



# Comparing Long-Term Employment and Earnings in Welfare Programs

Portland, Oregon, Early 1990s

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# Comparing Long-Term Employment and Earnings in Welfare Programs: Portland, Oregon, Early 1990s

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# OVERVIEW

## INTRODUCTION

The Personal Responsibility and Work Opportunity Reconciliation Act passed in 1996 replaced the Aid to Families with Dependent Children program with the Temporary Assistance for Needy Families program, which imposed, among other things, work requirements on participants who received benefits for a certain period of time and time limits on benefits that were paid with federal funds. Around the same time, there were several evaluations of welfare-to-work programs that tested the effects of alternative approaches to helping individuals on welfare find jobs and leave public assistance. Some of these evaluations—including the National Evaluation of Welfare-to-Work Strategies (NEWWS)—found these new approaches led to some positive short-term effects for participants. It is unclear how individuals who were receiving welfare fared longer term and whether the new approaches raised families' incomes enough to move them out of poverty.

## PURPOSE

This report is part of the *From Theory to Practice* project and presents findings from an analysis of 20-year outcomes and impacts of an employment-focused program offered to welfare recipients in Portland, Oregon, in the 1990s, as part of NEWWS. The findings described in this report represent some of the first available evidence on how individuals who previously received welfare fared in the labor market over the long term and on how sequence and cluster analyses can provide a richer picture of their trajectories and program impacts. In addition, this report reflects on the efficacy of sequence and cluster analyses as tools to measure 20-year impacts of employment-focused programs.

## KEY FINDINGS AND HIGHLIGHTS

- NEWWS led to a general increase in average 20-year earnings among individuals in the program group compared with those of individuals in the control group, particularly for certain subgroups with less attachment to the labor force at study entry.
- The NEWWS intervention, however, did not appear to change the common employment and earnings trajectories of individuals receiving welfare, nor did it seem to change the proportion of individuals who ended up in a particular trajectory.

## METHODS

The analyses presented in this report involved roughly 4,000 adults who were randomly assigned at the Portland NEWWS site. This sample includes 3,500 individuals assigned to the program group and 500 individuals assigned to the control group, who were subject to a full five-year embargo on receiving program services.

The research team used a sequence analysis in combination with a cluster analysis to look at individuals' 20-year employment and earning trajectories. These analyses were run separately for the program and control groups.

A sequence analysis provides a means for comparing individuals' trajectories—in this case, the patterns of them moving in and out of employment and of their earnings levels—and quantifying the extent to which they differ. For example, it is possible that many individuals ended up in stable employment with high wages by the 20-year point. Some of these individuals may have had a rapid transition into sustained work with high wages, while others may have struggled to find work or got stuck in low-paying jobs. A sequence analysis—unlike many more traditional methods—captures this distinction because it considers the full details of individuals' trajectories and not just their outcomes in one time period.

The research team then used a cluster analysis to identify groups of individuals who had broadly similar employment and earnings trajectories. The goal was to identify clusters of individuals who shared a similar overall pattern of outcomes, with these patterns qualitatively distinct across clusters.

The research team performed a conventional subgroup analysis to better understand whether NEWWS was more effective for individuals with certain characteristics than individuals with other characteristics. The full sample from the NEWWS Portland site—individuals in both the program and control groups—was split into three subgroups based on individuals' employment and earnings histories in the two years before entering the study. The team then ran impact analyses separately for each subgroup to see if NEWWS had an effect on the outcomes of the individuals in each subgroup.

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The Authors



## INTRODUCTION

The Personal Responsibility and Work Opportunity Reconciliation Act passed in 1996 dramatically altered the structure of the safety net program in the United States. The act replaced the Aid to Families with Dependent Children program with the Temporary Assistance for Needy Families (TANF) program, which imposed, among other things, work requirements on participants who received benefits for a certain period of time and time limits on benefits that were paid with federal funds.<sup>1</sup>

Around the same time, there were several evaluations of welfare-to-work programs that tested the effects of alternative approaches to helping individuals on welfare find jobs and leave public assistance. Some of these evaluations—including the National Evaluation of Welfare-to-Work Strategies (NEWWS)—found these new approaches led to some positive short-term effects for participants.<sup>2</sup> Yet it is unclear how individuals who were receiving welfare—both those who received the alternative services and those who received the regular services—fared longer term and whether the new approaches raised families’ incomes enough to move them out of poverty.

This report is part of the *From Theory to Practice* (T2P) project. It examines the long-term outcomes for individuals in the NEWWS study. Funded by the Administration for Children and Families’ Office of Planning, Research and Evaluation (ACF/OPRE) in the U.S. Department of Health and Human Services, T2P was developed to support research on long-term outcomes of employment and human service programs. See Box 1 for more information about T2P and the Assessing Options to Evaluate Long-Term Outcomes Using Administrative Data (LTO) project, which assessed the feasibility of conducting research on long-term outcomes using administrative records data. The analyses presented here assess the 20-year employment and earnings outcomes and trajectories of individuals in the NEWWS study. They also allow for a comparison of the average outcomes and trajectories between individuals in the program and control groups. The research team used two separate methods for these long-term analyses.<sup>3</sup> First, the team created average employment and earnings outcomes covering the full 20-year follow-up period to get a sense of how individuals fared overall. The team then estimated impacts on these outcomes for subgroups of individuals, based on their characteristics before they entered the study. Second, the team used a more innovative approach—combining sequence and cluster analyses—to examine the 20-year labor market trajectories of individuals in the program group, as well as to qualitatively assess any differences between the common trajectories of those individuals and the common trajectories of individuals in the control group. By using multiple approaches, these analyses not only shed light on the long-term outcomes of the NEWWS study, they also offer some new thinking on how to examine long-term outcomes. The findings also provide insights into whether future evaluations of similar programs should consider using these methods.

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1. U.S. Department of Health and Human Services (1996).
  2. Hamilton et al. (2001).
  3. For the study’s pre-registered analysis plan, see <https://osf.io/vc2hg/>.

