanic, and 34% are White. Approximately 61% of apprentices are employed in any given quarter before program entry, with average earnings of \$5,151 per quarter. Typical program duration was 7.1 quarters.

Comparisons to estimate impacts. The research design is based on identifying a valid comparison group that may have access to the SCA program and resembles the SCA population, but experiences less intensive services. This study considers WP participants for these comparisons. However, a challenge with using this group is that, unlike other programs, the average SCA participant does not experience a pre-program dip in employment or earnings at program entry. Thus, to avoid comparing WP participants who *had* experienced such a dip, comparison groups are formed by identifying individuals who had entered the WP program at an earlier time (FY 13–14) in the same geographic location. SCA participants' post-entry outcomes are still compared to WP participants' outcomes in the same time periods, but this represents a longer time from WP participation. See Ch. 3 Methods for a complete discussion.

All workers included in the following analyses had at least one quarter of positive earnings in the four years preceding program entry. The comparisons pursued in this study are:

- **Main comparison – SCA vs. WP:** This comparison is made between all apprentices with pre-program earnings enrolled in an SCA program and WP participants. Characteristics of the SCA population are provided in column (2) of Table 4.8.1. Since the majority of participants have pre-program earnings (85%, see Table 2.1), the demographic characteristics of this sample are very similar to the overall population of apprenticeship participants, although a higher percentage of this group was employed in any given quarter prior to program entry (71% vs. 61%).
- **Additional comparisons:** The study includes three additional comparisons using subgroups of SCA participants: those who completed their apprenticeship program and those who dropped out. The first of these analyses is a comparison between completers and non-completers, with non-completers serving as the comparison group. The second analysis compares apprenticeship non-completers with WP participants, and the last analysis compares SCA completers with WP participants. Among all SCA participants, approximately 33% completed their programs (not shown). Characteristics of SCA completers and non-completers are given in columns (3) and (4) of Table 4.8.1. There are two notable differences between these groups. First, completers were much more

attached to the labor force before entry with 78% being employed in any given quarter before entry compared to 66% for non-completers. They also earned more (\$8,063 per quarter versus \$4,743 per quarter). The second feature is how long they participated. Completers participated for an average duration of 11.6 quarters compared to those who did not complete at 4.2 quarters.

TABLE 4.8.1: Characteristics of SCA participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	SCA participants (1)	Main group: SCA in design (2)	SCA completers (3)	SCA non- completers (4)
Age	29	29	30	29
Male	93%	94%	90%	96%
Female	7%	6%	10%	4%
Binary gender not selected	0%	0%	0%	0%
Hispanic	52%	52%	50%	53%
Black	8%	8%	6%	9%
White	34%	34%	36%	33%
Declined to state race/ethnicity	0%	0%	0%	0%
Disability (self-identified)	.u	.u	.u	.u
Quarterly earnings before entry	\$5,151	\$6,040	\$8,063	\$4,743
Quarterly employment before entry	61%	71%	78%	66%
Program experience				
Quarters participated (mean)	7.1	7.1	11.6	4.2
Observations	47,662	40,647	15,893	24,749

Notes: Quarterly earnings and employment are taken from the 2nd year before program entry.

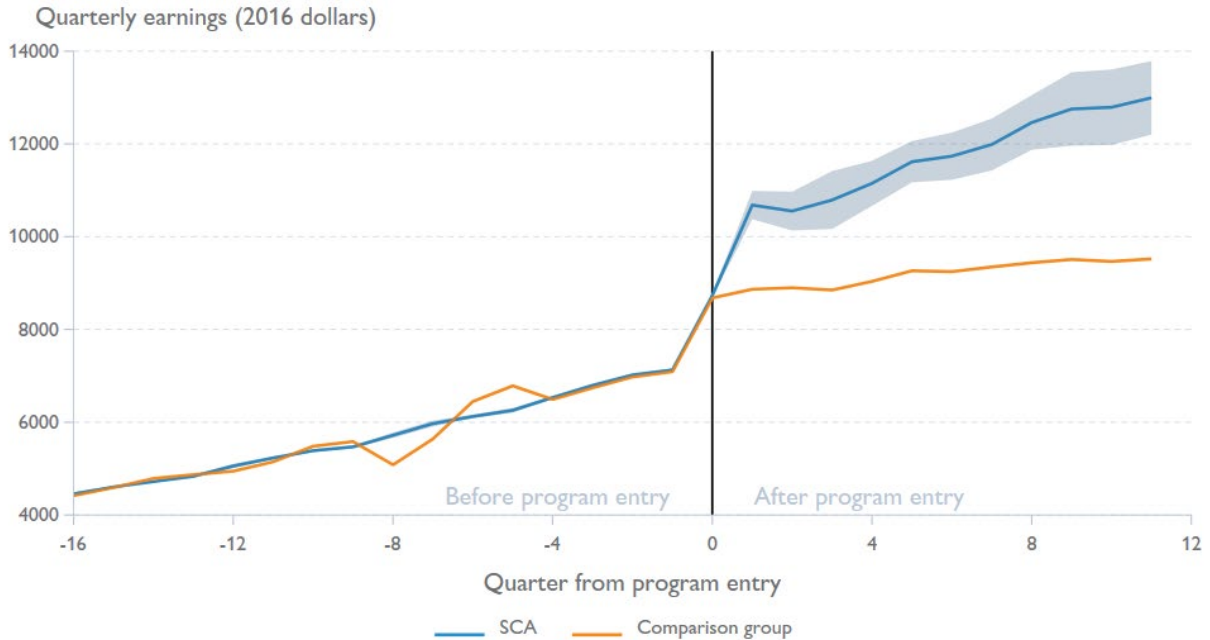
.u – characteristics not reported in CAAL-Skills dataset.

