Common Employment and Earnings Pathways for Individuals Eligible for Short-Term Training Programs: Findings from the TechHire/SWFI Evaluation

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Overview

Interest and participation in short-term training programs have increased in recent years, highlighting the need to understand how program participants' employment and earnings change over time. Looking only at participants' average outcomes at specific points in time overlooks the potential variation in people's experiences over time.

The H-1B TechHire Partnership Grants (TechHire) and the Strengthening Working Families Initiative (SWFI) were designed to provide funding for programs that would make training more accessible to individuals who might otherwise experience barriers to training and help participants enter middle- and high-skill jobs in high-tech industries upon completing training. A national evaluation of all the programs includes an impact study of five programs.

This issue brief explores the question: **What are the most common three-year employment and earnings pathways followed by people in the TechHire/SWFI impact study?** We used an innovative approach—combining social sequence and cluster analyses—to identify and then group the three-year employment and earnings pathways followed by people in the study.

The findings indicated that:

- People in the impact study followed a range of three-year employment and earnings pathways, from being in a pathway defined by having stable employment with relatively high earnings (the most common pathway, followed by around one-third of people) to being mostly not employed.
- Within each pathway, people, for the most part, maintained the same employment and earnings status over the three-year period.
- Similar rates of people in the TechHire/SWFI and control groups followed each of the identified pathways.

The TechHire/SWFI programs in the impact study served a heterogeneous group of participants. Similar programs may want to adjust service offerings for different groups of people to better support them in ending up in more favorable pathways. Further exploration of why some people end up in less favorable pathways than others could identify where additional supports may be needed.

Additionally, implementing social sequence and cluster analyses in evaluations of training programs is feasible and may provide insights into how to design and implement future programs.

In recent years, there has been increased interest and participation in short-term occupational skills training programs that lead to credentials (Strada Center for Education Consumer Insights, 2020).[1] Research indicates that if focused on high-demand industries, these programs can enhance participants' economic mobility.[2] Typically, studies of short-term training programs assess economic mobility by analyzing

[1] In this study, the length of training programs ranged from 6 days to 12 months, with most being less than 6 months.

[2] See for example, Kanengiser and Schaberg (2022) and Roder and Elliot (2021).

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Box 1. Overview of the H-1B TechHire Partnership Grants (TechHire) and the Strengthening Working Families Initiative (SWFI) Grant Programs and Evaluation

TechHire and SWFI Programs

The H-1B TechHire Partnership Grants (TechHire) and the Strengthening Working Families Initiative (SWFI) programs were launched in 2016 and administered by the U.S. Department of Labor. Both grant programs were designed to make training more accessible to individuals who might otherwise experience barriers to training; provide support services that address the unique and varied challenges facing people who have barriers to employment; and offer a range of training strategies, including accelerated training and online options, to address skills deficits, especially for populations that could not afford to drop out of the labor market to pursue traditional academic studies. The types of trainings offered across the two grant programs were broadly similar.

TechHire targeted young adults ages 17 to 29 with barriers to training and employment, and special populations defined as individuals with disabilities, limited English proficiency, or criminal records. SWFI targeted custodial parents of low- or middle-skill level who were available to work in the United States, and who had at least one dependent who was 13 years of age or younger or at least one dependent with a disability or developmental delay who may have been older than 13 years of age.

TechHire/SWFI Evaluation

In 2016, the Chief Evaluation Office of the U.S. Department of Labor contracted with Westat and its partner MDRC to conduct an evaluation of the strategies used in the TechHire and SWFI grant programs. The evaluation includes:

- an **implementation evaluation** that examines how all 53 TechHire and SWFI grantees implemented their programs, and the grantees' successes, challenges, and lessons learned;
- an **outcomes evaluation** that provides a description of training and labor market outcomes for participants; and
- an **impact evaluation** that involves a randomized controlled trial with five grantees to estimate the effects of their programs on outcomes such as skills attainment, employment, and earnings.

overall average post-enrollment employment rates and earnings for individuals in the studies. Researchers usually focus less on the steps that individual program participants take in their career paths over time.[3] Because of this, it remains uncertain if program participants benefit, for example, by getting high-paying jobs immediately after they complete their training or by having gradual earnings increases as they gain more work experience. It is also unclear how many people follow these or different paths and whether there are associations between participant characteristics—for example, participant demographics and prior employment histories—and certain pathways.

This brief explores these possibilities and presents findings from an exploratory analysis of the three-year employment and earnings pathways of 949 individuals who were eligible for short-term training programs as part of the Evaluation of the TechHire and Strengthening Working Families Initiative (SWFI) grant programs (the "TechHire/SWFI Evaluation"). These two grant programs operated from mid-2016 through mid- to late-2021 and offered short-term (between 1 and 24 months), accessible occupational skills training and supports to unemployed and underemployed U.S. workers with barriers to training (for example, those with limited English proficiency or limited work experience). The goal of the programs was to create a pipeline of workers to fill jobs in high-tech fields such as information technology, health care, and advanced manufacturing. (See Box 1 for more information on the evaluation.)