## BOX 1

### **Overview of the *From Theory to Practice (T2P)* and *Assessing Options to Evaluate Long-Term Outcomes Using Administrative Data (LTO)* Projects**

Many federal employment and human service interventions are designed to have long-term effects, yet most evaluations end after only a few years, before the full story is known. The T2P and LTO projects, funded by the Administration for Children and Families' Office of Planning, Research, and Evaluation (ACF/OPRE) in the U.S. Department of Health and Human Services, were launched in response to a call from the Commission on Evidence-Based Policymaking to use rigorous evidence from random assignment studies and good models for accessing administrative data to better understand the long-term effectiveness of these programs.

The LTO project is helping ACF/OPRE understand how to link a number of major evaluations to data sets. The project team selected and reviewed evaluations and administrative data sources to assess the feasibility of linking them to conduct long-term follow-up studies. The result is the *Compendium of Administrative Data Sources for Self-Sufficiency Research*, a resource providing information on administrative data sources and how to access and use these data to measure impacts of social programs in both the medium and long term.

The T2P project is developing products and conducting analyses intended to expand the use of administrative data when studying long-term outcomes of federal social program interventions. If shown to be effective, extended follow-up studies could provide more information to researchers, policymakers, and social program providers about the kinds of programs that yield positive long-term results. More information, including a guide to conducting long-term follow-up studies, can be found on OPRE's project page.

Administrative data—data that are created and stored to enable government administration, or that are a by-product of it—are a key component of this research. These data present a potentially low-cost opportunity for tracking the long-term effects of new policy and program interventions. T2P aims to provide an example of what can be accomplished by accessing administrative data and linking them to participant data from a long-completed study.

## **WHY NEWWS, AND WHY PORTLAND?**

The NEWWS site in Portland, Oregon, was selected as the focus of this report for two main reasons. First, the evaluation's subject matter is still an often debated policy issue. The NEWWS study was conducted from 1991 to 1996 and was designed to test the effects of alternative approaches to helping welfare recipients find jobs and leave public assistance. NEWWS examined the effects of 11 mandatory welfare-to-work programs (in seven sites around the country) on welfare recipients and their children using a randomized controlled trial design. Individuals in the study were assigned at random to either a program group that was eligible to receive the enhanced services provided through NEWWS or a control group that was not eligible to receive those services. Individuals in both groups were tracked over time and their outcomes were compared with estimate the impacts of the programs.

The NEWWS sites that used employment-focused strategies (which emphasized short-term job search assistance and finding a job quickly), including the Portland site, tended to have larger short-term effects than programs that used education-focused strategies (which emphasized longer-term skill building, including basic education).<sup>4</sup> Today, there are still ongoing policy debates about the optimal structure of safety net programs and whether education- or employment-focused programs can lead to sustained increases in income in the long term.

Second, the Portland site was selected because it produced the largest, most consistent five-year employment and earnings effects among the NEWWS sites. The Portland site operated an employment-focused program that initially assigned some enrollees to very short-term education or training and others (the majority) to job search. Over five years, program group members worked 1.6 quarters more than control group members, and their average five-year earnings were about \$5,000 higher. Portland's program also produced the largest impacts on measures of stable employment and earnings growth. The program's success may have been a result of its focus on employment and finding a good job and its offering of both job search and education services.<sup>5</sup> In a longer-term follow-up analysis (which covered the period between 10 and 15 years after random assignment),<sup>6</sup> the Portland program's employment and earnings effects faded.<sup>7</sup> The analyses in this report cover the 20-year period after random assignment and include the full follow-up period examined in previous analyses, from the program's initial impact to the control group's eventual catch-up, and beyond.

## DATA SOURCES

The analyses in this report relied on data from the original NEWWS evaluation and from the Longitudinal Employer-Household Dynamics (LEHD) program, maintained by U.S. Census Bureau.<sup>8</sup> The first data source was background data—such as demographic, education, and welfare history data—collected by welfare staff during routine interviews with individuals at the time they entered the NEWWS study. The research team used these data to describe the average characteristics of individuals in the sample.

The second data source was LEHD data from the state of Oregon.<sup>9</sup> The research team used these data to create quarterly measures of in-state employment and earnings over a 20-year

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4. Hamilton et al. (2001).

5. Hamilton et al. (2001).

6. This analysis used data from the National Directory of New Hires (NDNH).

7. Freedman and Smith (2008).

8. Administrative data on education and training are not currently available through the Census Bureau's infrastructure. These data could be important to fully understanding the analysis of the trajectories.

9. More specifically, the research team used data from the Oregon Employment History File. For more information on the LEHD program, see <https://lehd.ces.census.gov/>.

period.<sup>10</sup> A notable limitation of this dataset was that it only covered employment in Oregon.<sup>11</sup> For individuals who had no reported earnings in a quarter, there was no way to tell if they did not work at all or if they worked in another state. Similar to all analyses based on state unemployment insurance data, there was also no way to discern if someone was retired; had a contract, federal, or informal job; or was deceased.<sup>12</sup> These limitations meant that the employment and earnings levels in the study sample were likely slightly higher than the levels presented in this report. Additionally, the trajectories identified through the sequence and cluster analyses (discussed more below) may have reflected the types of employment covered.

## FINDINGS FOR THE CONTROL GROUP

The analyses discussed in this section focus solely on the roughly 500 individuals who were in the control group at the NEWWS Portland site.<sup>13</sup> The research team analyzed the control group in order to understand the ambient employment dynamics of TANF recipients during this period in the absence of a special intervention. As shown in the rightmost column of Appendix Table 3, nearly all individuals in the control group were female (94 percent) and the majority were White (69 percent). At the time they entered NEWWS, almost half of individuals (48 percent) were between the ages of 25 and 34. Notably, 5 percent of the individuals were over age 45 at the time they entered the study, meaning that they had reached retirement age (as commonly defined) by the end of the 20-year follow-up period. Over 60 percent of individuals had two or more children and at least one child under age 5. Around 69 percent of individuals had a high school diploma or General Educational Development (GED) certificate, but 74 percent of them did not work in the quarter before they entered NEWWS.

