



**Data Analysis for  
Stay-at-Work/Return-to-  
Work (SAW/RTW)  
Models and Strategies  
Project**

**Early Intervention Pathway  
Map and Population  
Profiles**

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## Glossary

DI	Social Security Disability Insurance program
DOL	U.S. Department of Labor
SAW/RTW	Stay-at-Work/Return-to-Work (programs)
SIPP	Survey of Income and Program Participation
SNAP	Supplemental Nutrition Assistance Program
SSA	Social Security Administration
SSI	Supplemental Security Income program
TANF	Temporary Assistance to Needy Families program

## Executive Summary

Stay-at-Work/Return-to-Work (SAW/RTW) programs are intended to help workers who experience an illness, injury, or other disability to remain at work, and workers who have separated from employment for those reasons to return as soon as medically feasible. The U.S. Department of Labor (DOL) seeks to build the knowledge and evidence base about SAW/RTW programs and to develop intervention design options and evaluation strategies. Towards that goal, DOL contracted with Abt Associates to conduct the SAW/RTW Models and Strategies project. To carry out the study, Abt:

- conducted a comprehensive review of SAW/RTW programs to describe the initiatives that are operating;
- reviewed evidence about the effects of SAW/RTW programs;
- analyzed publicly available data to examine pathways from illness/injury to federal disability benefits to develop early intervention pathways and target population profiles; and
- developed intervention and evaluation design options.

This document characterizes the prevalence of various pathways from illness, injury, and job loss to application for federal disability benefits. The document also characterizes the populations on those pathways and, in particular, populations for whom an intervention might deter entry into the two largest federal disability programs: Social Security Disability Insurance (DI) and Supplemental Security Income (SSI).

To develop early intervention pathways and target population profiles, we analyze publicly available data and literature and only consider workers who are possible primary DI or SSI beneficiaries; that is, who are not auxiliary beneficiaries or disabled adult children. Specifically, we use nationally representative surveys and the Annual Statistical Report on the DI and SSI programs, which contains information on benefits for nonelderly persons with a work disability.<sup>1</sup> We use these data sources to characterize inflow into federal disability benefits or its complement: return to work. Much of the evidence reviewed indicates that the propensity to seek federal disability benefits when one might also have remained in the labor force given some intervention is similar across primary type of disability, but the sizes of these groups varies substantially. If the size of a population leaving work and entering receipt of federal disability benefits is indicative of the number of people who could benefit from a highly effective SAW/RTW program, targeting of these programs becomes a matter of identifying how to reach the largest such population.

These analyses seek to identify pathways that include various “touchpoints”; that is, interactions at which a worker leaving employment due to a health condition might experience an early intervention that could keep him or her in the labor force, preventing application for federal disability benefits. The analyses presented in this document consider six such touchpoints: 1) unemployment insurance, 2) workers’

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<sup>1</sup> We use the term “nonelderly” to refer to individuals under the age of 65 to be consistent with tables in the Social Security Administration’s Annual Statistical Report. We define “with a work disability” as having been determined to be unable to perform Substantial Gainful Activity, which in 2020 means earning at least \$15,120 per year (or \$25,320 if blind).

compensation, 3) public assistance programs, 4) private disability insurance, 5) job training or educational enrollment, and 6) health care utilization.

Data limitations prevent us from examining four other touchpoints—employee assistance programs, case coordination, workforce services, or state vocational rehabilitation—that were identified in our earlier work in the Synthesis of SAW/RTW Programs, Efforts, Models, and Definitions and the Synthesis of the Evidence About SAW/RTW and Related Programs.

This document’s main findings (shown in Exhibit ES-1) are:

- With respect to pathways through touchpoints:
  - Eight in 10 workers were in a pathway that involved health care utilization (visits to doctors or hospitals). Unfortunately, data limitations prevent the analysis from identifying the specific types of interactions with medical professionals and their precise timing.
  - Of the workers in a pathway that included health care utilization, 54 percent utilized health care and interacted with another touchpoint, and 46 percent utilized health care only.
  - Another common set of pathways involves public assistance, including Supplemental Nutrition Assistance Program and Temporary Assistance for Needy Families: 24 percent of workers had some participation in public assistance during the 16 months following separation from work.
  - A substantial fraction of workers did not interact with any touchpoint: 11 percent of them reported no participation in unemployment insurance, workers’ compensation, public assistance, private disability insurance, job training, or health care during the 16 months following separation from work.
- With respect to likelihood of beginning to receive federal disability benefits:
  - Pathways with public assistance, private disability insurance, and health care touchpoints were all associated with higher rates of federal disability benefit receipt 17–20 months after separation from work, adjusting for other types of participation.
  - Limiting our attention to three touchpoints-- public assistance, private disability insurance, and health care -- and investigating alternative pathways defined by whether individuals begin receiving public assistance or private disability first (or both at the same time), we find that five of the six pathways that involve health care are associated with substantially and statistically significantly higher rates of federal disability benefit receipt 17–20 months after separation from work relative to the pathway that involves none of the three. The only pathway with lower rates of federal disability benefit receipt 17–20 months after separation from work, relative to the no-touchpoint pathway, was a pathway with no health care visit, and private disability receipt beginning after public assistance.
  - Demographic characteristics seem to matter little, except that older workers are more likely to be awarded benefits.
- We conclude with discussion of future research that could overcome the limitations imposed by using only publicly available data.

**Exhibit ES-1. Rates of participation in the 16 months following separation from work by type of touchpoint, rates of return to work, and receipt of DI/SSI 17-20 months after earnings loss (touchpoints are listed in the order they are presented in this report)**

Touchpoint	Participation Rate	Return to work	DI/SSI Receipt
Unemployment insurance	16%	61%	16%
Workers' compensation	10%	38%	19%
Public assistance	24%	42%	25%
Private disability insurance	9%	31%	37%
Job training	8%	71%	8%
Health care	80%	48%	21%
None	11%	57%	5%

Source: Authors' analysis of SIPP data, 2001-2013.

## 1. Introduction

Stay-at-Work/Return-to-Work (SAW/RTW) programs are intended to help workers who experience an illness or injury to remain at work, and workers who have separated from employment to return as soon as medically feasible. The U.S. Department of Labor (DOL) seeks to expand the knowledge and evidence base about SAW/RTW programs and to develop intervention design options and evaluation strategies.

Towards that goal, DOL contracted with Abt Associates to conduct the SAW/RTW Models and Strategies project. To carry out the study, Abt:

- conducted a comprehensive review of SAW/RTW programs to describe the initiatives that are operating;
- reviewed evidence about the effects of SAW/RTW programs;
- analyzed publicly available data to examine pathways from illness/injury to federal disability benefits to develop early intervention pathways and target population profiles; and
- developed intervention and evaluation design options.

### 1.1 Policy Context

The Social Security Disability Insurance program (DI) is the nation's primary earnings-replacement program for workers who become unable to work substantially due to long-term or terminal physical or mental conditions. Administered by the Social Security Administration (SSA), in 2017 the DI program paid \$142.7 billion in cash benefits to 10.4 million "disabled workers" and their dependents. SSA also administers Supplemental Security Income (SSI), a means-tested program that provides cash assistance to individuals meeting the DI medical criteria but not insured under DI.

In December 2016, about 12.8 million people aged 18 to 64 received federal disability benefits. Sixty-two percent (8 million) received benefits from the DI program only, 28 percent (3.5 million) received benefits from SSI only, and 10 percent (1.3 million) received benefits from both programs concurrently.<sup>2</sup>

Since the 1990's, several factors—particularly low benefit termination rates and growing eligibility rates—have contributed to substantial growth in the federal disability caseload and in program costs. The DI caseload as a fraction of the population has more than doubled, rising from about 1.5 percent in the 1980's to more than 3 percent after 2009; over the same time period, SSI incidence doubled from 1 percent to 2 percent. As shown in Chapter 2, growth in the caseload is driven by growth in musculoskeletal and mental conditions. Because populations defined by primary impairment have similar declines in earnings associated with receipt of federal disability benefits, suggesting similar program effects across populations, targeting an effective SAW/RTW program at the largest populations could produce the largest overall effects on return to work. Regardless, the size of a population indicates the

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<sup>2</sup> See SSA (2017a), Table 66. In December 2016, the civilian labor force (including workers under age 18 and over age 64) totaled 160.6 million. People who receive federal disability benefits are not in the labor force.

potential impact of a maximally effective intervention, and could motivate the targeting of SAW/RTW programs more broadly.

The long-term trend of higher disability rates and lower employment rates among persons with functional limitations poses critical public policy challenges (Autor & Duggan, 2006; Bound, et al., 2014). Spending on SSI, as with other entitlements, has also been a perennial concern. Concerns about the solvency of the DI Trust Fund motivates an interest in reducing inflow into the DI caseload.<sup>3</sup>

## 1.2 Touchpoints

A first step in designing a SAW/RTW program is to identify workers who have an injury or illness that puts them at risk of exiting the labor force. Once they are identified, the program can provide services. However, simply identifying those at risk of exiting the labor force is challenging, and there is no obvious single point at which to screen for which services would be helpful—the rest of this paper develops this idea further. Currently, when a worker experiences illness, injury, or onset of a temporary work disability, no comprehensive, coordinated<sup>4</sup> service delivery system exists to help the worker remain in the labor force and avoid developing a permanent work disability. Instead, workers who experience a medical condition that threatens their ability to work must navigate a range of systems with different goals and rules on their own (Ben-Shalom et al., 2017). All of these different systems represent possible places to identify workers at risk of exiting the labor force, and serving those workers.

### 1.2.1 Possible Touchpoints

The balance of this document considers several potential places to identify workers with a new injury or illness, or a change in condition, who are at risk of developing a work disability<sup>5</sup> and exiting the labor force. Here we list these “touchpoints” and clarify why they might be promising.

1. Workers with illnesses or injuries who separate from work may claim **unemployment insurance** due to “good cause” when they recover sufficiently to look for work, as shown below in section 3.1.1, and described in Lindner & Nichols, 2014. That is, though unemployment insurance benefits are designed to insure those who will return to work (and who report being willing and able to work), benefits are also paid to many individuals with severe health problems that may prevent work, and who might eventually apply for DI/SSI (and who report being unable to work). We measure the prevalence of unemployment insurance receipt.

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<sup>3</sup> The 2017 Trustees’ Report projected an exhaustion date of 2028 (SSA 2017b). The 2018 Trustees’ Report revised that projection to 2032, due to recent declines in DI awards (SSA 2018) and the 2019 Trustees Report revised projections even further, to 2052. The 2020 Trustees Report (SSA 2020) did not take into account the potential effects of the COVID-19 pandemic, which could be substantial (SSA 2020).

<sup>4</sup> In some states, the workers’ compensation system may be considered coordinated, but it affects only a small fraction of workers. A similar proviso applies to other systems.

<sup>5</sup> Here “work disability” is defined as an illness, injury, or medical condition that has the potential to inhibit or prevent continued employment or labor force participation; “federal disability benefits” refers specifically to the Social Security Disability Insurance and Supplemental Security Income programs. See <https://www.ssa.gov/disability/> for more information on SSDI and SSI.