Design Results. The research design resulted in well-matched comparison groups for all comparisons between the full SCA group and the WP sample but only moderately well-matched comparison groups for SCA completers and non-completers. For each of the analyses, Appendix section B.8.1 contains three tables (one for each comparison) that present means and differences in means for baseline characteristics (Tables B.8.1.1–4). For all comparisons between the full SCA sample and WP, the groups are nearly indistinguishable with close to zero differences across demographic and pre-entry labor market outcomes. Further, less than 5% of the SCA sample was excluded due to poor comparison groups within labor markets, which signals that the design was able to broadly identify good comparisons for the sample. However, comparisons

within SCA for completers and non-completers were not as strong, with 11.1% of the sample needing to be excluded due to poor comparisons, and baseline effect sizes in quarterly earnings as high as 0.19. Even still, these differences are reasonable since the presented analyses control for these differences when estimating impacts. **Taken together, this provides evidence that the comparisons represent the causal effect of SCA training on employment outcomes.**

Impact results. There were statistically significant and meaningful differences in labor market outcomes after program entry between SCA participants and their comparison groups. To provide a visual presentation of this, Figure 4.8.1 presents quarterly earnings trends for the main comparison from 4 years before program entry up to 3 years after program entry. The trend line for the SCA group includes a 95% confidence interval to provide a sense of the degree of statistical uncertainty about the estimates. Aside from the earnings dip and variability exhibited by the WP group around their actual program entry (quarters -4 and -8), the nearly overlapping trend in earnings for the two groups in all other periods before program entry is evidence that the research design worked as intended since earnings differences were close to zero for those periods. After program entry, however, there is a clear divergence in the earnings trend where the apprenticeship group shows a steady increase in earnings relative to the WP comparison group, and the gap grows over the study period.

FIGURE 4.8.1: Quarterly earnings comparisons between SCA participants from FYs 2014–15 and 2015–16 with a similar WP comparison group



Notes: Quarterly earnings are presented in 2016 dollars. The light-blue shaded region around the apprenticeship trend line represents a 95% confidence band for weighted group differences from within-local labor market comparisons that do not control for covariates and takes the weights as given. This shaded region is also present in the pre-enrollment quarters but is not visually apparent due to precise estimates.

As measured by outcomes in the UI base wage file, SCA participants included in the study experienced improved labor market experiences across all four comparisons. Employment and earnings impacts for each of the four comparisons are provided in Table 4.8.2. These results are presented as quarterly averages from 1.5 to 3 years after program entry (that is, Q7 to Q11) in order to represent stabilized impacts. All impacts in the table are large, positive, and statistically significant at a 95% level of confidence. For the main comparison, SCA participants were 6.2 percentage points more likely to be employed than their WP comparison group and earned \$3,090 (32.7%) more per quarter. The impacts on earnings in the remaining comparisons are all positive and span a wider range – including when comparing SCA completers to non-completers. These results show that the overall impacts are driven by the completers of the program even though some participation appears to still benefit workers. A detailed version of the impacts table with statistics from the design and estimates of statistical significance is given in Appendix B, Table B.8.3.1.