The research team opted to run the sequence and cluster analyses on the control and program groups separately in order to observe any differences that were found in the common employment and earnings trajectory groups. The technical appendix provides more details on the analysis methods used.

- 
10. For a more detailed description of the data sources and analysis methods used in this brief, see the technical appendix.
  11. The 2008 NEWWS follow-up study conducted by Freedman and Smith used NDNH data, which covers employment in all states and federal employment. These data are not the same as those used for this 20-year follow-up study.
  12. The data do not include federal and military employment, self-employment, independent contractors, or other informal types of employment not covered by the unemployment insurance system. See Czajka, Patnaik, and Negoita (2018).
  13. This sample includes only individuals in the control group in Portland who were in the analysis sample used in the five-year NEWWS impact report. These individuals were subject to the full five-year embargo on receiving program services. See Hamilton et al. (2001).

## How Many Distinct Clusters Did Individuals' 20-Year Employment and Earnings Trajectories Reveal?

Generally, individuals in the control group struggled to find and maintain consistent employment. For example, on average, individuals worked 7.25 years (or 29 quarters) of the 20-year (or 80-quarter) follow-up period and earned \$160,000, or \$8,000 a year. The sequence analysis quantified how similar (or dissimilar) each individual's 20-year employment and earnings trajectory was to every other individual's trajectory. The research team used three quarterly employment and earnings states (described in more detail later) for this assessment: (1) not employed, (2) employed with low earnings (defined as earnings less than \$4,000), and (3) employed with high earnings (defined as earning \$4,000 or more).<sup>14</sup> A cluster analysis then grouped individuals with similar trajectories together, resulting in three distinct clusters: (1) the "fairly consistently employed with higher earnings," (2) the "consistently not employed," and (3) the "employed early on, then in and out of employment."<sup>15</sup>

Over 60 percent of individuals in the control group were in the cluster that had the poorest outcomes overall (the "consistently not employed" cluster). Overall, the three clusters were relatively similar in terms of the average demographic characteristics of the individuals in each cluster, suggesting that these characteristics were not strongly associated with the employment and earnings trajectories, as measured by the available data.

## What Were the 20-Year Earnings Differences Across the Three Clusters?

Figure 1 shows average quarterly earnings by cluster and reveals how discrete these clusters were from one another in terms of earnings. Table 1 paints a more detailed picture of the differences across the clusters, showing that, as expected, the employment and earnings outcomes for the clusters corresponded with their definitions. For example, while everyone in the "fairly consistently employed with high earnings" and "employed early on, then in and out of employment" clusters had reported earnings at some point in the 20-year follow-up period, just under 20 percent of the "consistently not employed" cluster never worked at all.

There were also stark differences in overall earnings across the clusters. On average, a member of the "fairly consistently employed with higher earnings" cluster made around \$400,000 over the 20-year period, over 10 times more than a member of the "consistently not employed" cluster, who averaged around \$37,000 in earnings over the same period. A member of the

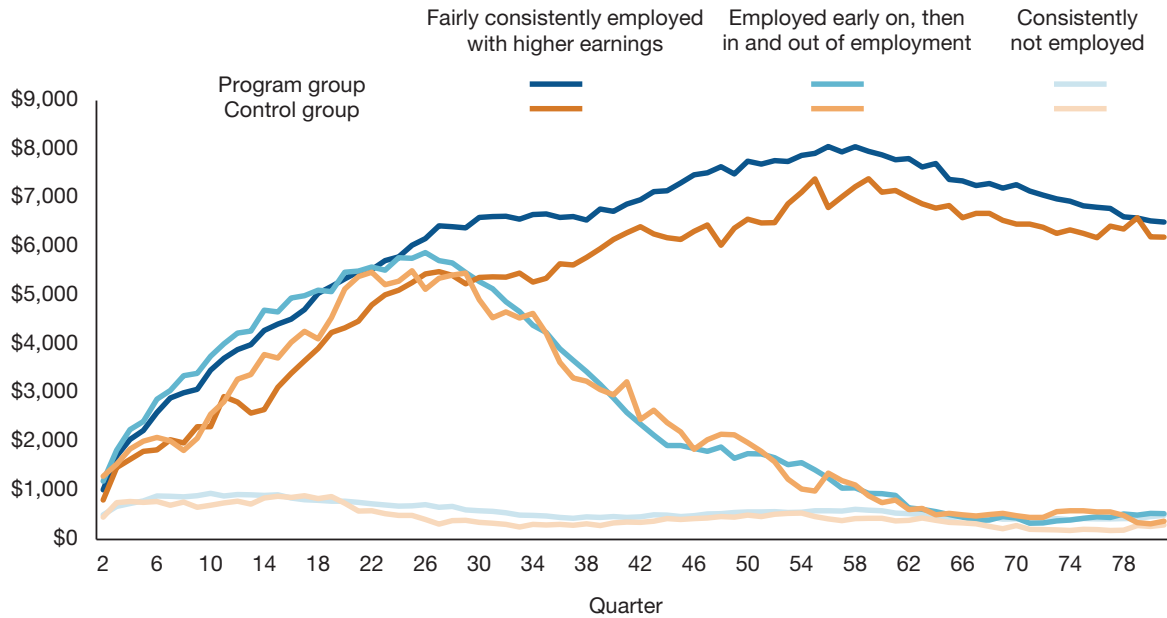
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14. In the original NEWWS evaluation, quarterly earnings were top coded at \$15,000. The research team applied the same rule here. Further, because this analysis covers a 20-year period, all earnings thresholds and amounts were adjusted for inflation to 2014 dollars.