2. If a medical condition occurs that is related to work, the worker is typically eligible for medical care and cash assistance through the state's **workers' compensation** program. With a work-related accident, they would contact their program provider. However, work-related medical conditions make up only a small share of all disabling conditions, so the coverage is narrower than for private disability insurance.<sup>6</sup>
3. Workers with illnesses or injuries who separate from work may claim **public assistance** benefits such as those from the Supplemental Nutrition Assistance Program (SNAP) or Temporary Assistance for Needy Families (TANF). We measure the prevalence of public assistance participation.
4. About 40 percent of workers have **private disability insurance**, either provided by their employers or purchased on their own (Ekman, 2015). With the onset of disability or injury, they would contact their insurance provider, even if the injury or illness were not work related.
5. Workers may seek assistance from employment services, workforce agencies or American Job Centers, state vocational rehabilitation programs, or other services to help them remain at work or to find new work that matches their current functional capacity. These agencies may refer workers to get training, so we measure the prevalence of **job training** or enrollment in educational institutions.
6. Workers may also turn to their private **health care** providers, who may or may not offer treatment intended to help the patient stay at work, or refer patients to additional services. We measure the prevalence of visits to doctors or hospitals in this document.

### 1.2.2 Hypotheses

From the literature and program review conducted previously for this project, we developed a conceptual map for SAW/RTW, reproduced here in Chapter 2 (Background). This diagram identified a need to measure the prevalence of various events in the months following illness or injury and work separation, then measuring return to work and DI or SSI receipt. Each worker navigates these pathways within his or her own economic/environmental context and influenced by his or her own household attributes.<sup>7</sup> For example, pathways towards DI application include:

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<sup>6</sup> O'Leary, et al., 2012 estimate that about 7 percent of new DI awards in the state of New Mexico over 1995-2000 resulted from workers' compensation-covered illnesses or injuries for which workers' compensation benefits were paid. O'Leary et al., 2012 were only able to generate this estimate for New Mexico, but New Mexico has the highest ratio of new workers' compensation claims to DI awards in the country, so we take this as an upper bound on the national fraction. Similarly, Bound, et al., 2003 show that a small fraction of DI and SSI applicants participate in any "temporary" benefit program, including workers' compensation and state temporary disability benefit programs (workers' compensation can provide permanent benefits but is classified as a temporary benefit program in that paper).

<sup>7</sup> The literature suggests that drivers of SSDI application include local economic conditions (Nichols, Schmidt, & Sevak, 2017), temporary disability and assistance program parameters (Lindner & Nichols, 2014), health conditions and limitations (Loprest, et al., 2009), household resources (Bound, et al., 2003), risk aversion and time preferences (Bound, et al., 2004), and past earnings and the generosity of benefits (Bound et al., 2004).

- Onset (or worsening) of an injury or illness that may lead to job separation or spur a worker to seek medical diagnoses or to apply for workers' compensation or private disability insurance benefits. Benefits will typically be claimed after earnings fall to zero, as workers cannot receive them and wage income at the same time (though they may still be employed).
- Job separation that may lead to unemployment insurance claims or application for public assistance (e.g., from SNAP).
- Medical diagnoses that may open the pathway to claiming private disability insurance payments and/or benefits from DI/SSI. Medical treatment is also a major part of this and other pathways. A diagnosis might lead to referrals to therapeutic services (including vocational rehabilitation) or employment services, including job training or formal schooling, if the worker seeks to enter a new occupation.

Because worker characteristics may also be used to target SAW/RTW services, we also estimate the influence of worker characteristics on outcomes. As Bound et al., 2003 show, take-up of temporary benefits is low among applicants for federal disability benefits, but even a low-prevalence participation pathway could be associated with later outcomes.

With regard to profiles of discrete target populations who might benefit from SAW/RTW programs, we hypothesize (for reasons discussed in Chapter 2) that groups with the greatest recent growth in applications and receipt of DI or SSI benefits constitute the bulk of marginal applicants. Based on our estimates, and publicly available data on DI awards nationally, we describe the size of these target populations in Section 3.2 (Population Profiles).

### 1.3 Purpose of the Report

This report describes the data analysis undertaken for the Stay-at-Work/Return-to-Work (SAW/RTW) Models and Strategies project:

- The report characterizes the prevalence of various pathways from work disability and job loss to application for federal disability benefits. These results constitute an **early intervention pathway map**.
- The report also characterizes the populations in those pathways, and in particular, characteristics associated with entry into the receiving federal disability benefits. These findings constitute **population profiles**.

In the next section, we describe the data and methods used to perform that data analysis.

### 1.4 Data and Methods

This section describes data and methods used to develop the early intervention pathway map. We also describe the methods specific to developing the population profiles.

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Expectations about screening and eventual acceptance probability also affect persistence in a further stage of application (Waidmann, et al., 2003).

### 1.4.1 Data Source

This document reports analyses of panels of the Survey of Income and Program Participation (SIPP). Each SIPP panel is nationally representative and allows researchers to track respondents every four months (each four-month period is called a “wave”) over a two- to four-year time period (each panel has a different length; each panel tracks a different set of individuals). Other longitudinal data sources, such as the National Longitudinal Surveys or the Panel Study of Income Dynamics, do not track outcomes at such short time intervals, which is crucial for understanding the potential for early intervention, and they would have even smaller sample sizes. We use the SIPP because the scope of the project does not allow for obtaining restricted access data, such as surveys matched to administrative datasets, which would allow us to construct a data set containing more detail about the timing of touch points and nature of services received.

The SIPP is well suited for studying the possible “touchpoints” on the pathway to DI or SSI listed in Section 1.2. The SIPP is nationally representative (when using analysis weights) and measures participation in a large number of programs. We use the 2001, 2004, and 2008 SIPP panels covering the period 2001-2013 to measure separation from work, subsequent program participation, and return to work or receipt of federal disability benefits. Data collected in each wave of the SIPP are known as “core” items, but some waves include Topical Modules that contain surveys fielded for special topics.<sup>8</sup>

We compare some of these statistics (specifically, the size of target populations by selected characteristics observable in the SIPP) to population size estimates from SSA (2017a), the [Annual Statistical Supplement](#). These population estimates are summarized in Chapter 2.

### 1.4.2 Sample

We limit our analysis to SIPP respondents who separate from a job for health reasons, and/or who report a disability, and who are not receiving DI at the time of job separation. We define job separation as positive earnings (defined as any earnings, including self-employment or earnings from a business) one month followed by zero earnings the next, and we measure these changes across waves only (the fourth reference month of one wave compared to the first month of the next wave).

Because we are interested in potential DI and adult nonelderly SSI applicants, the relevant sample from each SIPP panel is the number of individuals experiencing this change due to job separation who are aged 18 to 61 for a 20-month follow-up period following separation (and are thus aged 18 to 60 at separation). Because we examine only cases in which respondents separate from work and report that the reason for being out of work is a health condition or that a disability prevents work, the sample size is a small fraction of the overall panel (2 percent of the weighted sample for individuals aged 18 to 61). These relatively small sample sizes mean that many possible pathways are simply not observed.<sup>9</sup> We examine

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<sup>8</sup> For example, Medical Expenses/Utilization of Health Care is recorded in waves four, seven, and 10 of the 2008 SIPP, at the end of 2009, 2010, and 2011, respectively. Work Disability History is recorded in wave two and Functional Limitations and Disability in wave six of the 2008 SIPP. In the 2004 SIPP, Medical Expenses/Utilization of Health Care is recorded in waves three and six, Work Disability History is recorded in wave two, and Functional Limitations and Disability in wave five.

<sup>9</sup> We include data self-reported by the survey respondent but also proxy responses and imputed values. To the extent that variables measured in every wave should be affected by this more than those measured in a single

the nine most prevalent pathways. We also restrict our attention to wave two and later, because of changes in how SIPP measured disability from wave one to later waves (Wittenburg & Nelson, 2006).

Our final sample of individuals aged 18 to 60 who experience a work separation due to health and have 20 months of follow-up data is 2,432 individuals across three SIPP panels.

### 1.4.3 Literature and Document Review

Though the SIPP is a relatively detailed longitudinal dataset, it is likely that there are touchpoints on the pathway to DI application that are not observable in the data. To complete the data analysis, we reviewed material and findings from the evidence review and program synthesis tasks, conducted concurrently with this analysis. That literature review helped to illuminate the theories of action for those interventions. We also mention in this report touchpoints or experiences that appear to be influential in SAW/RTW models from Task 2, and we incorporate those findings into the pathways model.

### 1.4.4 Analysis Methods: Pathway Map

Ideally, we could observe and compute the rate at which people who report onset of a disability seek various types of information or services that influence their decision to apply for DI. For example, we would want to observe the timing and rate of doctor visits, occupational therapy visits, any point of contact with government services and supports such as state vocational rehabilitation or SNAP, initiation of private disability claims, etc.

#### Overview of Task 3.1: Early Intervention Pathway Map (Section 3.1 in Chapter 3)

- Identifies paths leading to application and entry into DI from the point of injury, illness, or work disability; and
- Describes critical touchpoints throughout the process, as well as key influencers and interventions at each touchpoint.

Not all of those activities are observable, but an important set of them are. Prior work (using instrumental variables to establish causal relationships) indicates that the receipt of benefits such as TANF or SNAP tends to increase the likelihood of applying for DI or SSI, whereas the receipt of unemployment insurance benefits tends to reduce that likelihood (Lindner & Nichols, 2014). Therefore, we track individuals following job separation for 16 months,<sup>10</sup> and measure participation in unemployment insurance, workers' compensation, private disability insurance, public assistance, job training, and health care utilization (primary care physician or hospital visits).

To summarize this information, we report the rate of various types of service receipt over time. We can use this information to inform choices of when and where best to reach and influence a high proportion of potential DI applicants. Outcomes include *return to work* or *receipt of DI or SSI*. We track types of service receipt for 16 months following separation from work, and then measure those outcomes in the period 17 to 20 months following job separation.

Limiting our attention to participation (or not) in the six programs from Section 1.2.1, we define a set of 64 potential pathways ( $2^6$ , for the six binary participation choices) of program participation after job exit. However, not all of these potential pathways are recorded in the data. To support stable inferences, we

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wave or subset of waves, we suspect the patterns we document should not change very much even with restrictions to self-reported data alone. The effects of measurement error could be an important point to address in future work on this topic.

<sup>10</sup> We use 16 months because this corresponds to four 4-month waves in the SIPP.

focus on the most prevalent pathways so that a sufficient number of individuals is observed in each one. We rank the pathways by prevalence, and discuss outcomes for the top nine pathways, but we show all the estimates in Exhibit 3-1.

For each of the nine selected pathways, we measure three possible outcomes at 16 months:

- Receipt of DI/SSI (with or without work at the same time),
- Return to work (but no receipt of DI/SSI), or
- Neither work nor receipt of DI/SSI.

If certain services or points of contact are associated with a higher likelihood of DI or SSI application, SAW/RTW interventions could potentially target providing those services or points of contact. To facilitate comparing across pathways, we estimate a regression of eventual receipt of federal disability benefits on types of participation in the intervening 16 months. This regression also facilitates adjusting for demographic factors, such as age, race, and educational attainment. We estimate these regressions both for the full set of 64 pathways, and for a set of 12 alternate pathways, limiting our attention to health care, utilization, private disability insurance, and public assistance, where we differentiate pathways by the timing of private disability insurance and public assistance receipt.

#### 1.4.5 Analysis Methods: Population Profiles

The target population profiles include information on the size of target populations, by age ranges, education levels, gender, geographic location, industry or occupation (or other information) of the type of job held at the time of injury or illness. In addition, we document types of injury, illness, or other disability and employment outcomes after an injury, illness, or other disability.