TABLE 4.8.2: Labor market impacts for groups of SCA participants from FYs 2014–15 and 2015–16

	SCA vs. WP (1)	SCA completers vs. SCA non-completers (2)	SCA completers vs. WP (3)	SCA non-completers vs. WP (4)
Quarterly employment: Q7 to Q11				
Treatment group mean	84.1%	95.5%	95.3%	76.8%
Comparison group mean	77.7%	79.8%	82.8%	74.7%
Impact in percentage points	6.2*	14.5*	12.2*	2.0*
Quarterly earnings: Q7 to Q11				
Treatment group mean	\$12,607	\$17,623	\$17,556	\$9,412
Comparison group mean	\$9,458	\$11,243	\$11,665	\$8,033
Impact in 2016 dollars	3,090*	5,337*	5,724*	1,356*
Impact as percent	32.7%*	47.5%*	49.1%*	16.9%*
Sample Characteristics				
Participants in full sample	40,647	15,893	15,893	24,749
Participants included in analysis	39,553	14,120	15,231	24,038
Excluded due to poor comparison	2.7%	11.2%	4.2%	2.9%

Notes: See Appendix Table B.8.3.1 for model and design details. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* - represents statistically significant differences at a 95% level of confidence.

Contextualizing results. The impact estimates presented here indicate that participation in an SCA program increases both employment and earnings when compared to WP participants. Effects are largest for those who complete their SCA programs, though the study also finds positive effects when the program is not completed. A noteworthy feature of this fact is that median program participation for completers is 11 quarters while the impacts measured here are up to 11 quarters. This implies that the earnings gains coming from SCA participation are being realized during the period of training – a finding that may help to explain the positive effect for non-completers, who may also have been enrolled for a portion of the period of which outcomes are measured.

These findings are consistent with research on apprenticeship programs across multiple states. In another study including 10 states, earnings gains were present for participants in registered apprenticeship programs even if they only completed a small portion of the program, and these gains were substantially higher for program completers (Reed et al. 2012). Although findings on completers should be caveated since completers might reflect more motivated or higher-skilled workers that would have performed better anyway, the consistency of the finding suggests more work around program completion would be valuable, or longer outcome windows that extend beyond the completion date.

Given the SCA program appears promising, further research around its effectiveness could be expanded in a few ways. First, the supplemental analyses suggest that program completion is important. The majority of participants did not complete their programs within the 3-year window of this study, so an improved understanding of completion could lead to actionable insights that increase the effectiveness of SCA even more. According to DIR staff, most non-completing participants exit the program within the first six months, so understanding why this happens is important for identifying potential enhancements. Second, subgroup analyses would help provide evidence on program access and the feasibility of expansion. Specifically, further research could ask whether the positive labor market gains are experienced by all types of workers, or whether they are concentrated amongst a select few. This could also be expanded to whether it is concentrated by industrial sector or region. Finally, a cost-benefit analyses would be useful to understand return-on-investment.

4.9. Trade Adjustment Assistance

The TAA program offers career services, training services, and financial support to workers experiencing job instability resulting from broad economic factors. It is a federal program administered by the U.S. Department of Labor (DOL) and at the state level by the Employment Development Department (EDD). The TAA program was established under the Trade Act of 1974 to provide assistance to workers who are laid off as a result of increased imports or a shift in production to a foreign country. The program assists workers in regaining satisfactory employment through the use of employment services, classroom and/or on-the-job training, job search assistance, and relocation allowances. These services could be received through other programs since TAA participants are mandated to enroll in the T1DW program.³² Additionally, eligible workers can receive a Trade Readjustment Allowance (TRA) during periods of unemployment beyond the exhaustion of UI payments. Not to exceed \$10,000 over a two-year period, TRA payments act as a work subsidy and are calculated as 50% of the difference between a worker's reemployment wage and the wage at the worker's certified job.

Characteristics of all TAA enrollees during FYs 2014–15 and 2015–16 are in column (1) of Table 4.9.1. At 1,272 participants, the TAA program is the smallest within the CAAL–Skills set of programs. On average, participants are 49 years old and 52% are male. Given the nature of the program, TAA participants have a high level of labor force attachment with 93% being employed in any given quarter before employment and average quarterly earnings of \$14,225. Importantly, these stable employment histories facilitate the identification of credible comparison groups. The typical program participation duration is almost five calendar quarters.