15. In the sequence and cluster analyses, the research team placed participants who did not exactly meet the definitions of the trajectory groups in whichever cluster they were closest to. For example, the team likely placed people who were consistently employed with low earnings in to the "employed early on, then in and out of employment" cluster.



**FIGURE 1. Average Quarterly Earnings in Years 1 to 20 Among Individuals in the Program and Control Groups, by Trajectory Group**



SOURCE: MDRC calculations from Oregon Longitudinal Employment Household Dynamics data, maintained by the U.S. Census Bureau.

NOTES: All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-098. Earnings amounts were adjusted for inflation to 2014 dollars.

“employed early on, then in and out of employment” cluster earned \$200,000 on average over 20 years, around half as much as the highest earning cluster and over five times as much as the lowest earning cluster.

## PROGRAM AND CONTROL GROUP DIFFERENCES

This section describes the findings from two separate analyses designed to gauge the long-term employment and earnings impacts of the NEWWS program. Because the analyses assessed the impact on outcomes over a 20-year period, the research team hypothesized that the impacts would vary quite a bit for individuals in the study (both overall and within each research group), and that estimating average impacts across all individuals would miss part of the story. To provide a richer picture of program effects over the longer term, the research team used two different approaches that go beyond estimating an average impact: first, a more conventional subgroup analysis, and, second, sequence and cluster analyses to identify trajectories.

**TABLE 1. Employment and Earnings Outcomes in Years 1 to 20 Among Individuals in the Program and Control Groups, by Trajectory Group**

Outcome	Program group			Control group		
	Consistently employed with higher earnings	Consistently not employed	Employed, then not employed	Consistently employed with higher earnings	Consistently not employed	Employed, then not employed
Ever worked (%)	100	86	100	100	81	100
Average number of quarters worked	67	16	41	60	12	40
Worked in all quarters (%)	5	D	D	4	D	D
Worked in 60 or more quarters (%)	78	1	4	n/a	n/a	n/a
Average total earnings (\$)	500,000	47,800	210,000	400,000	37,000	200,000
Average number of quarters earned \$1-3,999	13	11	16	20	8.6	20
Average number of quarters earned \$4,000 or more	54	5	25	50	3.6	20
Earned \$4,000 or more in 60 or more quarters (%)	42	D	D	30	D	D
Sample size	900	2,200	500	100	300	80

SOURCES: MDRC calculations from Oregon Longitudinal Employment Household Dynamics data, maintained by the U.S. Census Bureau, and NEWWS baseline information survey data.

NOTES: D = number suppressed due to minimum sample size requirements.

All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-098.

Numbers may not sum to 100 percent due to rounding requirements.

Sample sizes for trajectory clusters do not sum to the overall sample sizes for the reserach groups due to rounding requirements.

Earnings amounts were adjusted for inflation to 2014 dollars.

## Did Employment and Earnings Impacts Vary by Subgroups Based on Pre–Random Assignment Labor Market Histories?

The first long-term follow-up analysis used a more conventional approach to place individuals into groups: Individuals were divided into subgroups based on their characteristics prior to entering NEWWS. To estimate impacts for each subgroup, the research team compared the outcomes of program group members with those of control group members. The team also assessed whether there were statistically significant differences in the estimated impacts across subgroups (using what are called “Q statistics”).<sup>16</sup> If such differences were found, there would be evidence that NEWWS worked better for some groups of individuals than others.

In the analysis, the research team split the full sample from the NEWWS Portland site—individuals in both the program and control groups—into three subgroups based on their employment and earnings histories in the two years before entering the study:

- Unemployed—those who did not work in the two years before entering the study
- Employed with lower earnings—those who worked in at least one quarter in the prior two years and earned less than \$3,000 during that period<sup>17</sup>
- Employed with higher earnings—those who worked in at least one quarter in the prior two years and earned \$3,000 or more during that period

Based on findings from the original NEWWS evaluation and other similar studies, the research team hypothesized that the effects of NEWWS would be strongest among individuals in the middle group—those who were employed with lower earnings.<sup>18</sup> Individuals in that group had some connection to the labor market and may have been at a tipping point in their employment trajectories, potentially making them more receptive to the intervention’s employment-focused services. NEWWS may have helped those individuals gain a foothold in the labor market, which individuals in the employed with higher earnings group may not have needed as much (although, some in that group would have). Individuals in the unemployed group, on the other hand, may have had more barriers to overcome.

Consistent with these expectations, the impacts of NEWWS appear to have been strongest among the employed with lower earnings. (See Table 2.) For that subgroup, NEWWS produced large and statistically significant effects on several measures of overall employment and earnings (for unemployment-insurance-covered jobs in Oregon). For example, among individuals

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16. Q statistics test whether the estimated impacts across subgroups differed by a statistically significant amount. For more information, see Greenberg, Meyer, and Wiseman (1994).

17. All quarterly earnings amounts were adjusted for inflation to 2014 dollars.

18. This pattern was noted in the WorkAdvance evaluation, the Employment Retention and Advancement study, and in a synthesis of 1980s welfare-to-work programs. See Schaberg (2017), Hamilton and Scrivener (2012), and Friedlander (1988).

in this subgroup, program group members were more likely to have ever worked (94 percent versus 90 percent) and to have worked more quarters (31 quarters versus 20 quarters) than control group members.<sup>19</sup> Among the unemployed group, NEWWS increased overall employment by a statistically significant amount, but did not have an effect on the number of quarters employed. Among the employed with higher earnings group, NEWWS did not have a statistically significant effect on either of these outcomes. Additionally, for several outcomes (including average number of quarters worked and average total earnings), the intervention's impacts across the subgroups differed by a statistically significant amount. Overall, these findings suggest that NEWWS was more effective for some groups of individuals than others at increasing employment and earnings.