One main component of the TechHire/SWFI evaluation is a randomized controlled trial (or impact study) assessing the effectiveness of five grantees (out of 53 grantees in the overall study) at improving employment and earnings outcomes for program participants over a three-year period (see Box 2 for more information on the grantees in the impact study). This analysis investigates whether the labor market outcomes of individuals who were offered TechHire/SWFI program services (referred to as the "TechHire/SWFI group") differed, on average, relative to the outcomes of individuals who were not offered the services (referred to as the "control group").[4]

This brief presents findings from a different, innovative approach—combining social sequence and cluster analyses—used to first identify and then group the employment and earnings pathways followed by

[3] One exception is the evaluation of Year Up. See Fein, Jao, and Zeidenberg (2022).

[4] The analyses in this brief focus on individuals from the five sites in the evaluation that were involved in the randomized controlled trial. More information on the randomized controlled trial can be found in Tessler, Schaberg, Fink, and Gasper (2021) and Gasper et al. (2023).

individuals. This approach summarizes the pathways followed by individuals (rather than just outcomes at specific points in time), allows for the emergence of unforeseen pathways (as it relies on the data, rather than the researcher, to place people into groups), and highlights how individuals in these groups progress over time (as opposed to looking at the study sample as a whole).[5] The findings in the brief reveal common pathways among the individuals in the study, the association of participant characteristics with these pathways, and the programs' role in guiding individuals toward pathways with better outcomes.

The findings reveal that there was substantial variation in the most common career pathways. However, within each pathway there was remarkably little variation over time in employment status or relative earnings. Moreover, there are some associations between participant characteristics and pathways that suggest training programs can be better adapted to the individual circumstances of enrollees to help guide them toward more advantageous career paths.

These findings can be used by program practitioners and policymakers when thinking about how best to support participants of short-term training programs both while they are in the programs and as they continue their career journeys.

Data sources

The analyses in this brief rely on data from a survey completed by the 949 individuals in the impact sites (those in the TechHire/SWFI and control group) at the time they entered the TechHire/SWFI evaluation (referred to as the baseline survey) and data from the National Directory of New Hires (NDNH).[6] The baseline survey data—which cover individuals' demographics, education, and employment history—were used to describe the average characteristics of individuals in each of the pathways and to assess whether individuals with different characteristics were more likely to end up in certain pathways.

The NDNH data were used to create quarterly measures of employment and earnings over a three-year period. This three-year period begins in the first quarter following enrollment in the evaluation and ends 12 quarters later (study enrollment began in April 2018 and ended in January 2020, so the NDNH data cover between quarter 3, 2018 and quarter 2, 2023, depending on when people entered the study). The NDNH data include employment covered by the unemployment insurance system, as well as some federal employment. The records do not cover earnings from self-employment, some agricultural work, gig work, or informal jobs.[7] These data were used to define individuals' employment and earnings pathways.

Box 2: TechHire/SWFI Programs in the Impact Study

The five TechHire/SWFI programs in the table below were selected for the impact study among the 53 programs funded by the TechHire and SWFI grant programs. Factors considered during the program selection process for the impact study included their program models; the types of training, support services, and, for the SWFI grantees, child care services they offered; the number of participants they expected to serve and the types of participants they were hoping to recruit; their marketing and recruitment plans; local demand for their program; and whether the services they offered were substantially different from other services available in their community. Enrollment for the impact study lasted from April 2018 to January 2020.

	Program	Grantee	Target sector(s)	People enrolled in impact study
TechHire programs	**East Coast Florida**	Daytona State College, Eastern Florida State College, and Florida State College at Jacksonville	Information technology (IT) and advanced manufacturing	240
	New York City	LaGuardia Community College	IT	120
	Tampa	CareerSource Tampa Bay	IT and health care	299
SWFI programs	**Denver**	Community College of Denver and Community College of Aurora	IT, advanced manufacturing, and health care	213
	Vermont	Vermont Technical College	Advanced manufacturing	80

[5] This analysis is similar to prior analyses that used "strings" to represent individuals' histories with employment or benefit receipt. These strings are presented as a series of 0s and 1s, indicating someone's status in different time periods. See, for example, Dolton and Smith (2011).

[6] More information on NDNH data can be found here: **https://www.acf.hhs.gov/css/training-technical-assistance/guide-national-directory-new-hires**.

[7] See Czajka, Patnaik, and Negoita (2018) for more information.