Comparisons to estimate impacts. The research design is based on identifying a valid comparison group that may have access to TAA and resembles the TAA population, but does not receive TAA services (see Ch.3 Methods for a full discussion). It is important for the comparison group to resemble TAA participants in order to build credibility in

³² Note that this does not always happen, and co-enrollment into T1DW was only 34.1%, while cross-training from T1DW was only 3.3% (Table 2.2).

the idea that post-program experiences of these participants would reflect what TAA participants had they not received training. This study uses WP participants to form comparison groups. This is a credible comparison group given both programs cater to UI-eligible participants experiencing job instability at the time of enrollment, comparisons are only made within local labor markets, and indicators for industry are included when identifying similar samples. Further, both programs are administered through EDD, which increases the availability of the program for non-TAA participants. The comparisons conducted are:

- **Main comparison – TAA trainees vs. WP:** Given this study’s focus on training, the main comparison will be between TAA participants who enrolled in training compared to a similar group of WP participants. Characteristics of TAA trainees are provided in column (2) Table 4.9.1. Only 58% of TAA participants received training (not shown), but trainees generally resemble the overall population.
- **Additional comparisons:** The study includes two additional analyses. Since indicators for training completion are available, the first analysis compares TAA trainees who completed training compared to a similar group of WP participants. The final comparison is all TAA participants (both trainees and non-trainees) compared to WP participants to study the overall impacts of the program. Table 4.9.1 presents participant characteristics for those who completed training in column (3). Of those who trained, 81% completed their training program, and the sample again looks similar to the overall sample of TAA participants.

TABLE 4.9.1: Characteristics of TAA participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	TAA participants (1)	Main group: TAA trainees (2)	TAA completed training (3)
Age	49	49	49
Male	52%	49%	51%
Female	48%	51%	49%
Binary gender not selected	0%	0%	0%
Hispanic	32%	33%	32%
Black	5%	5%	5%
White	30%	30%	29%
Declined to state race/ethnicity	16%	14%	16%
Disability (self-identified)	1%	1%	2%
Quarterly earnings 2nd year before entry	\$14,225	\$14,065	\$14,064
Quarterly employment 2nd year before entry	93%	92%	92%
Program experience			
Quarters participated (mean)	4.5	5.6	5.6
Observations	1,272	734	598

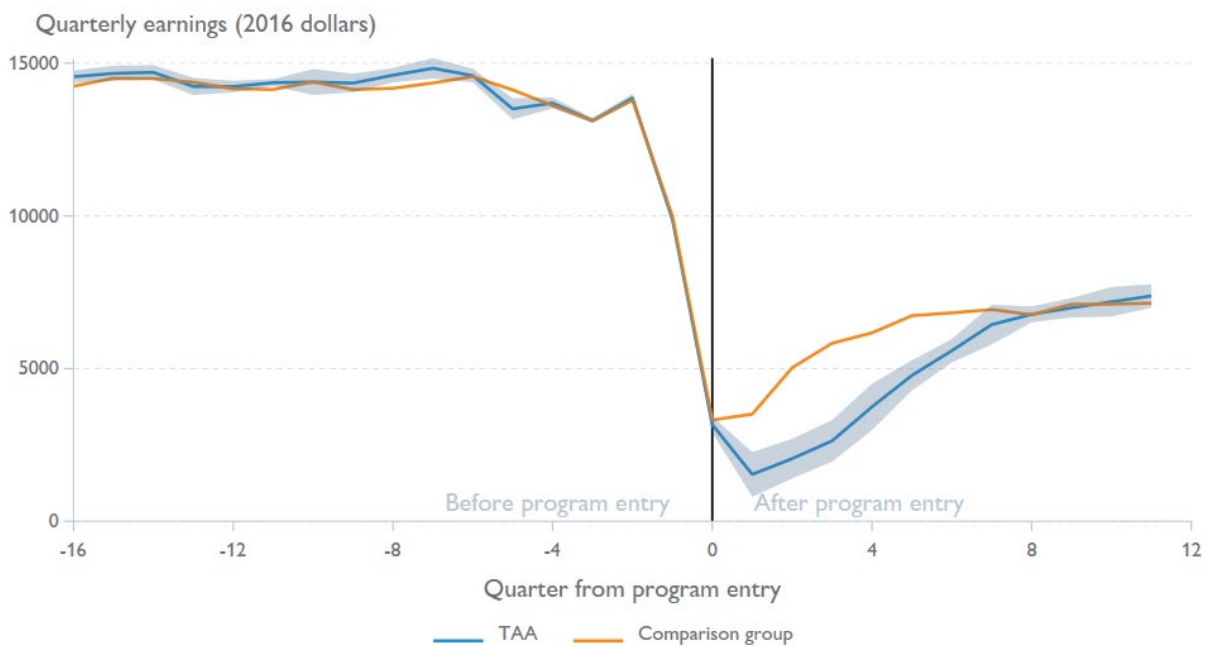
Notes: Quarterly earnings and employment are taken from the 2nd year before program entry.