## Did NEWWS Change the Common Employment and Earnings Trajectories of Individuals Who Were Receiving Welfare?

The research team used a second approach, less common in the context of random assignment evaluations, to place individuals into groups to study their long-term outcomes. It involved two steps: identifying the common employment and earnings trajectories among individuals (using a sequence analysis) and then grouping individuals who had similar trajectories together (using a cluster analysis). (The technical appendix provides more information on these analyses.) A main difference between this approach and the one discussed earlier is that, in this approach, the groups were defined based on the individuals' outcomes after they entered the study rather than on their characteristics before they entered the study.<sup>20</sup> One benefit of this approach was that it considered the full details of individuals' trajectories, and not just their outcomes in one time period.

As mentioned earlier, the research team performed the sequence and cluster analyses separately for the program and control groups. Doing so allowed the team to conduct three qualitative comparisons of the trajectory clusters identified for each research group: (1) a comparison of the most common identified trajectories, (2) a comparison of the proportion of individuals who ended up in more positive versus less positive trajectory clusters,<sup>21</sup> and (3) a comparison of the overall outcome levels within the comparable trajectory clusters.

The findings presented in this report are all descriptive and not precise because the underlying structure of the identified trajectory clusters could have differed by research group. In other words, the cluster analysis grouped individuals with common trajectories together and gave an overall picture of each cluster. Yet even if the clusters appear similar across research groups,

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**19.** The control group sample size for the low-earners group was less than 100, which makes the impact estimates somewhat more uncertain.

**20.** This approach shares some commonalities with quantile regression, which is more frequently used. See Angrist and Pischke (2009).

**21.** A more positive trajectory cluster, for example, would include more consistent employment and relatively higher earnings over the period.

**TABLE 2. Impacts on Employment and Earnings in Years 1 to 20, by Subgroups Defined by Level of Attachment to the Labor Market at Study Entry**

Outcome	Not employed			Low-earners			High-earners			Sig.
	Program group	Control group	Difference (impact)	Program group	Control group	Difference (impact)	Program group	Control group	Difference (impact)	
Ever worked (%)	86	82	4**	94	90	4***	96	98	-2	
Average number of quarters worked	27	25	2	31	20	11**	38	38	0	†††
Worked in 60 or more quarters (%)	16	13	3	17	10	7	27	27	0	
Average total earnings (\$)	151,000	140,000	11,000	160,000	100,000	60,000**	231,000	210,000	21,000	†††
Average number of quarters earned \$1-3,999	10	9	1	14	10	4*	13	14	-1	†††
Average number of quarters earned \$4,000 or more	17	16	1	18	10	8*	25	23	2	†††
Earned \$4,000 or more in 60 or more quarters (%)	9	5	4**	8	6	2	14	10	4	
Sample size	1,500	250		750	90		1,300	200		

SOURCES: MDRC calculations from Oregon Longitudinal Employment Household Dynamics data, maintained by the U.S. Census Bureau, and NEWWS baseline information survey data.

NOTES: All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-098.

The not employed group includes individuals who did not work in the two years prior to study entry. The low-earners group includes individuals who worked at least one quarter in the two years prior to study entry and earned less than \$3,000 (in 2014 dollars). The high-earners group includes individuals who worked at least one quarter and earned \$3,000 or more (in 2014 dollars).

Statistical significance levels are indicated as follows: \*\*\* = 1 percent; \*\* = 5 percent; \* = 10 percent.

Differences across subgroups were tested for statistical significance. Statistical significance levels (Sig.) are indicated as follows: ††† = 1 percent; †† = 5 percent; † = 10 percent.

Numbers may not sum to 100 percent due to rounding requirements.

Sample sizes for groups do not sum to the overall sample sizes due to rounding requirements.

the individual trajectories for the people within each cluster could have differed across research groups. (Such individual-level comparison was not possible with this method.) Therefore, direct comparisons of each cluster may gloss over these individual-level differences among cluster members.

The sequence and cluster analyses identified distinct clusters within both the control and program groups. Based on a commonly used diagnostic tool,<sup>22</sup> the research team ultimately chose the three-cluster solution for both research groups because the results were clearly interpretable and because the clusters all had sample sizes of at least 50 people (an arbitrary threshold selected by the team).

## Were the Most Common Trajectories Similar Across Research Groups?

The resulting clusters, whose average quarterly earnings are shown in Figure 1, have very similar overall employment and earnings trajectories across the two research groups—so similar, in fact, that the research team named and defined them identically:

- The “fairly consistently employed with higher earnings” cluster comprises individuals who were employed in unemployment-insurance-covered jobs in Oregon for the majority of the 20-year follow-up period and had relatively higher earnings compared with the other clusters.
- The “consistently not employed” cluster comprises individuals who had relatively low or no earnings (from unemployment-insurance-covered jobs in Oregon) throughout the follow-up period.
- The “employed early on, then in and out of employment” cluster comprises individuals who tended to work in the early part of the follow-up period (through Year 7), and then went in and out of employment (in Oregon).<sup>23</sup>

Figure 1 shows how distinct these clusters are from one another in terms of average earnings within both the program and control groups. For example, within the program group, the average quarterly earnings of those in the “consistently not employed” cluster never substantially exceeded the \$1,000 mark over the 20-year period, while the average earnings of those in the “fairly consistently employed with higher earnings” cluster increased for most of the follow-up period (through Year 14) and then decreased slightly. Individuals in the “employed early on, then in and out of employment” cluster tended to work through around Year 7 (observed by the increase in average earnings), and then went in and out of employment for the remaining

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22. This diagnostic tool is called the average silhouette distance. For more information, see the technical appendix.

23. This drop could have been caused by some individuals retiring, losing steady employment, or entering employment not covered in this data source.

years (observed by the decrease in average earnings). (See Box 2 for a discussion of the average baseline characteristics for each cluster in the program group.) Similar patterns were observed for the three comparable clusters identified in the control group.