Each set of characteristics defines a dimension (or dimensions) along which we can tabulate the size of the population and disability rates in that category. For example, age categories differ due to cohort sizes and mortality, and each has very different disability and employment rates. Likewise, for different types of injury, illness, or other disability, population sizes differ dramatically but so too do the rates of employment and DI receipt.

One might conjecture that the populations of DI beneficiaries that are largest or that have increased most rapidly in recent years are promising target populations in which to intervene, as an intervention that has an impact on application rates will have an outsize impact on future increases to the disability rolls. As shown in Chapter 2, the prevalence of illness or injury types among DI beneficiaries is much higher for mood disorders and musculoskeletal conditions (these two are the only conditions in double digits and together make up 42 percent of all DI cases), and the prevalence of these disorders has grown in recent decades. Thus, one may infer that mood disorders and musculoskeletal conditions should be high

#### Overview of Task 3.2: Population Profiles (Section 3.2, Chapter 3)

- Complements the pathway map by defining profiles of discrete target populations who would benefit from SAW/RTW programs, interventions, and services.
- Goals of the population profiles are to
  - identify populations that plausibly could be induced by an intervention not to enter DI or SSI; and
  - describe the size of those populations.

priorities when examining interventions that promote return to work or staying at work, avoiding DI application, assuming interventions have similar effects across condition.<sup>11</sup>

Our approach to measuring the sizes of these “potential inflow” populations is to calculate the number of people separating from work due to a health condition, which is the sample for the pathway map analysis (Task 3.1), as well. For the Task 3.2 population profile tabulations, however, we are interested in the characteristics of this population in the wave prior to job separation, and the size of the relevant population by age, sex, race, education, geographic location, and industry or occupation. These characteristics describe the population at risk for the movement through the pathways described in Task 3.1, to either receipt of federal disability benefits or return to work.

### 1.5 Organization of this Report

The balance of this report is structured as follows. **Chapter 2** provides some policy background and context necessary for interpreting the results of our analysis. That context includes some summary statistics from past releases of the SSA [Annual Statistical Supplement](#). **Chapter 3** summarizes the findings of our data analysis, in two parts: Section 3.1/Early Intervention Pathway Map and Section 3.2/Population Profiles. We then compare these findings and draw conclusions in **Chapter 4**.

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<sup>11</sup> If interventions have very different effects by personal characteristics or by type of potential work disability, the population profiles and pathways here are less informative about optimal targeting of interventions. However, it is the product of intervention effects and population size that determines the optimal targeting, so both are important, and describing how intervention effects may differ is outside the scope of this paper.

## 2. Background

This chapter begins by presenting our conceptual framework. It then summarizes trends in DI and SSI that inform our analysis.

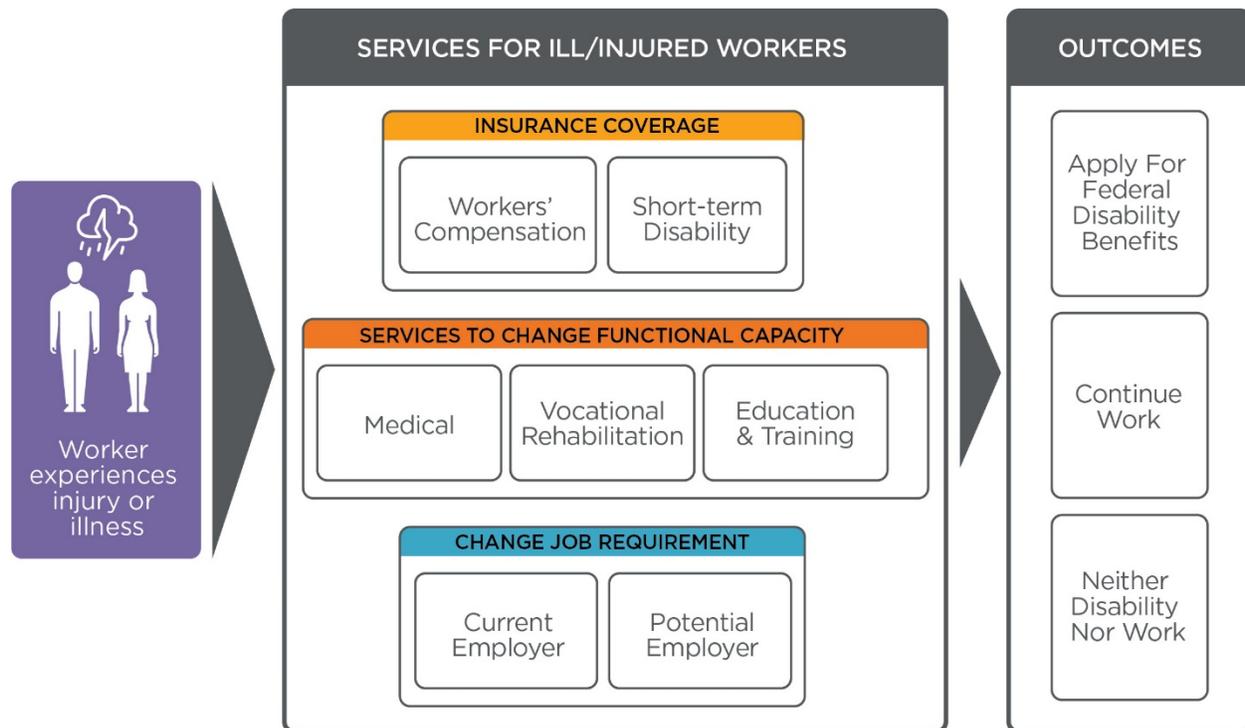
### 2.1 Conceptual Framework for SAW/RTW

The stylized map in Exhibit 2-1 identifies multiple and not mutually exclusive pathways from an injury or illness to either return to work or work disability. After an injury or illness, the worker might proceed along pathways including any or all of the touchpoints in the diagram, or none of these touchpoints, as we document below. The worker might:

- Directly seek certain services, including medical treatment or education and training (proceeding directly to one of the orange icons along the top, labeled “change functional capacity”).
- Enter a SAW/RTW program or activity (denoted by a burgundy-colored briefcase icon), recognizing participation in this program may lead to other services.
- Take up a benefit offered through coverage under workers’ compensation, unemployment insurance, or short-term disability insurance (denoted by a dollar sign icon). Seek a new type of work from an existing employer, or seek a new employer (blue icons along the bottom).
- Move between these services or activities over time, before eventually seeking disability benefits or returning to work (boxes on the far right of the diagram).

We have chosen a dataset that provides the largest set of participation measures in publicly available longitudinal data. However, though the data ask questions about participation in a broad variety of programs, the list is not exhaustive, but we are not aware of any data source that brings together all relevant forms of participation. Thus, due to limitations, we can measure worker participation in some possible interventions (unemployment insurance, workers’ compensation, private disability insurance, job training or education, public assistance, and/or health care utilization), but not others (e.g., state vocational rehabilitation, workforce services such as might be provided at an American Job Center, or most SAW/RTW programs described in the program synthesis).

Exhibit 2-1. A stylized map of the SAW/RTW concept



## 2.2 Statistical Profiles of DI/SSI

The past releases of the SSA [Annual Statistical Supplement](#) provide a wealth of information on beneficiaries, applicants, and awards in the federal disability program. We briefly summarize key trends and levels here.

An influential paper by Liebman, 2015 used the same data source to characterize changes in SSDI rolls due to increased eligibility among women and declining mortality among SSDI beneficiaries. Since the early 1990's,

Incidence rates among men, adjusted for the population age distribution and the business cycle, have been steady, while those for women have been gradually approaching those of men. In this period, population aging and increased eligibility among women account for two-thirds of the increase in DI benefit receipt, rising incidence among women accounts for one-quarter, and declining mortality rates account for one-sixth.

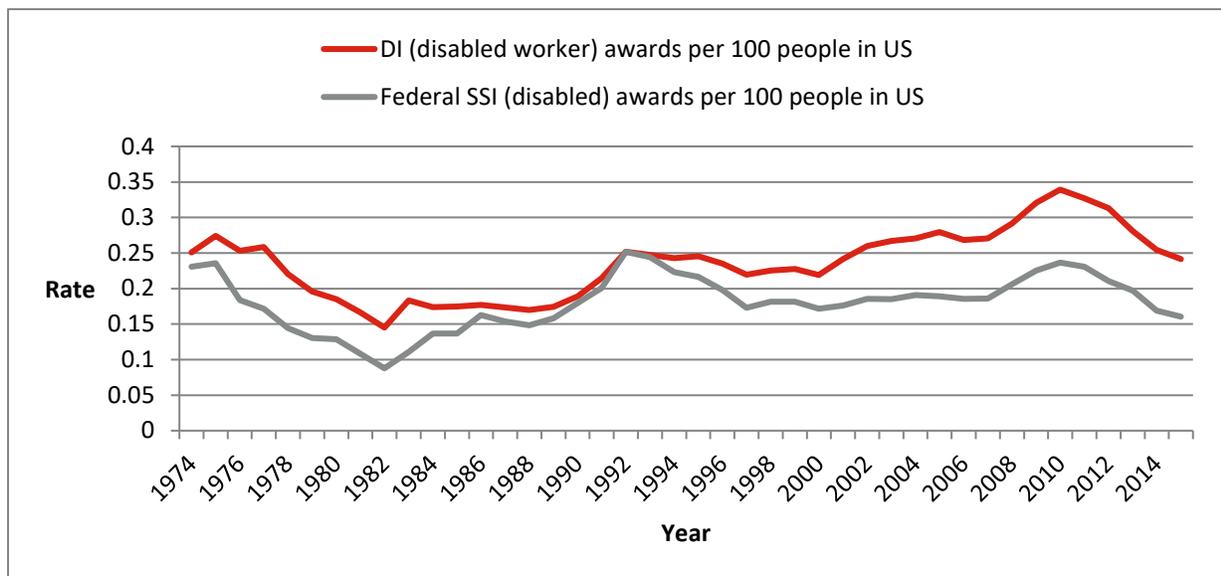
While adjusted incidence rates have mostly leveled off, there has been a change in the composition of DI recipients, with more recipients claiming benefits for hard-to-verify impairments and with the program playing an increasingly important role in providing income for low-skilled workers whose economic prospects have stagnated. Thus, the case for DI reform is not primarily a fiscal one—up until the 2007–2009 recession, spending on the program as a share of GDP had increased by only 0.13 percent of GDP over 30 years.” (Liebman, 2015, p. 124)

The decline in mortality of beneficiaries<sup>12</sup> arises from a shift in composition in the nature of impairments from high-mortality to low-mortality conditions and from improvements in medical technology. We examine these points below, examining new awards (the flow) rather than the disability rolls (the stock), since our focus in this project is on interventions designed to stem the tide of new awards.

### 2.2.1 Number of Awards

Awards as a fraction of the total population rose substantially from 1982 to 1992, but have been relatively stable since 1992. Award rates have been declining since 2010 (after the Great Recession). A series of administrative changes and court decisions, together with macroeconomic trends, have changed application and award rates as described by Kearney, 2005. The change in the number of awards per person in the United States over time encompasses a dramatic fall from 1974 to 1982, followed by a rise from 1982 to 1992. After 1992, there was a gradual rise in DI “disabled worker” (distinguished from survivor or spouse) awards per population and a gradual fall in SSI “disabled” (as distinct from elderly or children) awards, but the overall award rates are remarkably steady over time at two or two and half awards per thousand people, as shown in Exhibit 2-2 below.