Design Results. Across all three analyses, the implemented design resulted in WP comparison groups that were nearly indistinguishable from their respective program groups. For each of the analyses, Appendix B.9.1 contains two tables (one for each comparison) that present means and differences in means for baseline characteristics to compare the two groups. For all tables, the differences across groups are close to zero for all demographic characteristics presented in Table 4.9.1 as well as 16 labor market measures covering four full years before program entry. Further, 8.3% or fewer of the TAA samples were excluded from the analyses due to poor comparisons within local labor markets (see Chapter 3 for a full discussion). **Taken together, this provides evidence that the comparisons represent the causal effect of TAA training on employment outcomes.**

Impact results. In the short-term, there are statistically significant and economically meaningful differences in earnings outcomes after program entry between TAA trainees included in the study and their comparison groups. Figure 4.9.1 provides a visual representation of this. It plots quarterly earnings trends for the main comparison from 4 years before program entry through 3 years after program entry. The trend line

for TAA trainees includes a 95% confidence interval to provide a sense of the degree of statistical uncertainty about the estimates. The nearly overlapping trend in earnings across groups before program entry – including a large earnings dip that occurs around the time of entry – is evidence that the research design worked as intended. However, there is a clear divergence in the earnings trend after program entry. Through the first six quarters after program entry, the comparison group earns significantly more than TAA trainees. Trainees’ earnings steadily rise after this initial dip and become indistinguishable from the WP comparison group by quarter 8, which aligns with the time limits for the TRA subsidy. A noteworthy feature of the figure is that neither group obtains the pre–entry level of earnings over the study time period.

FIGURE 4.9.1: Quarterly earnings comparisons between TAA participants from FYs 2014–15 and 2015–16 with a similar WP comparison group



Notes: Quarterly earnings are presented in 2016 dollars. The light–blue shaded region around the Trade Adjustment Assistance trend line represents a 95% confidence band for weighted group differences from within–local labor market comparisons that do not control for covariates and takes the weights as given. This shaded region is also present in the pre–enrollment quarters but is not visually apparent due to precise estimates.

Across all analyses, this study finds that TAA participation has a positive impact on the probability of being employed, but only TAA participants who completed a training program experienced higher earnings. Table 4.9.2 provides employment and earnings

impacts for each of the analyses. The results are calculated as quarterly averages from 1.5 to 3 years after program entry (that is, Q7 to Q11) in order to represent stabilized impacts. Positive impacts on employment from TAA participation, ranging from 7.6 to 9.8 percentage points, are all statistically significant. However, there is no impact on earnings for the full group of TAA trainees or participants overall. However, those who completed a TAA-approved training program earned \$338 (4.9%) more relative to the WP comparison group. A detailed version of the impacts table with statistics from the design and estimates of statistical significance is given in Appendix B, Table B.9.3.1.

TABLE 4.9.2: Labor market impacts for groups of TAA participants from FYs 2014–15 and 2015–16

	TAA trainees vs. WP (1)	TAA completed training vs. WP (2)	TAA all participants vs. WP (3)
Quarterly employment: Q7 to Q11			
Treatment group mean	65.3%	65.5%	64.2%
Comparison group mean	56.6%	55.9%	56.8%
Impact in percentage points	8.8*	9.8*	7.6*
Quarterly earnings: Q7 to Q11			
Treatment group mean	\$6,956	\$7,195	\$7,205
Comparison group mean	\$7,013	\$6,893	\$7,140
Impact in 2016 dollars	-18	338*	64
Impact as percent	-0.3%	4.9%*	0.9%
Sample Characteristics			
Participants in full sample	734	598	1,272
Participants included in analysis	673	560	1,228
Excluded due to poor comparison	8.3%	6.4%	3.5%

Notes: See Appendix Table A.9.3.1 for model and design details. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* - represents statistically significant differences at a 95% level of confidence.

Contextualizing results. These estimates indicate that TAA training (and participation in general) have positive impacts on employment and no impact on stabilized earnings, but the impacts are nuanced. In the short-term, TAA trainees (and participants in general) experience lower earnings relative to the comparison group up until 8 quarters after program entry. This could relate to lost earnings as an opportunity cost of training. Alternatively, since this time period aligns with the length of time these

participants could be receiving the TRA, the lower earnings could instead reflect TAA participants' quick re-entry into the labor market at jobs that are compensated below their previous positions, which would then make them eligible to receive TRA payments. Although the study authors could not verify this using actual receipt of TRA, this aligns with the positive impact findings on employment across all TAA groups.

Finally, the impacts from this study diverge substantially from the literature. A national evaluation of the TAA program using a similar follow-up time period found that TAA participation had a negative impact on employment of 16 percentage points and a decrease in earnings of 35% (Schochet et al, 2012).³³ This is in contrast to positive impacts on employment and zero to positive impacts on earnings over a similar time period.