## BOX 2

### Characteristics of Individuals in the Program Group at the Portland NEWWS Site

#### Full Sample

The Portland NEWWS site program group included around 3,500 people, as shown in the rightmost column of Appendix Table 2. Not surprisingly, due to random assignment, the program group was demographically very similar to the control group. Over 90 percent of individuals in the program group were female and 70 percent were White. A little over half of participants (51 percent) were between the ages of 25 and 34 at baseline. Notably, 4 percent of the individuals were over age 45 at random assignment, meaning that they had reached retirement age (as commonly defined) by the end of the 20-year follow-up period. Around 59 percent of the program group had two or more children, and 68 percent had at least one child under 5. Around 67 percent of individuals in the program group had a high school diploma or General Educational Development (GED) certificate, but 75 percent of them did not work in the quarter before entering the NEWWS study.

#### By Cluster

One of the most salient takeaways from these analyses is that, generally, the three clusters looked fairly similar to one another in terms of the individuals' demographic characteristics at baseline. Appendix Table 2 shows that this was the case across the clusters in the program group for the most part. One notable exception (observed in the control group clusters as well) is that those in the "consistently not employed" cluster had the lowest rates of work prior to study entry and the highest rates of not having earned a high school diploma or GED certificate (37 percent). These findings reinforce the research team's hypothesis that individual demographic characteristics were not strongly associated with the identified employment and earnings trajectories. This may have been due to a phenomenon in statistics known as "attenuation bias," in which short-term correlations weaken over time.\* It is therefore unlikely that these clusters would have been identified using more traditional analyses that define groups based on individuals' characteristics before entering a program or study.

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\*Bloom, Zhu, and Unlu (2010).

Perhaps most interesting, however, is how similar the overall pictures of the clusters were across the two research groups. The similarities are evident in both Figure 1 and Table 1 (which shows outcomes over the 20-year follow-up period by cluster for both the program and control groups). For example, the comparable clusters in the program and control groups had very similar employment rates.

It should, again, be noted that these trajectory cluster comparisons across research groups were not direct ones since they compared only the average outcomes for individuals within each cluster. It is possible that there were differences in the outcomes and trajectories of the individuals who made up each cluster.

## **Were the Sizes of the Trajectory Clusters Similar Across Research Groups?**

Another way to compare the trajectory clusters across research groups is to look at the proportion of individuals who fall into each cluster. This comparison can help ascertain whether program group members were more or less likely than control group members to end up in a cluster that could be considered more or less positive.

Overall, the findings suggest that the proportions of individuals in each comparable trajectory cluster were roughly similar across the program and control groups. The cluster with the poorest outcomes—the “consistently not employed”—made up the largest proportion of both the program and control group samples (61 percent and 63 percent, respectively). Twenty-five percent of individuals in the program group were in the cluster that fared the best in the labor market over the 20-year follow-up period, the “fairly consistently employed with higher earnings” cluster, compared with 21 percent of individuals in the control group. (See Table 1.)

## **Were the Outcome Levels Within Each Trajectory Cluster Similar Across Research Groups?**

Finally, the average outcome levels of individuals in each cluster identified within the program group were qualitatively similar relative to the average outcome levels of individuals in the comparable cluster identified within the control group. The findings in Table 1 show that, in general, the average total earnings for program group members were higher than those for control group members within each comparable cluster. For example, on average, a program group member in the “consistently not employed” cluster made around \$47,800 over the 20-year follow-up period, almost \$11,000 more than the average control group member in the similar identified cluster. Additionally, the average program group member in the “fairly consistently employed with higher earnings” cluster earned an average of \$500,000 over the 20-year study period, which was \$100,000 more than what the average control group member in the highest earnings cluster earned.

These findings are not that surprising given that program group members had access to the enhanced services provided through NEWWS, which were already shown to have increased earnings for program group members (relative to control group members) early in the follow-up period.<sup>24</sup> These findings, however, do provide insights into the long-term effectiveness of the NEWWS intervention.

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24. Hamilton et al. (2001).



## Overall Assessment

The NEWWS intervention at the Portland site does not appear to have substantially changed the common employment and earnings trajectories of individuals receiving welfare. It also did not seem to move more individuals into more positive labor market trajectories over time. It did, however, appear to lead to a general increase in average 20-year earnings among individuals in the program group compared with those of individuals in the control group.<sup>25</sup>

## CONCLUSIONS

The findings described in this report represent some of the first available evidence on how individuals who previously received welfare fared in the labor market long term. They and the related analyses offer some new policy and methodological insights for the field. These insights are critically important to program administrators, researchers, and policymakers, who can use them to help guide their social service programming decisions with a view to making a long-lasting impact.

It would not have been possible to study the long-term effects of the NEWWS intervention without access to the U.S. Census Bureau's administrative earnings data. While the research team encountered some challenges accessing these data, these analyses confirm it is feasible and worthwhile to obtain and use these data for long-term research purposes.<sup>26</sup>

The long-term trajectories of and outcomes for individuals in NEWWS are interesting in their own right. The conventional subgroup analysis suggests that NEWWS was more effective at increasing earnings for the middle group of individuals, who had some attachment to the labor market before entering the study but were not earning much (under \$3,000 in the prior two years), than it was for the other groups (composed of individuals who were more and less attached to the labor market). These findings also confirm that subgroup analyses can be useful in assessing long-term impacts and outcomes.

The less conventional sequence and cluster analyses provided new information about the long-term trajectories of individuals who were receiving welfare and whether NEWWS altered those trajectories. The identified trajectory clusters within both the program and control groups were dramatically different from one another. This suggests that individuals who receive welfare are not a monolithic group and that the differences in individuals' outcomes compound over time (as evidenced by the large differences in average outcomes over the full 20-year period).

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**25.** The research team did not test differences between the research groups in the size of each cluster and the average earnings within a given cluster for statistical significance, given that they are based on post-random assignment outcomes. Thus, it is difficult to assess whether they represent program impacts.

**26.** For more information on accessing administrative data for long-term follow-up studies, see Bigelow, Pennington, Schaberg, and Jones (2021).

More modern approaches to policy and programs, including career pathways initiatives, could help put more individuals on positive employment trajectories long term.