**Exhibit 2-2. Federal disability benefit awards to workers, per population**



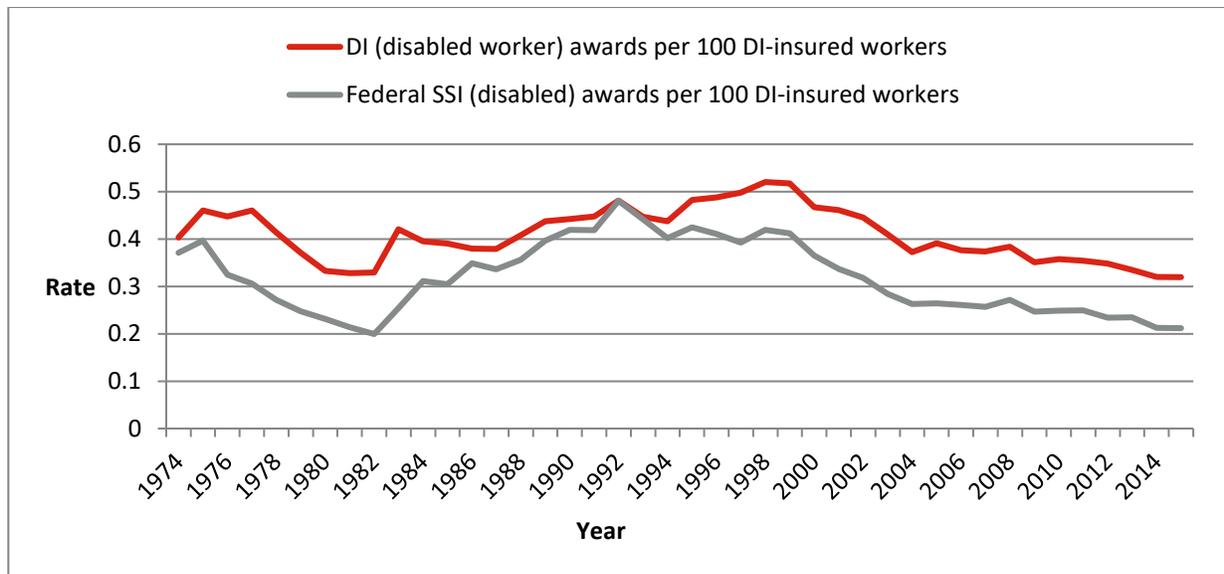
Source: Authors’ analysis of Social Security Administration (2018) and Census Population Estimates.

The previous discussion was in terms of awards per person. Considering awards per worker suggests a different trend. Over this period, the labor force grew—both with the working age population and with increases in work among women. Exhibit 2-3 divides awards instead by the number of DI-insured workers, a useful measure of the size of the labor force (and potential applicant pool for federal disability benefits). Trends are similar through 1992. Thereafter, there is a modest increase in award rates 1992-1999 (an increase that was not present in Exhibit 2-2). However, after 1999, awards for both DI and SSI

<sup>12</sup> Terminations from DI fell from about 15 percent per year in the pre-1984 period to about 7 percent per year in the 1998-2015 period. In 2015, some 57 percent of terminations were conversions from DI to old age benefits at the full retirement age, and 32 percent were due to the death of the beneficiary. Only 10 percent of terminations were due to no longer meeting the medical standard for DI eligibility.

fall. DI awards fall from more than five awards per thousand insured workers to slightly more than three per thousand; SSI awards fall from roughly four to two awards per thousand insured workers per year.

### Exhibit 2-3. Federal disability benefit awards to workers, per 100 DI-insured workers

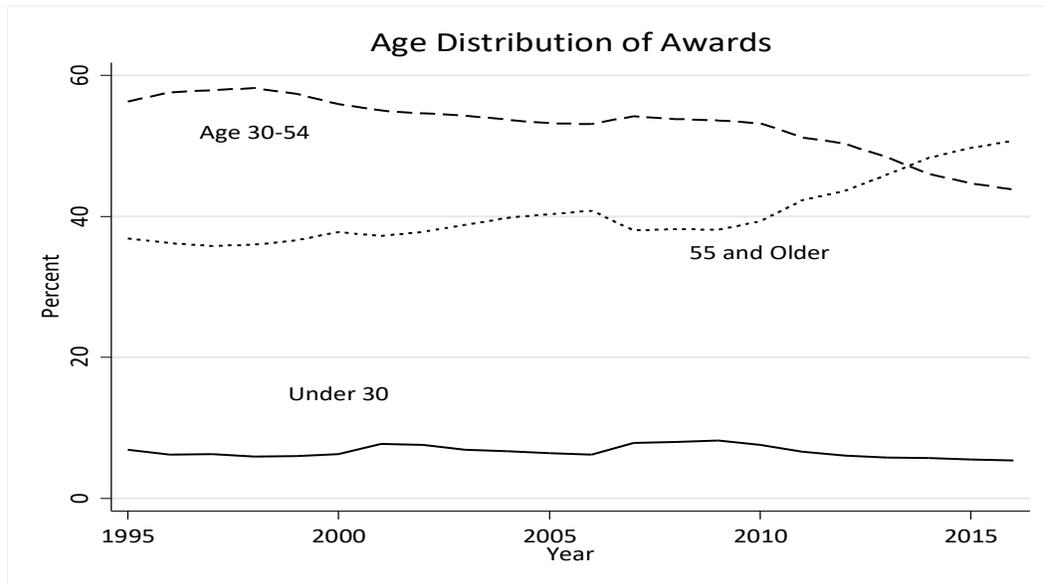


Source: Authors' analysis of Social Security Administration (2018).

DI beneficiaries exit the program for four main reasons: (1) death, (2) transfer to the retirement program at full retirement age, (3) medical recovery, or (4) sustained earnings that exceed the substantial gainful activity level (\$1,180 per month in 2018 for non-blind beneficiaries; \$1,970 per month for blind beneficiaries). Because awards are stable or falling over the last two decades, the increase in the rolls must be due to decreased exit from the rolls. Such a decrease could be due to younger workers entering (with inherently lower mortality) or compositional shifts in disability type. We examine these two explanations in turn, in the next two sections.

#### 2.2.2 Awards by Age

There is a common perception that DI applicants have gotten younger over time. As Liebman, 2015 pointed out, "Some observers have cited a shift in the age composition of the disability beneficiary population toward younger ages as evidence that disability determination standards have become more lenient, [though] as the baby boomers moved through their life cycle, they...mechanically increased the share of younger workers claiming disability benefits" (p. 143). However, as Exhibit 2-4 makes clear, the fraction of awards made to workers under age 55 has actually been falling over time, whereas the fraction of awards to older workers has increased sharply since 2009. Because mortality and benefit terminations due to age (conversion of DI benefits to retirement benefits at the full retirement age) are higher in the older population, this tends to push up exit rates from DI.

**Exhibit 2-4. DI awards to “disabled workers,” percentage in broad age categories**

Source: Authors' analysis of Social Security Administration (2018).

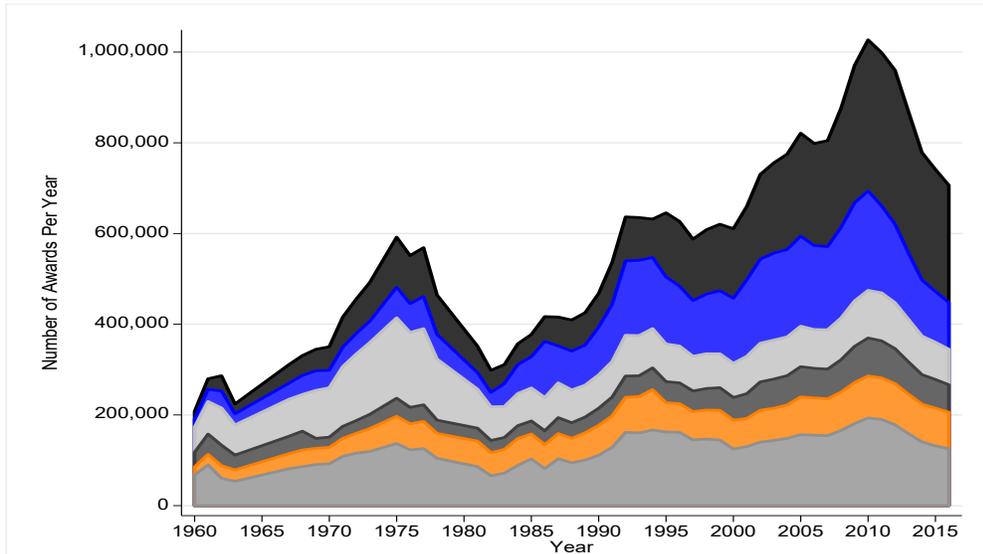
### 2.2.3 Awards by Type of Disability

Liebman asserts that there are “more recipients claiming benefits for hard-to-verify impairments” (2015, p. 124). For insight into types of impairments, we turn to the Annual Statistical Reports on the Social Security Disability Insurance Program. As Exhibit 2-5 demonstrates, the major shifts in patterns of award since 1992 have been in mental health and musculoskeletal conditions. DI and SSI award patterns are similar (see Appendix A), but data are more readily available for this long time span for DI awards only.

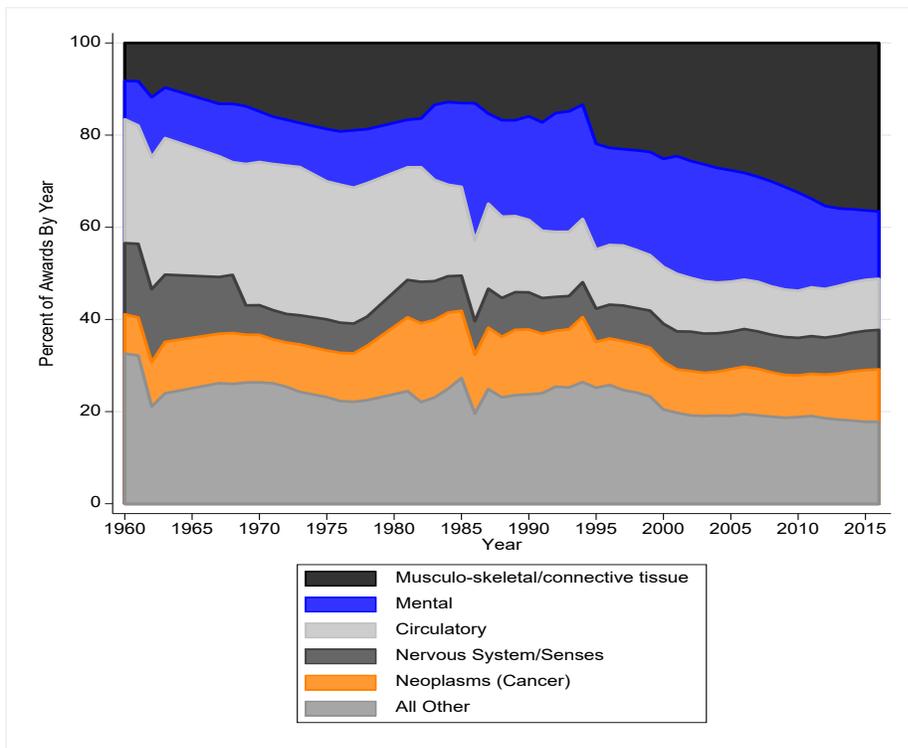
Mental health awards increased rapidly from 1983 to 2001, rising from 10 percent to 25 percent of all new DI awards to “disabled workers,” then fell after 2001, and are now less than 15 percent of awards. Mental health conditions are dominated by mood disorders such as depression or bipolar disorder (see Appendix A). Musculoskeletal and connective tissue disorders constituted 10 to 20 percent of awards until 1993, then underwent a dramatic increase, rising to at least 35 percent of awards in every year since 2011. Low back pain is a large source of musculoskeletal awards.