Methods

The research team implemented a two-step analysis (Box 3 contains definitions of several terms that are used in this section). First, a "sequence analysis" plotted out each individual's employment and earnings trajectory in the three years after entering the study. The research team used three quarterly employment and earnings states to define trajectories:

- **Not employed**: defined as not having earnings in that quarter
- **Employed with low earnings**: defined as having earnings equal to or less than the median earnings amount for all employed individuals in that quarter[8]
- **Employed with high earnings**: defined as having earnings above the median earnings amount for all employed individuals in that quarter

The research team ran the cluster analysis four times, grouping individuals into two, three, four, and five different clusters. The final choice for which cluster solution to highlight in this brief was based on (1) a commonly used diagnostic tool, which measures how similar a cluster is to itself compared with how similar it is to other clusters; (2) the identified clusters being clearly interpretable (a common rule of thumb is that it should be easy to give each cluster a name); and (3) the clusters all including at least 100 people (a somewhat arbitrary threshold selected by the research team to ensure adequate precision for each cluster).[9] This allowed for the identification of the most common pathways followed by individuals. (See Box 4 for more information on the analysis methods.)

The sequence and cluster analysis has several distinctions and potential benefits over other more traditional approaches to looking at outcomes (like standard subgroup analyses). This method is distinctive in its ability to group individuals based on their experiences throughout the study, rather than solely on pre-study entry characteristics. By examining the entire trajectory of participants' experiences, the sequence analysis provides a comprehensive view of their journeys, uncovering patterns and transitions that may be lost when focusing on single time-point out- comes. These insights can be helpful for designing tailored interventions that anticipate people's future outcomes based on their earlier trajectories. Finally, the analysis goes beyond looking at the average outcomes and impacts of a program and instead uncovers the range of outcomes experienced by participants, highlighting the complexity and nuances of participant pathways. This supports the possibility of more personalized programmatic adjustments, making this type of analysis a useful tool for enhancing short-term occupational skills training programs.

Box 3: Definitions of Terms Used in this Brief

State: The employment and earnings status of an individual in a given quarter (not employed, employed with relatively low earnings, or employed with relatively high earnings).

Trajectory: The pattern of employment and earnings states for each individual from the quarter after they entered the study to 11 quarters later. Example trajectories include: not employed in all 12 quarters or not employed in first quarter and employed with low earnings for the next 11 quarters.

Cost: An estimate of the extent to which one person's trajectory differs from another person's trajectory, or in other words, the extent to which one person's trajectory would have to be changed to be the same as the other person's trajectory. The higher the cost, the more different the two trajectories are.

Pathways: Groups of broadly similar trajectories. Each individual person's trajectory was assigned to one of four pathways.

Average silhouette distance: A measure of how similar one cluster—or in this analysis, pathway—is to itself compared with how similar it is to other clusters (or pathways). The higher the average silhouette distance, the more distinct the clusters (or pathways) are from one another.

What are the most common employment and earnings pathways of TechHire/ SWFI participants over a three-year period?

The sequence and cluster analysis identified four distinct clusters of employment and earnings trajectories among the 949 individuals who were enrolled in the TechHire/SWFI study (including individuals in both the TechHire/SWFI and control groups).[10] In determining the optimal grouping for the analysis, the research team chose the four-cluster—or four-pathway—solution. This decision was guided by the

[8] The median earnings amount ranged from around $4,300 in the quarter following study entry to around $8,300 12 quarters (or three years) later.

[9] This diagnostic is called the "average silhouette distance. See Box 3 and Kaufman and Rousseeuw (1990) for more information.

[10] The TechHire/SWFI evaluation enrolled 952 people. Three people, however, did not complete the study's baseline survey and thus are not included in this analysis (as the research team did not have information on their demographics).

pathways' internal consistency (meaning people within the pathway followed roughly similar trajectories), as measured by a statistical diagnostic that assesses homogeneity within pathways versus differentiation from other pathways.[11] The pathway names describe a general experience for each study participant in that cluster. The individual trajectories of each participant may adhere more or less to that description, but the pathway definitions capture the general experience of most of the people in that pathway.[12] Each pathway also met the minimum sample size criterion of 100 people, ensuring a robust sample for analysis, and presented a clear pattern that was simple to interpret. This clarity allowed for a more meaningful comparison of the pathways. (The sequence and cluster analysis was also run separately for the TechHire/SWFI group and the control group. Those analyses identified similar pathways for both groups.)