The identified employment and earnings trajectory clusters appear to have had very similar overall patterns among both control group and program group members. (However, as discussed earlier, the underlying structure of the clusters may have differed across groups.) This finding suggests that the NEWWS intervention at the Portland site did not substantially change the common employment and earnings trajectories of individuals receiving welfare, nor did it seem to change the proportion of individuals who ended up in a particular trajectory. Further, given that most individuals in both research groups were in the cluster with the poorest outcomes (the “consistently not employed” cluster), more intensive services may have been needed to really help individuals gain a foothold in the labor market long term. Moreover, the pattern of outcomes seen in the “employed early on, then in and out of employment” cluster suggests that some individuals may have needed longer-lasting services to retain or advance in their jobs over time. Many programs, including the NEWWS intervention in Portland, are “one and done” programs and do not continue to work with individuals over the longer term.

Finally, the analyses showed that individuals in each of the three identified employment and earnings trajectory clusters had similar demographic characteristics, suggesting that the clusters likely could not have been identified through more conventional analyses. (Conventional analyses typically use such demographic characteristics to define subgroups.) This was true for both the control group and the program group and suggests that these methods did bring a “value added” to the study of social programs using randomized controlled trials. Researchers should consider using these approaches in the future.



# A

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## Technical Appendix



This appendix provides more detail on the analytical methods described in the report and used as part of the *From Theory to Practice* (T2P) project. The analyses follow the study's pre-registered analysis plan.<sup>1</sup>

## STUDY DESIGN AND SAMPLE

The report describes extended follow-up analyses of an employment-focused program offered to welfare recipients in Portland, Oregon, as part of the National Evaluation of Welfare-to-Work Strategies (NEWWS).<sup>2</sup> NEWWS was conducted from 1991 to 1996 and was designed to test the effects of alternative approaches to helping welfare recipients find jobs and leave public assistance. The original study used a randomized controlled trial design. Individuals were assigned at random to either a program group that was eligible for program services and subject to participation requirements, or to a control group that was not eligible for program services and not subject to participation requirements (although they could participate in other services in the community).

The analyses involved roughly 4,000 adults who were randomly assigned at the Portland NEWWS site. This sample includes the some 3,500 individuals assigned to the program group and 500 individuals assigned to the control group, who were subject to a full five-year embargo on receiving program services.<sup>3</sup>

## Sequence and Cluster Analyses

The research team used a sequence analysis in combination with a cluster analysis to look at individuals' 20-year employment and earning trajectories. These analyses were run separately for the program and control groups.

### Sequence Analysis

A sequence analysis provides a means for comparing individuals' trajectories—in this case, the patterns of them moving in and out of employment and of their earnings levels—and quantifying the extent to which they differ.<sup>4</sup> For example, it is possible that many individuals ended up in stable employment with high wages by the 20-year point. Some of these individuals may have had a rapid transition into sustained work with high wages, while others may have struggled to

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1. For the study's pre-registered analysis plan, see <https://osf.io/vc2hg/>.

2. Hamilton et al. (2001).

3. The full control group sample was larger than 500 individuals. The sample of 499 individuals was used in this report and in the final report for NEWWS because this group was subject to the full five-year embargo. See Hamilton et al. (2001) for more information.

4. See Abbott (1995).

find work or got stuck in low-paying jobs. A sequence analysis—unlike many more traditional methods—captures this distinction because it considers the full details of individuals’ trajectories and not just their outcomes in one time period. The sequence analysis allowed the research team to assign individuals to one of three mutually exclusive states—based on earnings in unemployment-insurance-covered jobs in Oregon—in any single quarter:

- Not employed—defined as not having any quarterly earnings
- Employed with low earnings—defined as having quarterly earnings less than \$4,000<sup>5</sup>
- Employed with high earnings—defined as having quarterly earnings of \$4,000 or more

In practice, how similar (or dissimilar) two individuals’ trajectories are is calculated based on the number of changes that would be required to make their two trajectories the same. For example, one individual may have worked and had high earnings in every quarter in a year, while another individual may not have worked at all in that year. To make the first individual’s trajectory match the second individual’s trajectory, four changes would be required (changing from “employed with high earnings” to “not employed” in all four quarters of the year).

Each of these changes has a “cost,” which can be thought of 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.

Changes that are more common in the data may be viewed as less substantial, and therefore less “costly,” than changes that are less common. For example, if most people in a sample are employed, making a change from “employed with low earnings” to “employed with high earnings” may be more common than a change from “not employed” to “employed with high earnings.” In this case, the former type of change could be associated with a smaller cost than the latter.

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.<sup>6</sup> First, this method used the data to derive the costs for each type of change. (The less commonly observed a change was between two states, the higher the cost.) Second, it allowed the costs to vary over time. (The cost associated for each relative quarter varied.) The costs of all of the changes were aggregated into what is called a dissimilarity matrix. The team implemented the sequence using the TraMineR package in R.<sup>7</sup>

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5. All quarterly earnings amounts were adjusted for inflation to 2014 dollars.

6. For more information on Dynamic Hamming Distance, see Lesnard (2006) and in Section 3.4.1 of Studer and Ritschard (2016).

7. For more information on the TraMineR package, see Gabadinho, Ritschard, Müller, and Studer (2011).

## Cluster Analysis

The research team then used a cluster analysis to identify groups of individuals who had broadly similar employment and earnings trajectories. (That is, the overall cost of changing from one individual's trajectory to another's was small.) The goal was to identify clusters of individuals who shared a similar overall pattern of outcomes, with these patterns qualitatively distinct across clusters. The team used the Partitioning Around Medoids (PAM) method of cluster analysis as it is robust to outliers.<sup>8</sup>

A key decision the team made in the cluster analysis concerned how many clusters to include. The team ran the cluster analysis multiple times to look at the two-, three-, four-, and five-cluster solutions. The final decision on which cluster solution to use was based on (1) a diagnostic tool called the average silhouette distance, which measured how similar a cluster was to itself compared with how similar it was to other clusters; (2) a qualitative assessment of the results that looked at whether the resulting clusters could be sensibly interpreted; and (3) the sample sizes for each cluster. (For example, it did not make sense to include clusters that were too small as they did not represent many people in the sample.)