Crucially for this project, the evidence review we conducted previously (Nichols et al., 2020) suggests some labor force exits due to this cause may be preventable by a Stay-at-Work/Return-to-Work program.

**Exhibit 2-5a. Number of DI awards to “disabled workers,” by condition, 1960-2016**



**Exhibit 2-5b. Percentage of DI awards to “disabled workers,” by condition, 1960-2016**



Source: Authors' analysis of Social Security Administration (2018).

## 2.2.4 Contextual Information on Awards by Type of Disability and Age

The objective of this study is to identify evaluation design options to build evidence about strategies that encourage labor force attachment among workers with illness and injury. Therefore, a key open question is whether some of these disability awards represent applicants who might have avoided DI/SSI if they had been served by a SAW/RTW program. In what follows, we refer to this group as “marginal awardees”—because a substantial fraction of them *might* have remained in the labor force. As we discuss below, there has been a persistent concern that federal disability benefits draw workers out of the labor force who might have remained at work in the absence of the programs. As Liebman, 2015 suggests, this pull could be especially strong for lower-income workers (with higher earnings replacement rates) and at older ages (when leaving the labor force means fewer years of earnings foregone).

Prior work by Bound, 1989<sup>13</sup> attempted to estimate the work disincentives of such benefits by considering marginal awardees (i.e., those who could have remained in the labor force), by comparing allowed and rejected applicants for federal disability benefits. The motivation for these analyses is that rejected applicants tend to be in better health than those allowed benefits, so their labor force participation and earnings are greater than for applicants allowed benefits. This implies that a comparison of allowed and denied applicants constitutes an “upper bound” on the effect of benefits on labor force participation and earnings. Bound, 1989 and others using the same method find that no more than a third of workers awarded benefits would have worked had they been denied benefits, suggesting up to a third of applications might be “marginal awardees.”

Bound et al., 2003 updated this work using more recent data (SIPP survey data matched to administrative data from 1984–2001). A recent paper by von Wachter, Song, and Manchester (2011) updates the analyses of Bound, 1989 and Bound et al., 2003 to newer cohorts and more recent data (SSA administrative data on DI application and receipt from 1981–1999, and administrative data on earnings before and after DI application for the period 1978–2006.). The paper compares younger and older applicants, to measure whether the impact of DI on employment and earnings has changed in recent years (comparing applicants in two time periods, 1982–1987 and 1992–1997). The findings suggest a reduction in employment of roughly 20 percentage points among workers aged 45 or older at application who have a musculoskeletal or mental health condition, but a reduction in employment of roughly 30 percentage points among workers aged 30–44 at application.

The paper first replicates Bound, 1989 using male applicants aged 45–64 in 1982. Two years after application, only 40.4 percent of rejected applicants have any positive earnings, and only 32 percent of rejected applicants have earnings greater than one quarter of full-time earnings at the 2000 minimum wage, compared to 70 percent of non-applicants. In 1997, some 52.6 percent of rejected applicants have any positive earnings, reflecting a change in the composition of DI applicants over time. However, the mean earnings of these rejected applicants was \$6,672 in 1982 and \$7,639 in 1997, and the median of positive earnings only was \$10,000 in both time periods, indicating comparable residual work capacity.

In contrast, among men aged 30–44 at the beginning of their application year, 59.8 percent worked at two years after application in the 1982 cohort, and 69.6 percent in the 1997 cohort. Average annual earnings among rejected applicants were \$10,393 in 1982 and \$8,440 in 1997; median positive annual earnings

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<sup>13</sup> Bound, 1989 uses the 1972 Survey of Disabled and Non-Disabled Adults and 1978 Survey of Disability and Work; others have updated this analysis using other data sources, as described here.

were \$10,000 in 1982 and \$8,000 in 1997. However, younger allowed applicants had higher employment and earnings, so that the differential in participation is about 30 percentage points in both groups. The low earnings among both older and younger rejected applicants who return to the labor force indicate that earnings losses associated with disability award are substantial when compared to similar non-applicants.

We observe a gradual increase in earnings among younger applicants both among those awarded DI and those rejected; the two trajectories track quite closely (von Wachter et al., 2011, Figure 3, p. 3317). The data show no such increase among older applicants. The apparent impact is also broadly similar across impairment groups (von Wachter et al., 2011, Table 2, p. 3319; reproduced below as Exhibit 2-6). von Wachter and colleagues extend their results by matching applicants on characteristics using nearest-neighbor matching, and conclude that “the robustness of the changes in employment and earnings before and after application to controlling for differences in core characteristics is quite striking and leads us to believe that counterfactual employment rates based on rejected applicants are informative” (2011, p.3322). That is, because various methods of controlling for selection do not appreciably change the findings, it is plausible that the observed employment and earnings of rejected applicants represent the employment and earnings the DI awardees would have, approximately, if they were not awarded DI.

**Exhibit 2-6. Earnings and employment of rejected and allowed DI applicants, by condition (impairment) and age, males only**

		Musculoskeletal	Circulatory	Mental Disorders	Respiratory	Neoplasms (Cancer)	Infectious Diseases	Injuries
<b>Men aged 45–64 at beginning of application year</b>								
Positive covered earnings 4 years prior to application (%)	All new beneficiaries	91.7	91.4	90.8	90.7	90.6	933	90.6
	Rejected applicants	81.9	81.7	81.8	78.2	82.8	85.0	81.3
Positive covered earnings 2 years after application (%)	All new beneficiaries	19.4	18.5	21.5	14.7	8.5	16.8	20.3
	Rejected applicants	43.9	41.4	44.1	30.2	37.2	41.5	51.7
Earning above minimum 2 years after application (%)	All new beneficiaries	11.7	11.8	13.2	7.7	5.2	10.6	12.8
	Rejected applicants	34.0	34.5	33.7	21.1	30.9	30.9	41.3
Average annual earnings 2 years after application (\$)	All new beneficiaries	1,657	2,097	2,199	2,743	3,446	3,812	4,409
	Rejected applicants	8,475	10,005	7,521	7,881	9,868	9,351	10,003
Median positive annual earnings 2 years after application (\$)	All new beneficiaries	11,142	11,030	7,327	3,228	6,820	597	2,179
	Rejected applicants	2,847	2,042	1,432	450	408	100	754
<b>Men aged 30–44 at beginning of application year</b>								
Positive covered earnings 4 years prior to application (%)	All new beneficiaries	91.3	90.9	89.4	87.7	90.9	92.0	90.5
	Rejected applicants	87.2	86.5	83.8	84.6	84.5	82.3	86.9
Positive covered earnings 2 years after application (%)	All new beneficiaries	25.5	24.8	27.6	20.7	13.3	18.6	28.2
	Rejected applicants	59.0	53.0	59.4	48.9	63.5	49.8	65.2
Earning above minimum 2 years after application (%)	All new beneficiaries	17.5	15.7	15.8	12.7	9.5	11.5	20.0
	Rejected applicants	47.4	45.3	44.4	36.9	56.3	40.1	54.1
Average annual earnings 2 years after application (%)	All new beneficiaries	2,832	2,642	2,471	1,756	2,506	1,675	3,288
	Rejected applicants	8,725	8,351	7,077	5,012	15,655	5,796	9,761
Median positive annual earnings 2 years after application (%)	All new beneficiaries	5,339	3,853	3,104	4,963	6,845	3,937	6,132
	Rejected applicants	6,119	1,184	3,913	402	219	334	2,396

Source: von Wachter, et al., 2011, p. 3319.

The authors point out (on p. 3318) that younger and older workers *should* exhibit different patterns for a variety of economic reasons:

“Younger rejected applicants may be healthier than their older counterparts, and they may face stronger incentives to return to the labor force. For example, they have fewer options to replace lost income than older workers, an important fraction of whom can draw on pension benefits (Bound, et al., 2003). Younger rejected applicants also benefit from reentry to the labor force over a longer period of time. They are likely to face smaller losses in occupation, industry, or firm-specific human capital, and also benefit more from reinvesting in specific human capital...”

The difficulty in interpreting this kind of evidence arises because there are both income and substitution effects embedded in DI rules. That is, someone awarded benefits has less need to work (an income effect) because they have another source of income, and the price of work rises (a substitution effect) when there is a risk that working could be used as evidence of medical recovery and lead to benefit termination. Benefit termination is rare, but DI beneficiaries do not seem to realize how rare. If income fell by about three-fourths on average after DI award (as with the reduction to \$1,657 from \$6,283 among older workers with musculoskeletal conditions in Exhibit 2-4), either a 0 or 10 percent income effect would indicate a large role for substitution effects, also known as moral hazard. To the extent that substitution effects are large, the cost to society (deadweight loss) could be substantial. However, there are costs to society even from the pure transfers inherent in income effects, because of the excess burden of taxation.

Generally, the earnings of rejected DI applicants do not indicate that income and substitution effects are large. Chen & van der Klaauw, 2008 estimate that the work disincentive effects associated with DI benefit receipt during the 1990’s were modest, and that the participation rate of DI beneficiaries would have been between 19 and 32 percentage points higher had they not received benefits. French and Song (2014) found a reduction of 27 percentage points in labor force participation, whereas Bound, 1989 found a reduction of 34 percentage points, and Maestas, et al., 2013 found a 35 percentage point reduction.

Lammers, et al, 2013, de Jong, et al., 2011, and Borghans, et al., 2014 examine Dutch disability programs; Gruber (2000 and Campolieti & Riddell, 2012 examine the Canadian disability program; Staubli, 2011 the Austrian program; Karlström, et al., 2008 the program in Sweden; and Kostol & Mogstad, 2014 the Norwegian program. These international findings are broadly consistent with the U.S. evidence.

The most recent U.S. evidence comes from Mullen & Rennane, 2017, which shows a negligibly small income effect among workers’ compensation beneficiaries (a statistical zero, with a point estimate under 1 percentage point, when measured across years); and Gelber, et al., 2017, which shows income effects on the order of 10 percent at the second bend point (in 2018, \$64,764 in annual earnings) among DI beneficiaries. The observed sum of income and substitution effects may be divided quite differently across these two populations, so these findings are not necessarily contradictory.

In general, looking across the literature on income and substitution effects, there seems to be some role for both effects. The most striking finding from von Wachter, et al., 2011 is how similar the reductions in employment and earnings are across disability types and across ages. This suggests that a similar percentage of “marginal awardees” may exist for each condition. However, even if this is true, a much larger number of “marginal awardees” would be observed in the largest categories, meaning mental illness and musculoskeletal conditions, with circulatory system conditions a close second. However, we

note that these estimates are most relevant to a period including the late 1990's during a strong labor market, and a total number of new SSDI awards stable at about 600,000 a year (Exhibit 2.5a), so a newer update of these estimates would be helpful.