Each identified pathway represents a labor market trajectory that is similar among the individuals in that pathway, but that varies from the trajectories of individuals in other pathways. The four pathways are:

- **Mostly employed with high earnings**: individuals who were employed for most of the three years after they entered the study and had high earnings[13]
- **Mostly not employed**: individuals who were not employed for most of the three years after they entered the study
- **Mostly employed with low earnings**: individuals who were employed for most of the three years after they entered the study and had low earnings[14]
- **Employed with low earnings and then not employed**: individuals who were employed and had low earnings for most of the first year-and-a-half after they entered the study, and then were not employed for most of the second year-and-a-half of the follow-up period

Table 1 shows that the most common pathway—followed by roughly one-third of the individuals in the study—was mostly employed with high earnings. This is the pathway with the most positive labor market outcomes and the pathway that the TechHire/SWFI programs sought to promote since their goal was to help people obtain well-paying jobs. Individuals in this pathway, for the most part, worked in all 12 quarters after they entered the study, and had relatively high earnings compared with other individuals who were employed. (The upper leftmost panel in Figure 1 shows the distribution of employment and earnings statuses for this pathway.)

Box 4. Sequence and Cluster Analyses

Sequence analysis

A sequence analysis provides a way to compare individuals' trajectories—in this case, employment patterns and earnings levels—and to quantify the extent to which these trajectories differ. In practice, the similarity (or dissimilarity) of two individuals' trajectories can be calculated based on the number of changes that would be required to make both trajectories the same. Each of these changes has a "cost," which can be thought of as the extent to which the change could have altered the person's trajectory. The result of the sequence analysis is a total cost—the sum of the costs in each quarter—for changing one person's trajectory to match that of the other person. Such a calculation is conducted for every pair of individuals in the data.

For this analysis, the research team used the Dynamic Hamming Distance method to calculate the total cost for changing each person's trajectory to every other person's trajectory (Lesnard, 2006; Studer & Ritschard, 2016). This method uses the data to derive the cost for each type of change (the less commonly observed a change was between two states, the higher the cost) and allows the costs to vary over time (the costs associated with each relative quarter varied). The team implemented the sequence using the TraMineR package in R.

Cluster analysis

A cluster analysis groups individuals with broadly similar employment and earnings pathways. (That is, the overall cost of changing from one individual's trajectory to another's trajectory is small.) The goal is to identify clusters of individuals who share a similar overall pattern of outcomes, with these patterns being qualitatively distinct across clusters. The team used the Partitioning Around Medoids method of cluster analysis as it is robust to outliers (Kaufman and Rousseeuw, 1990).

[11] The three-cluster solution had the highest average silhouette distance, indicating greater heterogeneity between pathways. However, the research team felt that having only a three-cluster solution did not capture the full diversity of the pathways followed by people in the study. The four-cluster solution had the second-highest average silhouette distance.

[12] Individuals who did not exactly meet the definition of one of the pathways were placed in whichever pathway they were most similar to. Individuals whose trajectories deviated significantly from the trajectories of others in their pathway were relatively rare with few commonalities in trajectories.

[13] "High earnings" was defined as having earnings above the median earnings amount in each quarter (among those with earnings).

[14] "Low earnings" was defined as having earnings at or below the median earnings amount in each quarter (among those with earnings).

Table 1. Percentage of Individuals in Each Pathway, Overall and by Research Group			
Pathway (%)	**Full Sample**	**TechHire/SWFI Group**	**Control Group**
Mostly employed with high earnings	33.6	33.8	33.3
Mostly employed with low earnings	27.1	26.3	28.0
Mostly not employed	27.1	27.1	27.1
Employed with low earnings then not employed	12.2	12.8	11.6
Sample size	949	517	432

Source: National Directory of New Hires data.

Note: SWFI = Strengthening Working Families Initiative.

The next most common pathways—both followed by around 27 percent of individuals—were mostly employed with low earnings and mostly not employed. The former is the pathway with the second most positive outcomes. Individuals in this pathway were mostly employed and, despite having low earnings, were able to increase their earnings over time.[15] They were, however, not able to increase their earnings enough to move into the relatively high earnings state. The existence of this pathway may be consistent with findings from the study's implementation analysis, which showed that three of the five programs in the randomized controlled trial were, for the most part, offering training courses that led to entry-level, lower-skilled jobs. The hypothesis was that getting people into high-tech industries may give them a foothold and a chance to gain experience that they could then use to advance over time. Although participants on this pathway are employed and may have obtained a foothold in their desired field, there is little evidence that this leads to subsequent career advancement over time. People who began their journey with low earnings were seldom set on a path where high earnings were eventually achieved, at least within the three-year period of this study.

The latter pathway is of note because it is unclear why more than one-fourth of individuals in the study were not employed for most of the three-year period, nor how they supported themselves during this time.[16] The next section focuses more on examining some of the characteristics of this group, which may prove useful to policymakers seeking to provide a better pathway to increase earnings and employment for unemployed participants who enter similar training programs.

The least common pathway was mostly employed with low earnings through roughly the mid-point of the follow-up period and then not employed.[17] The narrative conveyed by this pathway is noteworthy, but could reflect potential data limitations rather than an accurate depiction of the lived experience of participants.[18]

How were the identified pathways influenced by the onset of the COVID-19 pandemic?