³³ The percentage impact on earnings was calculated from Table VII-11 by dividing the earnings impact of -\$7,451 by the comparison group's earnings of \$20,999 over Quarters 9-12 from program entry.

4.10. Welfare-to-Work

WtW is the workforce component of California's Temporary Assistance for Needy Families (TANF) program, CalWORKs.³⁴ CalWORKs is a needs-based program that provides families with temporary cash assistance. In addition to cash, program components include general wraparound and supportive services as well as support for employment and training programs. Importantly, the program does have work requirements, but participation in certain education and training programs (or activities) can satisfy those requirements. The program serves all 58 counties in the state of California and is operated locally by county welfare departments.

Characteristics of all WtW enrollees during FYs 2014-15 and 2015-16 with known locations are provided in Column (1) of Table 4.10. On average, participants are 31 years old, 30% are male, and 44% are Hispanic. Employment from UI-covered jobs before program entry is low, with only 38% of participants being employed in any given quarter before program entry, on average. This presents general challenges for measuring the effectiveness of the WtW program on labor market outcomes since the UI base wage file is the primary source of information for both creating comparable groups and measuring outcomes from the program. The typical duration of program participation is 3.1 quarters.

Comparisons to estimate impacts. Through conversations with CDSS, it was determined that participation in WtW alone should not be considered an indication for education or training since employment or other job readiness activities can satisfy the participation requirement. For that reason, it was decided that the CAAL-Skills dataset should be leveraged to identify WtW participants who had also participated in employment support, education, and/or training programs from other programs in the CAAL-Skills dataset. The goal is then to estimate the impact of these employment and training services for the WtW participants who received them – that is, WtW who were co-enrolled.

The research design is based on identifying a valid comparison group that may have access to WtW co-enrolled services and resembles this population, but does not

³⁴ CalWORKs is short for the California Work Opportunity and Responsibility to Kids program.

actually cross enroll in those services. WP participants were initially considered to form such a comparison group, but the study authors determined that this was inappropriate given WP participants are generally quite different than the WtW population. Further, since WtW is a needs-based program, it would be important to assess eligibility of WP participants to form a valid comparison group. However, such data is not available for WP participants.

Instead, this study uses other WtW participants who did co-enroll in another CAAL-Skills program as a potential comparison group. The benefit of using this group is that all participants share a common experience with the CalWORKs program and may have access to similar programs. The challenge with these potential comparison groups, however, is that there are programmatic reasons why WtW participants may not have co-enrolled in a CAAL-Skills program. For example, they may have been exempt from work requirements due to having a young child, or they may have decided to work instead of participating in education or training. This study is unable to account for those differences when constructing the comparison groups.

All comparisons are identified within the same local labor markets (e.g., within the same county and the same quarter) and required positive earnings in the UI Base Wage file before program entry. The comparisons conducted are:

- **Main comparison – WtW co-enrolled vs. WtW not co-enrolled:** “Co-enrolled” participants are those who enroll in at least one alternative program that reports to CAAL-Skills while still a WtW participant. The original study plan was to focus on those who co-enrolled in an “intensive training program,” but the analysis of co-enrollment presented in Chapter 2 clarified that this population was quite small, so co-enrollment in any program that reports to CAAL-Skills was included. The comparison group was selected as those that did not co-enroll in another program reporting to CAAL-Skills while being a WtW participant. As seen in column (2) of Table 4.10.1, the co-enrolling WtW participants are demographically similar to all WtW participants. The primary difference is that WtW co-enrolled participants are much more likely to be employed in a given quarter in the second year before enrollment at 60% compared to only 38% for the full WtW sample.

- **Additional comparisons:** The study includes one additional comparison. Given the initial goal of focusing on intensive-training services, the authors also compare WtW participants that received training from another CAAL-Skills-affiliated program while still enrolled in WtW, referred to as “cross-trained” participants. The distinction between co-enrollment and cross-training is important because not all participants are offered training services across programs. As with the main comparison, this study uses non-co-enrolled WtW participants to form the comparison group.

TABLE 4.10.1: Characteristics of WtW participants from FYs 2014–15 and 2015–16 and groups of these participants included in the study design

	WtW participants (1)	Main group: WtW co-enrolled (2)	WtW cross-trained (3)
Age	31	30	29
Male	30%	31%	29%
Female	70%	69%	71%
Binary gender not selected	0%	0%	0%
Hispanic	44%	45%	46%
Black	15%	16%	16%
White	25%	25%	23%
Declined to state race/ethnicity	0%	0%	0%
Disability (self-identified)	.u	.u	.u
Quarterly earnings before entry	\$1,714	\$3,185	\$2,485
Quarterly employment before entry	38%	60%	55%
Program experience			
Quarters participated (mean)	.u	.u	.u
Observations	312,201	18,906	6,964

Notes: Quarterly earnings and employment are taken from the 2nd year before program entry.2016–17 year. “.u” means that this characteristic was unavailable.