These findings are important for understanding the population size estimates discussed towards the end of the next chapter. If marginal awardees are roughly equally prevalent in numerous categories of conditions causing disability, then the relevant information for targeting a particular condition for an intervention is only how responsive the marginal awardees are to the intervention. As discussed in the review of evidence conducted as part of Task 2 for this project, we find limited evidence on how responsiveness varies and how large the relevant population is. In the absence of information about the size of the marginal awardee population, the size of the total population can be taken as indicative of the relative size of the relevant population.

- **Much of the evidence here indicates that the propensity to be a marginal DI applicant—that is, to seek DI when one might also have remained in the labor force—is similar across groups.**
- **However, the size of these groups varies dramatically.**

These two facts taken together suggest that the largest (or most quickly growing) categories of workers applying for DI benefits represent prime targets for intervention. The data in the next chapter represents about two and half million people exiting work with a health condition, measured at a variety of points in the last two decades, with about a quarter going on to receive federal disability benefits, which is broadly consistent with the additions to caseloads described in this chapter, as one would expect from comparing two nationally representative data sources.

### 3. Early Intervention Pathway Map and Target Population Profiles

This chapter presents the result of our analysis of a nationally representative data source (the SIPP) using the methods outlined in Chapter 1.

#### 3.1 Pathway Maps

Exhibits 3-1 to 3-7 present the patterns of participation across the six touchpoints from Chapter 1— (1) unemployment insurance, (2) worker’s compensation, (3) public assistance, (4) private disability insurance, (5) job training, and (6) health care, respectively—in the months following a job separation for health reasons (or with a preexisting condition that limits work). In each case, participation in the 16 months following separation from work is summarized per wave (four-month period), at four points in time in each of the three SIPP panels examined (2001, 2004, and 2008).

- **We find that participation in unemployment insurance, workers’ compensation, public assistance, private disability, and job training are all quite low, but health care utilization is very high.**

After discussing these findings, we turn to measuring outcomes for each.

**Exhibit 3-1. Participation rates of each touchpoint, by wave following job separation**

SIPP panel	Wave following job separation	Unemployment insurance (%)	Workers’ compensation (%)	Private disability insurance (%)	Public assistance (%)	Job training or education (%)	Health care <sup>a</sup> (%)
2001	1	7.9	9.4	9.3	14.6	8.1	85.3
2001	2	7.1	7.2	5.4	12.1	10.3	82.2
2001	3	5.4	7.5	4.3	14.5	9.6	83.9
2001	4	2.8	6.4	3.1	13.1	7.5	80.9
2004	1	8.3	7.3	4.2	15.2	1.6	84.4
2004	2	5.5	7.0	3.0	17.5	1.3	91.4
2004	3	2.1	6.0	2.1	17.5	0.9	86.9
2004	4	2.0	5.4	2.6	16.9	0.8	82.5
2008	1	18.4	6.6	6.1	19.3	1.1	84.1
2008	2	18.8	6.0	5.3	20.5	1.5	81.7
2008	3	15.7	4.2	5.4	21.8	1.2	79.1
2008	4	12.8	3.5	5.6	21.9	1.0	81.9

<sup>a</sup> Utilization rate.

Source: Authors’ analysis of SIPP data, 2001-2013.

### 3.1.1 Unemployment Insurance

Somewhat surprisingly, participation in unemployment insurance is extremely low (2 to 19 percent) in the four waves (16 months) following separation from work, relative to typical unemployment insurance receipt following separation even in the ongoing jobs recession of 2010 (Nichols & Simms, 2012). As shown in Exhibit 3-1, in all SIPP panels, in all waves, participation is less than 20 percent. There is a notable difference across panels, with 2001 and 2004 showing participation of less than 10 percent and 2008 closer to 20 percent; this is plausibly due to the increased prevalence of layoffs in the Great Recession and greater availability of unemployment insurance benefits.

Unemployment insurance modernization extended unemployment insurance benefits to workers who quit for health reasons in many states (Callan, et al., 2015). However, given good cause rules,<sup>14</sup> it may be that many people who separate from work cannot supply the needed documentation that they could not work and then that they are later able and willing to work. Further, not every state offers such good cause exceptions allowing quits for health reasons. A substantial fraction of workers participating in unemployment insurance may simply have had the misfortune of developing a health condition in a year when they were also laid off.

### 3.1.2 Workers' Compensation

Exhibit 3-1 also presents the patterns of participation in workers' compensation in the 16 months following separation from work (note that we define "separation from work" as earnings dropping to zero, but individuals may still be employed and receiving workers' compensation benefits instead of earnings). Workers' compensation applies only to work-related injuries and illnesses, and in many cases it will resolve either in a return to the same employer or to a permanent disability claim; there may be fewer "marginal" cases in this population. This rate is less than 10 percent in every wave (3 to 9 percent), which is not surprising given our earlier discussion of workers' compensation.<sup>15</sup> There is also no substantial difference in patterns across SIPP panels.

### 3.1.3 Public Assistance

Exhibit 3-1 presents the patterns of participation in public assistance in the 16 months following separation from work. This rate is roughly 15 to 20 percent in every wave, but has increased from earlier SIPP panels to later panels, due largely to the expansion of SNAP participation (Nichols & Zedlewski, 2011).

### 3.1.4 Private Disability Insurance

Exhibit 3-1 presents the patterns of participation in private disability insurance in the 16 months following separation from work. This rate is less than 10 percent in every wave (2 to 9 percent) and every SIPP panel.

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<sup>14</sup> Good cause provisions extend unemployment insurance benefits to workers who would not otherwise have been eligible but can show "good cause" for leaving employment; for example, due to escaping domestic violence or inability to work due to a health condition. These rules vary by state, but typically require additional documentation.

<sup>15</sup> See the earlier footnote that describes how O'Leary et al., 2012 and Bound et al., 2003 show low prevalence of workers' compensation participation among DI and SSI applicants.

### 3.1.5 Job Training

Exhibit 3-1 presents the patterns of participation in job training in the 16 months following separation from work. This rate is about 10 percent in every wave of the 2001 SIPP, and lower in subsequent SIPP panels.

### 3.1.6 Health Care

Exhibit 3-1 presents the patterns of measured participation in health care in the 16 months following separation from work. Because the question about visiting a doctor or hospital refers to the past year, rather than the past month or past four months, there is some indeterminacy on timing. However, if the four-month rate were 10 percent and participation were completely independent, the annual rate would be only 27 percent.

If the health care utilization pattern were similar to other types of participation, we would expect to see a rate under 30 percent. Instead, the health care utilization rate is in the range of 80 to 90 percent in every wave of the SIPP, in each of the SIPP panels. Evidently, virtually everyone who separates from work due to health reasons visits a doctor or a hospital in the year afterward.

### 3.1.7 Combined Participation Patterns

Exhibit 3-2 presents prevalence and outcomes for each of the patterns of participation in unemployment insurance, workers' compensation, public assistance, private disability insurance, job training, and health care in any of the 16 months following separation from work, across all three SIPP panels examined (2001, 2004, and 2008). The first column, labeled "Percentage in This Pathway," shows the fraction of workers separating from a job with the specified participation pattern. For example, 36.61 percent of people have a Yes in the "Health Care" column (meaning, some contact with doctors or hospitals), but no participation in unemployment insurance, workers' compensation, public assistance, private disability insurance, or job training (all No in those columns). This is the most common participation pattern. Other participation patterns are listed in order of decreasing prevalence.

In that most common participation pattern pathway, 18.49 percent of workers wind up receiving DI or SSI in months 17–20 (fifth wave after separating from work), and 51.28 percent have positive earnings; 30.23 percent are neither on DI/SSI nor working. Some of those reporting neither DI/SSI nor earnings will eventually wind up on disability benefits; some will return to work; some will remain in neither category until they retire and begin drawing Social Security old-age benefits. That is, the group reporting neither DI/SSI nor earnings is right-censored,<sup>16</sup> and we do not know what path they follow after month 20.

In virtually all of the pathways observed in the data with any substantial numbers of workers, some health care contact is recorded. The exception is workers who participate in none of the six touchpoints, which is 10.62 percent of people separating from work. Of these, a very small fraction are later on DI/SSI (4.87 percent) relative to other common pathways, an even lower fraction than the 1.81 percent of workers on the pathway involving participation only in unemployment insurance (of whom 11.88 percent wind up on DI/SSI in months 17–20).

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<sup>16</sup> An outcome is right-censored when we know only that an event has not occurred by some date, so we can say that the time to an event is at least as long as the last observed date. In this case, we know that the person has not started receiving benefits or returned to work yet by the end of month 20, but not which outcome may happen first at some future date.

## Early Intervention Pathway Map and Target Population Profiles

The top nine pathways (shaded in Exhibit 3-2) together account for nearly 85 percent of workers separating from work for health reasons, and all but two of the pathways involve health care utilization. The top pathway is health care alone, but also in the top nine are health care plus public assistance (12.41 percent), health care plus unemployment insurance (7.51 percent), health care plus workers' compensation (5.27 percent), health care plus private disability insurance (4.67 percent), and health care plus job training (2.19 percent). The top pathway involving no health care has no participation measured across all types (10.62 percent), but the second (2.88 percent) involves only public assistance participation.

We created an interactive data visualization tool—called the **Pathway Dashboard**—to display the results shown in Exhibit 3-2. Readers who would like to explore the combinations of pathways and outcomes in greater detail can find the tool at <https://www.dol.gov/agencies/odep/topics/saw-rtw/intervention-pathways>. Appendix D to this report provides a guide to using the **Pathway Dashboard**.

All pathways involving health care add up to 80 percent of workers, over all pathways. Those, together with the pathways with no participation and with only public assistance participation, account for 93.4 percent of workers.