The COVID-19 pandemic began to spread across the United States beginning in March of 2020, imposing extensive hardship on households and communities and disrupting the employment landscape. The economic tumult, in conjunction with other challenges elicited by the pandemic, such as school closures and more-limited

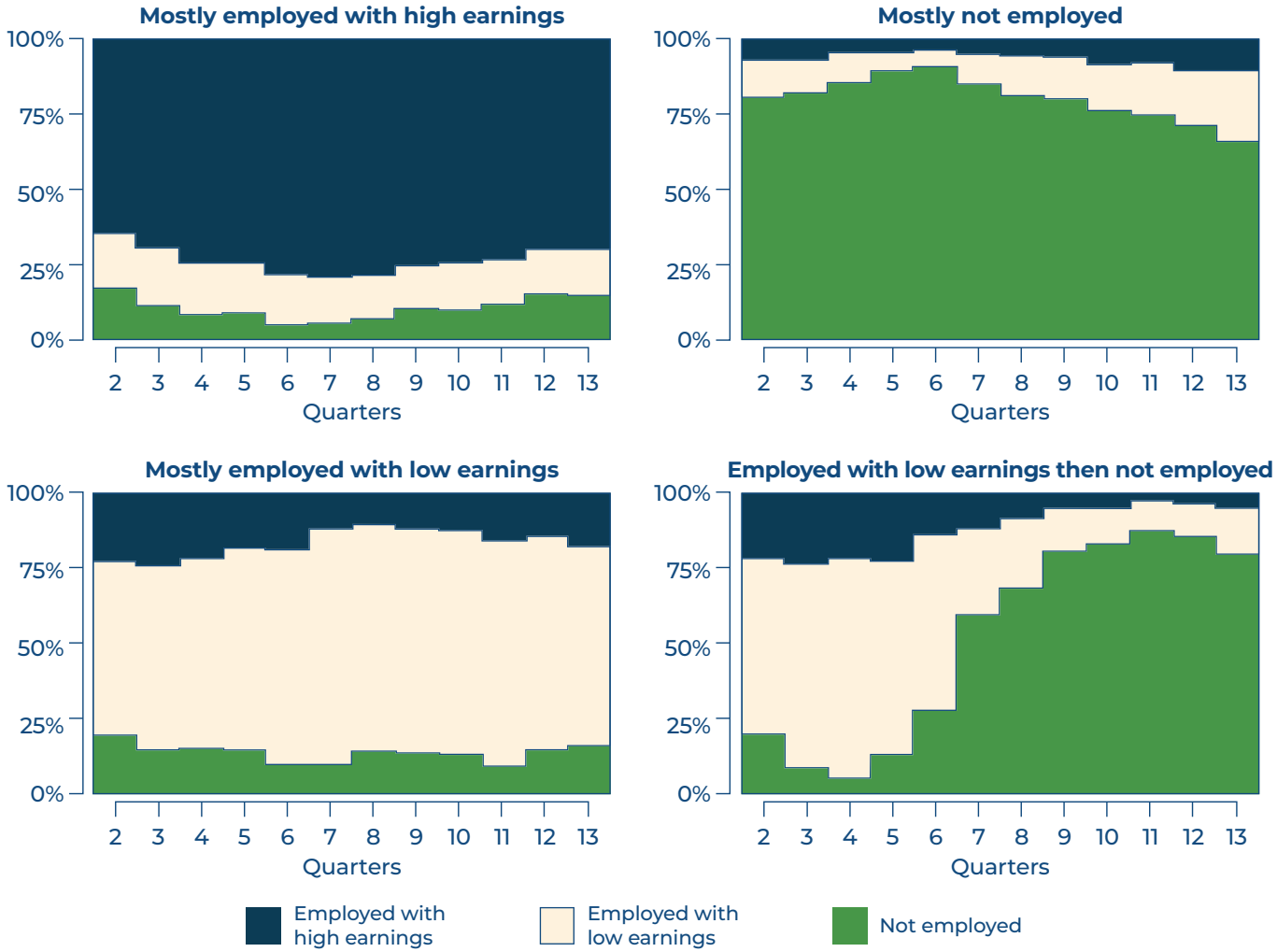
[15] Among individuals in the mostly employed with low earnings pathway in both the TechHire/SWFI and control groups, mean total earnings increased over time, but instances of individuals earning less than median earnings and then going on to earn more than median earnings were relatively rare in both groups.

[16] Some of these people may be employed in jobs that are not covered by the unemployment insurance system, as these jobs are not captured by NDNH data. Prior research has estimated that unemployment insurance wage records cover around 90 percent of jobs. A more recent estimate suggests 13 percent of people who reported being employed in a survey were not captured in unemployment insurance wage records. See Kornfeld and Bloom (1999) and Hotz and Scholz (2001).