Design Results. Across both comparisons, the implemented design resulted in comparison groups that were nearly indistinguishable from their respective program groups. For each of the comparisons, Appendix section B.10.1 contains two tables (one for each comparison) that present means and differences in means for baseline characteristics. In both tables, the differences across groups are close to zero for all demographic characteristics presented in Table 4.10.1 as well as 16 labor market measures covering four full years before program entry. Further, fewer than 6.2% of

WtW co-enrolled and cross-trained participants were excluded due to poor comparisons within local labor markets (see Chapter 3 for a full discussion). **Taken together, this provides evidence that the comparisons represent the causal effect of WtW co-enrollment on employment outcomes.**

Impact results. For the main comparison group, there does not appear to be any sustained impact from WtW participants who co-enrolled in another CAAL-Skills program. Figure 4.10.1 provides a visual presentation of this with earnings trends from four years before program entry through 3 years after program entry. The overlapping trends before program entry signal that the design worked well in making the groups comparable – including a sizeable earnings dip of over 50% around the time of program entry. After program entry, earnings of the co-enrolled WtW group were initially lower than the comparison group of those not-co-enrolled, but these differences disappear by the 6th quarter after program entry and the longer-term trends become indistinguishable.

FIGURE 4.10.1: Quarterly earnings comparisons between WtW participants from FYs 2014–15 and 2015–16 who co-enrolled in another program in the CAAL–Skills dataset with a similar WtW comparison group whose participants did not co-enroll in another program in the CAAL–Skills dataset



Notes: Quarterly earnings are presented in 2016 dollars. The light-blue shaded region around the WtW trend line represents a 95% confidence band for weighted group differences from within-local labor market comparisons that do not control for covariates and takes the weights as given. This shaded region is also present in the pre-enrollment quarters but may not be visually apparent due to precise estimates.

Although there are small positive impacts on employment, there is no impact on earnings from WtW participants who co-enrolled or cross-trained in other programs included in CAAL–Skills data. Quarterly employment and earnings impacts are provided in Table 4.10.2. as quarterly averages from 1.5 to 3 years after program entry (that is, Q7 to Q11). This time period is used to represent stabilized impacts. For the main comparison, WtW co-enrollees are 2.1 percentage points more likely to be employed compared to those who did not co-enroll. There are no differences in earnings. These findings are qualitatively similar for WtW participants who cross-trained compared to those who did not co-enroll in another program (column 2). A detailed version of the impacts table is given in Appendix B, Table B.10.3.1.

TABLE 4.10.2: Labor market impacts for WtW participants from FYs 2014–15 and 2015–16 who co-enrolled or cross-trained in another program in the CAAL–Skills dataset relative to similar WtW participants who did not co-enroll in another program in the CAAL–Skills dataset

	Main group: WtW co-enrolled vs. WTW not- co-enrolled (1)	WtW cross-trained vs. WtW not- co-enrolled (2)
Quarterly employment: Q7 to Q11		
Treatment group mean	61.5%	59.0%
Comparison group mean	59.4%	56.8%
Impact in percentage points	2.1*	2.3*
Quarterly earnings: Q7 to Q11		
Treatment group mean	\$3,613	\$3,184
Comparison group mean	\$3,571	\$3,136
Impact in 2016 dollars	29	48
Impact as percent	0.8%	1.5%
Sample Characteristics		
Participants in full sample	18,906	6,964
Participants included in analysis	18,315	6,529
Excluded due to poor comparison	3.1%	6.2%

Notes: See Appendix Table B.10.3.1 for model and design details. The percent of the treated group excluded in the analysis reflects those in local labor markets where no sufficient comparison sample could be identified.

* - represents statistically significant differences at a 95% level of confidence.

Contextualizing results. When making comparisons within program, these estimates suggest that there is a positive impact on employment but no impact on earnings for WtW participants who co-enrolled or cross-trained in other programs in the CAAL–Skills dataset. The impacts on employment were not large, at +2.1 percentage points while the earnings differences were indistinguishable across groups. It is important to note that earnings overall are low, and estimates for annual earnings for those who are employed would put a family of four at the 2016 poverty guideline.³⁵ Given the

³⁵ The 2016 poverty guideline for a family of four is \$24,300. This is compared to \$24,027 which is the comparison group quarterly earnings divided by quarterly employment multiplied by 4 from Table 4.10.2.

common experience of the comparison groups and the success in creating balanced groups, the authors find these results credible. That said, there are several limitations to these findings that are discussed below.