**Exhibit 3-2. SIPP 2001-2013 pathways in the 16 months following separation from work**

Percentage of workers in this pathway	Unemployment insurance	Workers' compensation	Public assistance	Private disability insurance	Job training	Health care	Fraction with DI/SSI in months 17–20	Fraction with earnings in months 17–20	Fraction with neither
36.61%	No	No	No	No	No	Yes	18%	51%	30%
12.41%	No	No	Yes	No	No	Yes	29%	39%	31%
10.62%	No	No	No	No	No	No	5%	57%	38%
7.51%	Yes	No	No	No	No	Yes	13%	63%	23%
5.27%	No	Yes	No	No	No	Yes	17%	36%	47%
4.67%	No	No	No	Yes	No	Yes	39%	26%	35%
2.88%	No	No	Yes	No	No	No	20%	32%	47%
2.44%	Yes	No	Yes	No	No	Yes	28%	45%	27%
2.19%	No	No	No	No	Yes	Yes	5%	79%	16%
1.81%	Yes	No	No	No	No	No	12%	63%	25%
1.28%	No	No	Yes	No	Yes	Yes	11%	61%	29%
1.23%	No	No	Yes	Yes	No	Yes	47%	25%	28%
1.09%	No	Yes	Yes	No	No	Yes	20%	27%	52%
1.08%	No	No	No	No	Yes	No	10%	76%	15%
1.01%	No	Yes	No	Yes	No	Yes	48%	34%	18%
1.01%	Yes	No	No	No	Yes	Yes	10%	75%	15%
0.97%	No	Yes	No	No	No	No	20%	36%	44%
0.75%	Yes	Yes	No	No	No	Yes	20%	62%	18%
0.71%	Yes	No	Yes	No	No	No	12%	77%	10%

## Early Intervention Pathway Map and Target Population Profiles

Percentage of workers in this pathway	Unemployment insurance	Workers' compensation	Public assistance	Private disability insurance	Job training	Health care	Fraction with DI/SSI in months 17-20	Fraction with earnings in months 17-20	Fraction with neither
0.58%	No	No	No	Yes	Yes	Yes	0%	78%	22%
0.49%	No	No	No	Yes	No	No	31%	5%	64%
0.38%	Yes	No	Yes	No	Yes	Yes	16%	70%	14%
0.36%	Yes	No	No	Yes	No	Yes	53%	31%	16%
0.31%	No	Yes	No	No	Yes	Yes	0%	26%	74%
0.30%	Yes	No	No	Yes	Yes	Yes	17%	60%	23%
0.25%	No	No	Yes	No	Yes	No	0%	87%	13%
0.22%	Yes	No	Yes	Yes	No	Yes	21%	79%	0%
0.22%	Yes	Yes	Yes	No	No	Yes	3%	62%	35%
0.17%	No	Yes	Yes	No	No	No	0%	67%	33%
0.14%	Yes	Yes	No	No	No	No	0%	50%	50%
0.14%	Yes	No	No	No	Yes	No	0%	67%	33%
0.11%	No	Yes	No	No	Yes	No	0%	50%	50%
0.10%	No	No	Yes	Yes	No	No	26%	0%	74%
0.10%	Yes	Yes	Yes	No	No	No	0%	50%	50%
0.09%	Yes	No	Yes	No	Yes	No	25%	75%	0%
0.08%	No	Yes	Yes	No	Yes	No	0%	100%	0%
0.07%	No	Yes	Yes	Yes	No	No	0%	0%	100%
0.06%	Yes	No	No	Yes	No	No	45%	55%	0%
0.04%	Yes	Yes	No	Yes	No	No	0%	100%	0%
0.04%	Yes	No	Yes	Yes	Yes	Yes	0%	0%	100%
0.03%	Yes	Yes	No	Yes	No	Yes	100%	0%	0%
0.03%	No	Yes	No	Yes	No	No	0%	59%	41%
0.03%	Yes	No	Yes	Yes	No	No	0%	0%	100%

Source: Authors' analysis of SIPP data, 2001-2013.

Turning to outcomes, for each pathway, we measure the proportion of workers who reach one of three “end” states: (1) receiving DI or SSI and not working, (2) working, or (3) neither. In our discussion, we focus on the top nine pathways, with more than 2 percent of the population each (which supports better estimates of outcomes). The fraction winding up on DI/SSI ranges from a low of 5 percent (with no touchpoints at all or with participation in job training and health care) to a first-place high of 39 percent for those with participation in private disability insurance and health care. Second place is taken by the pathway with public assistance and health care, with 29 percent of workers later on DI/SSI. This is close to the outcome for the pathway involving unemployment insurance, public assistance, and health care (28 percent).

## Early Intervention Pathway Map and Target Population Profiles

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Looking beyond the top nine pathways, the 1.23 percent of workers participating in public assistance, private disability insurance, and health care have a 47 percent chance of receiving DI/SSI benefits 17-20 months after separation from work. The 1.01 percent of workers participating in workers' compensation, private disability insurance, and health care have a 48 percent chance of receiving DI/SSI benefits 17-20 months after separation from work.

- **In general, looking across pathways, those with public assistance, private disability insurance, and health care seem to have elevated risk of later DI/SSI benefit receipt.**

We also estimated multiple regressions predicting DI or SSI receipt in months 17–20 after work separation due to health. Appendix B reports the full set of results. The regressions similarly indicate that public assistance participation, receipt of private disability benefits, and health care utilization are all strongly associated with higher risks of eventual receipt of DI or SSI, though this relationship may not be causal.

To examine the influence of timing, for this analysis we limit our attention to only three touchpoints: 1) public assistance, 2) private disability insurance, and 3) health care visits. In the SIPP data, we can classify pathways by whether individuals begin receiving public assistance or private disability first (or both at the same time), but health care is not measured monthly, so its relative timing cannot be pinned down. In Exhibit B-2 in Appendix B, we report a regression for the 12 possible pathways for these three touchpoints, reporting 10 coefficients for comparison to the no-touchpoint pathway. (The hypothetical 12th pathway of no health care visit, and private disability starts the same month as public assistance, is never observed in the data, so we have only 11 groups.)

We find that five of the six pathways that involve health care are associated with substantially and statistically significantly higher rates of federal disability benefit receipt 17–20 months after separation from work relative to the pathway that involves none of the three. The only pathway with lower rates of federal disability benefit receipt 17–20 months after separation from work, relative to the no-touchpoint pathway, was the one with no health care visit where private disability benefits began after public assistance. That is, individuals who receive both private disability benefits and public assistance, but no health care, and start receiving private disability benefits after public assistance, have the lowest rates of eventual DI/SSI receipt. This effect is substantial, and statistically significant, but does not necessarily represent a causal effect, as opposed to selection into that group of individuals who are unlikely to apply for or be awarded DI or SSI benefits. Furthermore, this group is not returning to work, as shown in Exhibit B-3, but presumably continuing to receive private disability benefits and public assistance.

Taken together, all of this evidence suggests that individuals who have health care visits have higher risks of eventual federal disability benefit receipt. Because four out of five individuals who separate from work due to a health condition have a health care visit, the high rates of eventual federal disability benefit receipt are especially salient. Among those with a health care visit, private disability and public assistance are also associated with higher risks of eventual federal disability benefit receipt, and nearly one in four individuals who separate from work due to a health condition receive public assistance. Noting that 85 percent have either a health care visit, private disability, or public assistance, reaching those who have no health care visit but public assistance would add 4.5 percent of the relevant population, while reaching those who have no health care visit but private disability would add less than one percent.

**3.2 Population Profiles**

Exhibit 3-3 presents the characteristics of our sample who are at risk of leaving the labor market. These are workers who separated from employment for health reasons and have 20 months of follow-up in the survey. Many of them will gain re-employment, and many will start receiving federal disability benefits in months 17–20. However, the linear probability model regression results presented in Appendix B, described in the previous section, indicate that we cannot easily predict which of those workers will become entitled for DI/SSI or return to work. Those regressions indicate that touchpoints that individuals interact with strongly predict eventual receipt of DI/SSI 17-20 months after separating from employment.

- **In contrast, the only demographic characteristic that strongly predicts eventual DI or SSI receipt is older ages, with a sharply increasing gradient of increased risk at ages above 47.**

No demographic characteristics strongly predict later DI/SSI receipt, with the exception of ages over 41.<sup>17</sup> Compared to the youngest workers (aged 18–23), those who separate from work at ages 48–53 have 13 to 14 percent higher probability of later DI/SSI receipt, and those at ages 54–61 have 30 to 31 percent higher probability of later DI/SSI receipt.

The only job characteristic that seems to have a substantial correlation with later DI/SSI receipt is industry of last employment. Manufacturing workers have about 13 percent higher probability of later DI/SSI receipt, compared to education or health service workers, and financial activities workers have about 16 percent higher probability of later DI/SSI receipt. Wholesale and retail trade and transportation and utilities workers have about 9 to 10 percent higher probability of later DI/SSI receipt compared to agriculture workers. However, none of these differences is significantly different from zero.

- **Only Armed Forces as the industry of last employment is statistically significant, and it is associated with 44 percent higher rates of DI/SSI receipt.**

The differentials in probability of receipt of DI by worker characteristics are very small compared to the added effects of pathway touchpoints. For example, interacting with public assistance, private disability insurance, and health care is associated with a 40 percent higher risk of eventually receiving DI/SSI.

- **These findings suggest that the path a worker takes after separating from work may be far more important than the worker’s demographics or past work characteristics.**

However, these are merely predictive effects; they may not reflect causal relationships.

**Exhibit 3-3. Population characteristics of individuals who might benefit from SAW/RTW**

Population Characteristic	Percentage	Approx. Count in 2018
<b>Individual characteristics</b>		
Less than high school	17.5%	846,576
High school graduate	31.1%	1,504,487
Some college	39.2%	1,896,331
Bachelor’s degree or better	12.2%	590,185
White	80.1%	3,874,901
Black	14.7%	711,124

<sup>17</sup> Ages 42–47 are associated with 6 percent higher rates of DI/SSI receipt, but this effect is not significantly different from zero once we control for industry of last employment (Appendix B, Exhibit B, column 3).

## Early Intervention Pathway Map and Target Population Profiles

Population Characteristic	Percentage	Approx. Count in 2018
Other race	5.2%	251,554
Male	49.1%	2,375,251
Female	50.9%	2,462,328
Ages 18-23	10.0%	483,758
Ages 24-29	10.4%	503,108
Ages 30-35	10.9%	527,296
Ages 36-41	13.8%	667,586
Ages 42-47	15.5%	749,825
Ages 48-53	17.9%	865,927
Ages 54-61	21.5%	1,040,079
<b>Industry at last job</b>		
Agriculture, forestry, fishing, and hunting	5.1%	246,717
Mining	3.0%	145,127
Construction	12.5%	604,697
Manufacturing	7.4%	357,981
Wholesale and retail trade	14.4%	696,611
Transportation and utilities	7.9%	382,169
Information	1.7%	82,239
Financial activities	4.1%	198,341
Professional and business services	10.4%	503,108
Educational and health services	14.4%	696,611
Leisure and hospitality	9.9%	478,920
Other services	5.7%	275,742
Public administration	3.0%	145,127
Armed Forces	0.5%	24,188
<b>Occupation at last job</b>		
Management, business, and financial occupations	25.3%	1,223,907
Professional and related occupations	9.3%	449,895
Service occupations	20.1%	972,353
Sales and related occupations	9.0%	435,382
Office and administrative support occupations	9.4%	454,732
Farming, fishing, and forestry occupations	1.1%	53,213
Construction and extraction occupations	8.1%	391,844
Installation, maintenance, and repair occupations	3.1%	149,965
Production occupations	6.2%	299,930
Transportation and material moving occupations	7.8%	377,331
Armed Forces	0.5%	24,188
<b>State of residence</b>		
Alabama	1.8%	87,076
Alaska	0.3%	14,513
Arizona	1.8%	87,076
Arkansas	1.2%	58,051
California	12.8%	619,210
Colorado	1.8%	87,076
Connecticut	1.0%	48,376
Delaware	0.2%	9,675
Florida	5.1%	246,717
Georgia	2.8%	135,452
Hawaii	0.4%	19,350
Idaho	0.9%	43,538
Illinois	3.4%	164,478
Indiana	2.2%	106,427

## Early Intervention Pathway Map and Target Population Profiles

Population Characteristic	Percentage	Approx. Count in 2018
Iowa	1.0%	48,376
Kansas	0.5%	24,188
Kentucky	1.8%	87,076
Louisiana	1.8%	87,076
Maine	0.4%	19,350
Maryland	1.1%	53,213
Massachusetts	2.1%	101,589
Michigan	3.4%	164,478
Minnesota	1.0%	48,376
Mississippi	1.8%	87,076
Missouri	2.2%	106,427
Montana	0.3%	14,513
Nebraska	0.5%	24,188
Nevada	0.7%	33,863
New Hampshire	0.4%	19,350
New Jersey	2.5%	120,939
New Mexico	0.7%	33,863
New York	5.9%	285,417
North Carolina	3.4%	164,478
North Dakota	0.3%	14,513
Ohio	4.3%	208,016
Oklahoma	2.0%	96,752
Oregon	1.0%	48,376
Pennsylvania	4.1%	198,341
Rhode Island	0.3%	14,513
South Carolina	1.4%	67,726
South Dakota	0.3%	14,513
Tennessee	3.0%	145,127
Texas	8.4%	406,357
Utah	0.8%	38,701
Vermont	0.2%	9,675
Virginia	1.4%	67,726
Washington	1.8%	87,076
West Virginia	1.0%	48,376
Wisconsin	1.9%	91,914
Wyoming	0.3%	14,513

Source: Authors' analysis of SIPP data, 2001-2013.