[17] The onset of the COVID-19 pandemic during the second year of the follow-up period may offer some explanation for the transition from employed to not employed witnessed in this pathway. However, prior analyses indicate that employment rates generally rebounded and approached pre-pandemic levels within two quarters, whereas no transition back to employment is seen in this pathway (Gasper et al., 2023). This suggests that the pandemic alone does not fully account for the employment trends reflected in the fourth pathway.

[18] A disproportionate number of the participants in this pathway are from the Denver site. The employment and earnings data for these individuals exhibit several atypical trends that have made outcomes for this site difficult to interpret. A sensitivity test was conducted that omitted participants from the Denver site. The set of pathways produced by this sensitivity analysis included the three large pathways from the main analysis but did not include the low earnings followed by not employed pathway. Unfortunately, the sample size for the fourth pathway produced in the sensitivity analysis was very small, making it difficult to draw meaningful conclusions about it.

Figure 1. Percentage of Individuals in Different Quarterly Employment and Earnings States, by Identified Pathway, Among All Individuals in the H-1B TechHire Partnership Grants (TechHire) and the Strengthening Working Families Initiative (SWFI) Study



Source: National Directory of New Hires data.

Notes: SWFI = Strengthening Working Families Initiative. Quarter 2 is the quarter after each individual entered the study. Each figure shows the 12 quarters, or 3 years, after each individual entered the study.

access to child care, presented substantial obstacles to study participants seeking to find or maintain employment. In quarter 2 of 2020, the first full quarter following the onset of the pandemic, average quarterly employment for the sample fell by about 8 percentage point from 71 percent to 63 percent. Average quarterly earnings also declined from $4,543 to $4,033.[19] By quarter 4 of 2020, both average quarterly employment and average quarterly earnings approximated pre-pandemic levels.

This sequence analysis examines the employment pathways experienced by study participants in the 12 quarters following their enrollment in the study. Study enrollment occurred over 7 quarters beginning in quarter 2 of 2018 and extending through quarter 4 of 2019.[20] Where the initial 2 quarters of the pandemic (when the level of economic disruption was at its highest, on average) fell in each person's trajectory depended on when a participant was randomly assigned. For some, the onset of

[19] While employment an earnings fell for the entire sample in the initial quarters of the pandemic no statistically significant differences were observed between the TechHire/SWFI group and the control group on most outcomes during this period. For a more detailed discussion examining the experiences of study participants during the pandemic please see Gaspar et al (2023).

[20] One participant was enrolled in Q1 2020. Enrollment was relatively evenly distributed across the other 7 quarters.

the pandemic occurred during the quarters immediately following enrollment (as early as quarter 3) when they were perhaps still enrolled in training or in the early phases of their job search. For others, the pandemic arrived two years or more after enrollment when they had perhaps already completed training and established employment. Because the pandemic happened at a fixed point in time its effects on employment and earnings are not concentrated at any one point of the observed pathways. Whereas the pandemic brought about economic disruption the pathways identified by the sequence analysis tell a story of stable states (those that were employed often remained employed while those that were not employed remained not employed) since the effects of the pandemic on employment and earnings are spread out over most of the follow-up period.

It's difficult to know how or if the results of the sequence analysis may have differed if the pandemic had not occurred. For those that experienced the pandemic shortly after enrolling in the study or at the time that they began their job search, perhaps the challenges presented by COVID-19 increased the likelihood that they remained on a pathway characterized by consistent unemployment. An additional sequence analysis based on quarter of random assignment where the onset of the pandemic occurred at the same point in the follow-up period for each individual could provide more insight. Unfortunately, sample size limitations precluded this option in this analysis.[21]

Which participant characteristics are associated with the likelihood of being in different pathways?

It is also important to look at who ends up in each pathway and whether certain people are more likely to end up in one pathway over another, as this could highlight how program services and supports could be tailored to meet the needs of individuals (rather than offering the same set of services to everyone). To explore this, the research team looked at the average characteristics of the people in each pathway at the time they entered the study and ran a series of regressions to see if the characteristics could predict the likelihood of being in each pathway. The findings show correlations between characteristics and the pathways, but do not imply that the characteristics caused someone to end up in a particular pathway.

Overall, there are differences in the average characteristics of the people in each pathway and many of the differences are consistent with the research team's expectations, given what is already known about trends in labor market outcomes over time. For example, those in the mostly employed with high earnings pathway were more likely to be employed at the time of study entry and had the highest average earnings in the year prior to enrollment ($22,096, shown in Table 2). By contrast, those in the mostly not employed pathway were less likely to be employed at the time of study entry, were more likely to not have been employed in the year prior to enrollment, and had the lowest average prior earnings ($6,841). Prior employment and earnings are often among the biggest predictors of future labor market outcomes, so it is not surprising that the pathway participants took was often influenced by where they started.