There are at least two potential explanations for the overall findings. First, the initial negative impact in earnings after program entry could reflect different decisions by participants in satisfying WtW's workforce requirements. For those who chose to work instead of enroll in an education program, earnings could have been temporarily higher, but these differences did not last beyond 5 quarters. Second, the types of programs that WtW participants co-enrolled in may not have been intensive. The analysis of cross-program participation patterns from Chapter 2 (Table 2.2) show that only 14% of WtW participants co-enrolled in another program, with the three largest programs being WP (7.4%), CTE (3.2%), and T2AE (2.8%). WP is considered a light-touch program since it does not provide training. For these reasons, it may not be surprising that no impacts were identified for these comparisons. This does not mean, however, that impacts would not exist if WtW participants had access to a broader set of programs with more intensive training components. However, an important take-away from this study is that WtW participants are not accessing more intensive programs that report to CAAL-Skills. This suggests that improved coordination across programs could be a fruitful avenue for improving outcomes of WtW participants. At the same time, coordination challenges may arise with programs that offer working opportunities along with training if earnings would place a worker above the income limits of program participation.

Finally, the research design presented here is limited in both the coverage of WtW participants as well as the specific question of which training programs or services are effective. In terms of coverage, this study was able to only include a relatively small subset of program participants. Specifically, only those with previous earnings histories from the UI base wage file were included in the study in order to build confidence in the similarity of any compared groups. Although this decision is required based on available data, it may exclude those who are hardest to serve. More participants could be included in a similar design if detailed information on income and other resources were included in the data for those participants. For the limitations of the specific question, this study focused on within-program comparisons based on co-enrollment in another program reporting to the CAAL-Skills database. This means that other non-

CAAL-Skills training programs that WtW participants engage with may dilute the results, and the research questions are limited to understanding the impacts from co-enrollment. If additional data on the training activities that are available to WtW participants were to be included in CAAL-Skills, the research design could rely on that information rather than cross-program enrollment. Further, it may be of interest to compare WtW participants to non-WtW participants to understand the effectiveness of the program in its entirety. If comparisons outside of CalWORKs are desired, an improved design would identify a population that participates in similar government programs as WtW participants - potentially where income and resource information are collected at the time of enrollment. One potential group could be participants of California's Supplemental Nutrition Assistance Program, CalFresh.

5. Next steps

This is the first study to use the CAAL–Skills dataset to assess the effectiveness of these programs. As such, the study team learned many lessons on the value and limitations of these data for evaluation research. This section presents broad suggestions on available directions to extend the findings included here.

Enhanced data on program components. Many of the analyses would have benefitted from the inclusion of detailed program components, such as the specific type of training provided to each participant. This could expose differences in the effectiveness of program components both within and across locations. The value of including these types of measures in impact evaluations is that it could be used for within–program comparisons that could be utilized for continuous quality improvement.

Alternative research designs. This study found programs in the CAAL–Skills dataset where impact estimates could not be estimated due to the inability to identify credible comparison groups. Impact evaluation is particularly challenging for programs that serve unique populations, where there are no comparable individuals served in other programs or where data limitations make it impossible to identify them. For these programs, alternative research designs should be considered. This includes both experimental and quasi–experimental designs. Quasi–experimental designs can be based on programmatic features that introduce randomness into whether participants actually receive certain services – such as through assignment to caseworkers. Even for programs where non–experimental strategies are feasible, these more rigorous designs should be considered to verify the results presented here.

Identification/inclusion of more populations. Impact estimates were often precluded due to our inability to identify a relevant comparison group. Expanding the CAAL–Skills dataset to include more programs could enhance the dataset’s analytical value. For example, CalFresh participants would provide a large sample of low–income individuals who could be compared to workers in programs that serve those with barriers to employment. The inclusion of consistent employer identifiers and relevant participant

characteristics – such as level of significance of disability for disabled workers – would also improve the analytical value of the data.

Studying program improvement strategies. Direct research on program enhancements can be used for continuous quality improvement. Coordinating these types of research agendas around the CAAL–Skills dataset would allow for rapid–cycle evaluations of new program strategies.

Applying design to specific populations of interest. This study was limited in the number of comparisons that could be made. If there are specific populations of interest for a program, the design could be extended to those specific groups. The main requirements are that data are available to identify these groups and the samples are sufficiently large to support the analysis.

Grounded on the richness of the CAAL–Skills database, the results in this study represent a useful benchmark for assessing included programs. The analysis exposed many promising programs and practices, and further improvements should become available with further research.

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