Appendix Table 1 shows the average silhouette distances for each cluster solution by research group. The table shows that the two-cluster solution for both research groups had the highest average silhouette distance.<sup>9</sup> However, the research team decided that looking at only two clusters did not capture the full diversity of trajectories among the samples. The four- and five-cluster solutions, on the other hand, had clusters with few people in them, at least among the control group sample.

Following this assessment, the research team ultimately chose the three-cluster solution for the control group sample because it had a relatively high average silhouette distance, the clusters were easily interpretable, and the clusters comprised at least 50 individuals (an arbitrary minimum sample size threshold selected by the research team). The research team decided to select the three-cluster solution for the program group for similar reasons. This also allowed for easier comparisons of the overall identified clusters across the two research groups.

## Subgroup Analysis

The research team performed a conventional subgroup analysis to better understand whether NEWWS was more effective for individuals with certain characteristics than individuals with other characteristics. The full sample from the NEWWS Portland site—individuals in both the

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8. For more information on PAM, see Kaufman and Rousseeuw (1990).

9. Kaufman and Rousseeuw (1990) suggest a minimum average silhouette distance of 0.7 for a “strong structure” and 0.5 for a “reasonable structure.” The average silhouette distances shown in Appendix Table 1 indicate that the clusters ultimately formed in the analysis do not have the structure and dissimilarity of ideal clusters. This is likely due at least in part to the lack of diversity of data that was used to inform the states on which the clusters were based. Future studies could likely mitigate this problem by bringing in more types of data, such as education, health and health care, retirement, and out-of-state activity data to provide more data variation.



program and control groups—was split into three subgroups based on individuals’ employment and earnings histories in the two years before entering the study:

- Unemployed—those who did not work in the two years before entering the study
- Employed with lower earnings—those who worked in at least one quarter in the prior two years and earned less than \$3,000 during that period
- Employed with higher earnings—those who worked in at least one quarter in the prior two years and earned \$3,000 or more during that period

The team then ran impact analyses separately for each subgroup to see if NEWWS had an effect on the outcomes of the individuals in each subgroup. The team also assessed whether there were statistically significant differences in the estimated impacts across subgroups using the Q statistic (also known as the homogeneity of theta).<sup>10</sup> Any statistically significant differences in impacts across subgroups are evidence that NEWWS was more or less effective for some groups of individuals compared with others.

**APPENDIX TABLE A.1. Average Silhouette Distance in the Program and Control Groups, by Number of Clusters**

Number of clusters	Program group	Control group
2	0.5027	0.4940
3	0.3795	0.3576
4	0.3312	0.3077
5	0.3415	0.2973

SOURCE: MDRC calculations from Oregon Longitudinal Employment Household Dynamics data, maintained by the U.S. Census Bureau.

NOTE: All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-098.

<sup>10</sup>. For more information on the Q statistic, see Greenberg, Meyer, and Wiseman (1994).

**APPENDIX TABLE A.2. Average Characteristics at Baseline Among Individuals in the Program Group, by Trajectory Group and Overall**

<b>Characteristic (%)</b>	<b>Consistently employed with higher earnings</b>	<b>Consistently not employed</b>	<b>Employed, then not employed</b>	<b>Overall</b>
Female	95	93	91	93
Age				
19-24 years	30	22	18	24
25-34 years	49	53	49	51
35-44 years	19	21	28	21
45-59 years	2	4	5	4
Race/ethnicity				
White	70	70	69	70
Black	19	20	22	20
Other race/ethnicity	11	10	9	10
Has any children younger than 5 years old	73	68	60	68
Has two or more children	61	59	58	59
Does not have a high school diploma or GED certificate	25	37	26	33
Worked in the quarter before study entry	31	21	32	25
Worked in the year before study entry	47	39	50	43
Received AFDC/welfare in the year before study entry	82	85	81	84
Sample size	900	2,200	500	3,500

SOURCE: MDRC calculations from Oregon Longitudinal Employment Household Dynamics data, maintained by the U.S. Census Bureau, and NEWWS baseline information survey data.

NOTES: AFDC = Aid to Families with Dependent Children.

All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-098.

Numbers may not sum to 100 percent due to rounding requirements.

Sample sizes for trajectory groups do not sum to the overall sample size due to rounding requirements.

**APPENDIX TABLE A.3. Average Characteristics at Baseline Among Individuals in the Control Group, by Trajectory Group and Overall**

<b>Characteristic (%)</b>	<b>Consistently employed with higher earnings</b>	<b>Consistently not employed</b>	<b>Employed, then not employed</b>	<b>Overall</b>
Female	100	93	90	94
Age				
19-24 years	20	20	10	19
25-34 years	50	49	50	48
35-44 years	30	27	30	28
45-59 years	3	5	8	5
Race/ethnicity				
White	70	69	70	69
Black	20	21	20	21
Other race/ethnicity	8	10	10	10
Has any children less than 5 years old	70	65	60	64
Has two or more children	60	63	50	62
Does not have a high school diploma or GED certificate	30	35	20	31
Worked in the quarter before study entry	30	20	40	26
Worked in the year before study entry	50	37	50	42
Received AFDC/welfare in the year before study entry	80	84	70	81
Sample size	100	300	80	500

SOURCES: MDRC calculations from Oregon Longitudinal Employment Household Dynamics data, maintained by the U.S. Census Bureau, and NEWWS baseline information survey data.

NOTES: AFDC = Aid to Families with Dependent Children.

All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-098.

Numbers may not sum to 100 percent due to rounding requirements.

Sample sizes for trajectory groups do not sum to the overall sample size due to rounding requirements.

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