Other notable findings about the characteristics of the people in each pathway include:

- **Mostly employed with high earnings:** individuals with higher levels of education are more likely to be in this pathway and individuals who are Black are less likely to be in this pathway
- **Mostly employed with low earnings:** individuals who identify as female and those receiving Supplemental Nutrition Assistance Program (SNAP) benefits at the time of study enrollment are more likely to be in this pathway while individuals with higher levels of education are less likely
- **Mostly not employed:** individuals who entered the study with at least some college education, as well as those between the ages of 17 and 25 at the time of study enrollment, are less likely to be in this pathway
- **Employed with low earnings and then not employed:** individuals aged 40 to 49 at the time of study entry and participants at the Denver site were more likely to be in this pathway

These findings suggest that individual characteristics are associated with the identified pathways. Prior research has noted that certain groups, including the long-term unemployed and those facing barriers to employment, confront unique challenges in the labor market (for example, Abraham, Haltiwanger, Sandusky, and Spletzer, 2016). The results of this analysis align with that research and highlight the need to tailor training approaches with the unique needs of individuals firmly in mind so that programs are more likely to establish pathways where participants' outcomes improve as they move forward on their career paths.

[21] As set forth in the methods section of this brief, each pathway needs to include at least 100 people to ensure adequate precision. On average, 130 participants were enrolled in each quarter meaning that several quarters would need to be combined to ensure the smallest pathway has at least 100 people.

Table 2. Average Characteristics of Individuals at Study Entry, by Pathway

Characteristic (%)	Mostly Employed with High Earnings	Mostly Employed with Low Earnings	Mostly not Employed	Employed with Low Earnings then not Employed	Overall
Average earnings in year before study entry ($)	22,096	11,304	6,841	10,995	13,685
Employed in year before study entry	91.8	89.9	57.6	85.3	81.2
Currently employed	64.3	51.2	29.2	55.6	50.2
Recently employed	91.2	84.1	61.3	83.6	80.3
Female	51.6	65.6	54.1	64.3	57.6
Hispanic	29.7	22.7	19.6	24.1	24.4
Black	38.5	51.1	38.6	44.7	42.7
Age 17-25	44.5	52.9	37.7	42.2	44.7
Age 26-29	24.5	25.3	25.7	25.9	25.2
Age 30-39	18.5	11.3	17.9	25.9	17.3
Age 40-49	7.2	6.6	10.9	1.7	7.4
Age 50 or above	5.3	3.9	7.8	4.3	5.5
Parent or pregnant	30.8	34.9	42.1	50.1	37.3
Lives with a child	29.3	31.2	38.1	47.2	34.5
Has at least some college education	72.1	51.6	47.2	48.0	56.9
Previously received training in target industry	27.0	26.2	19.8	26.1	24.7
Receives food stamps/SNAP	19.7	42.0	38.9	43.1	33.8
Transportation-related issues limit ability to work	9.4	18.2	24.2	25.6	17.8
Childcare arrangements limit the amount/type of work	9.8	15.0	21.6	26.4	16.5
East Coast Florida program	27.6	27.2	24.9	15.5	25.3
Denver program	15.4	17.5	24.1	46.6	22.1
New York City program	15.4	7.8	15.6	9.5	12.6
Tampa program	36.1	40.1	21.8	21.6	31.5
Vermont program	5.6	7.4	13.6	6.9	8.4
Sample size	319	257	257	116	949

Source: TechHire/SWFI baseline survey and National Directory of New Hires data.

Notes: SWFI = Strengthening Working Families Initiative; SNAP = Supplemental Nutrition Assistance Program.

Were individuals in the TechHire/SWFI program group more likely to end up in different pathways than individuals in the control group?

As discussed above, the identified pathways show that people that started out not employed or employed with low earnings generally did not progress into being employed with high earnings by the end of the follow-up period. In other words, these people were likely to still not be employed or still be employed with low earnings. Combining this with the finding that certain individual characteristics, including prior employment and earnings, are predictive of future pathways, suggests that the TechHire/SWFI programs may not have been able to improve the employment and earnings outcomes for participants whose characteristics were associated with less favorable pathways.

Building on this, the team also investigated whether the TechHire/SWFI program group was associated with being in certain career pathways (compared to the control group), focusing on whether the programs increased the likelihood of participants ending up in more favorable pathways. According to Table 1, the distribution across the four pathways is nearly identical for the TechHire/SWFI group and the control group, with, for example, 34 percent of individuals in the TechHire/SWFI group and 33 percent of individuals in the control group landing in the "mostly employed with high earnings" pathway. These preliminary findings indicate that during the three- year period, the program did not appear to alter participants' career paths relative to the control group.

However, it is important to consider these findings within the scope of the three-year follow-up. Longer-term outcomes may reveal different trends. Furthermore, the results prompt a deeper inquiry into how the programs operate and whether there are external influences or internal programmatic elements that could be adjusted to better support positive labor market outcomes. It is crucial to use these insights to help ensure that future programs have a more pronounced effect on guiding participants toward the most advantageous employment and earnings pathways.

Conclusion

The findings in this brief underscore the diversity of the three-year employment pathways of individuals who enrolled in the TechHire/SWFI evaluation. The most prevalent pathway, followed by roughly a third of individuals, was having stable, high earnings. However, the persistence of less favorable pathways, notably, being employed with low earnings and not being employed, highlights the need for targeted interventions.[22]

While there was considerable variation across pathways, the employment statuses of people within the three most prevalent pathways did not, for the most part, change over time. For example, people who were employed with low earnings in the quarter after they entered the study tended to still be employed with low earnings three years later. Pathways that led from not being employed to employed or from low-earnings employment to high-earnings employment were relatively rare, suggesting a focus for future programs.

Finally, similar percentages of people in the TechHire/SWFI program group and in the control group were in each of the four identified pathways. This suggests that the TechHire/SWFI programs did not change the employment and earnings pathways individuals followed through at least Year 3. It is unclear whether this finding will extend into later years.

Implications for programs, policymakers, and researchers

The findings from this analysis have several implications for programs that offer short-term training courses, for policymakers that make decisions around programs and funding, and for researchers who are evaluating these programs.

- **Recognizing the heterogeneity of participants' backgrounds can inform program and service and better support those most at risk of following less favorable pathways.** The three most common pathways identified in the analysis—each followed by at least one-fourth of the individuals in the study—were being mostly employed with high earnings, mostly employed with low earnings, and mostly not employed. These are very distinct pathways, and they highlight the wide range of experiences of the people who applied for a short-term training program. Programs may want to consider making adjustments or adding additional services for people who may be more likely to end up in certain pathways.
- **Further exploring the characteristics and circumstances of people in the mostly not employed pathway can help programs develop targeted support strategies.** Over one-fourth of individuals were in the pathway that was defined as being mostly not employed during the three-year

[22] The fourth, and least common, pathway was also not a pathway the programs intended to promote, that of being employed with low earnings and then not employed. As noted, this pathway may reflect some of the limitations of the available earnings data and it is, therefore, unclear how much can be learned from this pathway.

period after study enrollment. Some of these people were employed in some quarters, but they were, for the most part, not employed. It is unclear whether these people were in training or school, looking for employment, working informal or gig jobs, or doing something else. The analysis suggests that those who were not employed in the year prior to or at the time of study enrollment, and those with less formal education were more likely to end up on this pathway. In addition to the information derived from this analysis, policymakers may need to learn more about the current circumstances and circumstances of people in this group and the best way to help them overcome structural and others obstacles they may face to increase their likelihood of progressing on a pathway toward greater career growth.

- **Reevaluating the "foot in the door" strategy and instead considering additional or alternative supports to foster upward mobility within sectors targeted by the training could help improve participant outcomes.** The study's implementation analysis showed that three of the five grantees trained people for entry-level jobs, with the idea that getting people a "foot in the door" in the targeted sector may allow them to gain experience and then advance over time. However, none of the identified pathways provide evidence that this approach has yet paid off. While average earnings for participants in the mostly employed with low earnings pathway increased during the follow-up period, trajectories where an individual transitioned from employed with low earnings to employed with high earnings were rare. Although these findings are not conclusive and the current follow-up period only spans three years, the findings do suggest that this approach may need to be adjusted or enhanced, perhaps by providing ongoing support with a focus on career advancement.
- **Using sequence and cluster analysis in future randomized controlled trials of training programs is feasible and could unlock new insights.** This is one of the first rigorous evaluations of a training program to look at individuals' entire career pathways, rather than just their outcomes at specific points in time.[23] This different approach to looking at the outcomes of people who apply for short- term training programs identified career pathways that would not otherwise have been evident, along with the characteristics of participants associated with these pathways. The information gained from this type of analysis can help future programs determine how best to support groups of people with diverse backgrounds and characteristics on their career path.

A future report from the evaluation will show employment and earnings impacts through Year 3 using NDNH data. Those findings will offer more evidence on TechHire/ SWFI's overall effects on labor market outcomes at specific points in time.

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For more information about the evaluation, visit: **https://www.dol.gov/agencies/oasp/evaluation/completed-reports/evaluation-of-the-techhire-and-strengthening-working-families-initiative-swfi-grant-programs**

[23] As noted earlier, one main study that has done this already is the evaluation of Year Up. See Fein, Jao, and Zeidenberg (2022).

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