Next we examine the disability type reported for those who later receive DI/SSI. Exhibit 3-4 tabulates the SIPP responses on conditions that lead to disability, for the subset of respondents who answer those questions on the Topical Module. The categories do not easily map to SSA reasons for DI award, but we can easily see that back or spine problems (32.47 percent) and mental or emotional conditions (9.28 percent) are the two most prevalent conditions. This is consistent with the evidence in Chapter 2 and in Appendix A, which both suggest large expansions of DI rolls are due primarily to applications based on musculoskeletal and mental conditions.

## Early Intervention Pathway Map and Target Population Profiles

**Exhibit 3-4. SIPP conditions leading to disability, for those receiving DI/SSI in months 17–20 after separation from employment**

Condition	Prevalence
Alcohol or drug problem or disorder	0.52%
Arthritis or rheumatism	6.44%
Back or spine problems	32.47%
Blindness or vision problems	2.06%
Broken bone/fracture	5.67%
Cancer	2.58%
Carpal tunnel syndrome	1.03%
Cerebral palsy	0.52%
Deafness or serious trouble hearing	1.55%
Epilepsy or seizures	1.29%
Head or spinal cord injury	2.58%
Heart trouble (Heart attack/disease)	3.87%
Hernia	0.77%
High blood pressure	4.90%
Kidney stones/kidney trouble	0.52%
Learning disability	3.35%
Lung or respiratory trouble	4.64%
Mental or emotional conditions	9.28%
Missing limbs/foot/hand/finger	1.55%
Multiple sclerosis	0.52%
Paralysis of any kind	1.03%
Stiff/deformed foot/hand/finger	2.06%
Stomach trouble	1.80%
Stroke	0.77%
Thyroid trouble or goiter	1.80%
Tumor	0.26%
Other	29.12%

Source: Authors' analysis of SIPP data, 2001-2013.

## 4. Key Findings and Next Steps

This report has described the pathways workers take to receive federal disability benefits or return to work. We used three SIPP panels (2001, 2004, and 2008) covering calendar years 2001–2013 to analyze separations from work for workers with health conditions. We examined participation in six touchpoints for 16 months and three outcomes 17 to 20 months after earnings loss. The six touchpoints examined are unemployment insurance, workers' compensation, public assistance programs, private disability insurance, job training or educational enrollment, and health care visits. The outcomes examined were receipt of federal disability benefits, return to work, or neither. Due to data limitations, we did not examine employee assistance programs, case coordination, workforce services, or state vocational rehabilitation.

The balance of this section discusses the key findings from our analysis before concluding with a summary of the next steps for this project.

### 4.1 Major Findings

Major findings are as follows:

- **Many of the most common pathways involved health care utilization (visits to doctors or hospitals).** Of the 64 pathways examined, the 32 that involved health care include 80 percent of workers passing through any pathway. Unfortunately, data limitations mean that we cannot identify the specific types of interactions with medical professionals, nor their precise timing. Most workers follow a pathway that combines health care with another type of participation.
- **The next most common set of pathways involved public assistance, including SNAP and TANF.** Fully 19 percent of workers passing through any pathway followed a path that was some combination of health care and public assistance. Another 4 percent followed a path that included public assistance but not health care.
- **A substantial fraction (11 percent) of workers did not interact with any touchpoint.**

Pathways with public assistance, private disability insurance, and health care were all associated with higher rates of federal disability benefit receipt 17–20 months after separation from work (roughly 8 to 10 percent higher for health care and public assistance, but more than 20 percent higher with private disability insurance participation, relative to the no-touchpoint pathway).

Demographic characteristics seem to matter little, in that only ages 48–53 and 54–61 indicators are statistically significant in both models. That is, older workers are more likely to be awarded benefits (about 6 percent more likely at ages 42–47, about 13 percent more likely at ages 48–53, and about 30 percent more likely at ages 54–61), which may reflect both weaker re-employment rates among older workers and differences in Disability Determination Service rules (which have rule changes at age 45 and age 55). The only job characteristic that matters is having been in the Armed Forces industry, suggesting that an exploration of SAW/RTW strategies for Veterans may be of particular interest.

The types of disabilities reported on the SIPP do not line up well with SSA published estimates. However, in both sources, musculoskeletal and mental conditions are the most prevalent (about one in four beneficiaries of federal disability benefits has a musculoskeletal primary impairment, and about four in 10

has a mental health condition). There is also a perception that these conditions may be more amenable to SAW/RTW programs, as evidenced in several publications from the S@W/R2W Policy Collaborative and the Washington State Centers for Occupational Health and Education evaluations.<sup>18</sup>

### 4.2 Implications

This report has three surprising and policy-relevant findings.

1. **The “no touchpoint” pathway is quite common.** This suggests that any touchpoint strategy may face challenges in identifying workers.
2. **Most pathways that involve any touchpoints include health care utilization.** This suggests that a health care strategy is promising. However, altering the behavior or incentives of the health care sector is challenging. In particular, states have limited policy instruments to affect health care and tend to be reluctant to use the tools they have (Horwitz, et al., 2018). Second, physician behavior tends to be very difficult to alter with non-financial incentives (e.g., physicians were slow to adopt aspirin and beta blockers<sup>19</sup> to treat emergent heart conditions, even though the evidence and guidance were unambiguous).
3. **Public assistance reaches many of those who do not interact with health care,** and those who receive public assistance have elevated rates of later federal disability benefit receipt. States have many policy instruments to affect participation in these programs, including those available under federal waivers. States have been eager to use those tools over the last few decades, suggesting that public assistance programs may be useful touchpoints to incorporate in interventions that promote continued labor force attachment.
4. **Unemployment insurance and workers’ compensation pathways are sufficiently rare that working through those touchpoints would reach few workers at risk of leaving the labor force and applying for federal disability benefits.** This is even true in a state such as Washington, where the workers’ compensation system is a monopoly, as there are still many workers not covered by that system, and most injuries or illnesses are not work related.

Together these analyses suggest that any single touchpoint strategy is unlikely to be successful. However, combining outreach or recruitment via health care and public assistance programs might be promising.

Importantly, all of the workers in this analysis leave employment. Thus, every pathway involves an employer who could report a worker dropping from positive to zero earnings. An option of incentivizing employers to report this event might be a more promising mechanism for identifying workers at risk of labor force separation and long-term disability. However, many employers might have no way of identifying employees who left work (if work schedules are irregular, for example). More importantly, employers may have no way of identifying employees who left work due to an injury or illness (whether

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<sup>18</sup> For example, from Stapleton et al., 2015: “The target population for EBEI [evidence-based early intervention] should include workers with musculoskeletal (MSK) or mental health disorders and possibly those with other chronic conditions that can be successfully managed with EBEI” (p. 1).

<sup>19</sup> See, for example, Skinner & Staiger, 2015: “Beta blockers, drugs costing pennies per dose, were shown during the early 1980s to reduce mortality by as much as 25 percent following a heart attack ... yet by 2000/2001 median state-level use was still only 68 percent” (p. 951).

new onset or worsening of any existing condition). It has also proven difficult to recruit employers into large-scale studies. Thus, we must simply regard employer incentives as a promising avenue for further study.

### 4.3 Next Steps

This analysis provides preliminary assessment of pathways that workers take after illness or injury. To provide more definitive guidance about how to identify target populations for Stay-at-Work/Return-to-Work programs, additional research is needed. Additional research could use qualitative or quantitative methods to examine workers' use of services from injury or illness to either returning to work months later or applying for federal disability benefits. Quantitative analysis of a matched file of survey data and administrative records, would provide more detailed information about the sequence and timing of touchpoints examined in this analysis. A more detailed matched data file could also offer more information about the nature of health care, and other services that workers use. The *Evaluation Design Options Report* discusses an evaluation design option that DOL might consider to examine potential target populations and timing of SAW/RTW interventions in greater detail. That option would use matched survey and administrative data to estimate hazard models and would overcome some of the limitations we faced in the analysis presented in this report, due to using only publicly available data.

**Appendix A: Distribution of Beneficiaries Aged 18–64, by Diagnostic Group, December 2016**

**Exhibit A. Distribution of beneficiaries aged 18–64, by diagnostic group, December 2016**

Diagnostic group	Total	Social Security only			SSI only	Both Social Security and SSI		
		Workers	Widow(er)s	Adult children		Workers	Widow(er)s	Adult children
<b>Total</b>	<b>12,827,804</b>	<b>7,362,028</b>	<b>79,702</b>	<b>540,219</b>	<b>3,535,396</b>	<b>951,118</b>	<b>29,784</b>	<b>329,557</b>
Congenital anomalies	73,091	12,843	95	12,735	36,821	3,028	36	7,533
Endocrine, nutritional, and metabolic diseases	342,241	222,841	3,813	2,171	81,049	28,896	1,714	1,757
Infectious and parasitic diseases	161,211	97,501	662	1,443	44,331	14,329	338	2,607
Injuries	422,423	292,070	1,885	8,792	86,477	28,353	680	4,166
Mental disorders								
Autistic disorders	167,402	13,949	8	26,820	105,514	5,413	4	15,694
Developmental disorders	47,843	5,928	44	3,041	33,619	2,468	33	2,710
Childhood and adolescent disorders not elsewhere classified	56,352	4,925	21	2,723	43,629	2,030	11	3,013
Intellectual disability	1,396,400	228,085	2,983	253,094	634,787	114,845	3,227	159,379
Mood disorders	1,830,625	1,020,458	13,016	29,182	551,935	187,609	5,300	23,125
Organic mental disorders	438,778	234,885	1,804	18,453	136,511	34,242	834	12,049
Schizophrenic and other psychotic disorders	758,133	294,195	2,383	39,679	300,096	96,609	1,219	23,952
Other mental disorders	580,204	275,138	3,035	19,323	209,451	56,209	1,439	15,609
Neoplasms	312,122	245,790	1,832	1,609	46,913	14,582	443	953
Diseases of the—								
Blood and blood-forming organs	40,407	19,339	153	1,474	14,575	3,466	49	1,351
Circulatory system	827,804	610,745	6,155	3,121	158,279	45,838	2,014	1,652
Digestive system	178,040	128,031	1,222	815	35,690	11,418	350	514
Genitourinary system	193,767	139,513	771	1,506	38,560	12,001	247	1,169
Musculoskeletal system and connective tissue	3,188,082	2,456,676	28,680	5,724	497,154	187,880	7,886	4,082
Nervous system and sense organs	1,174,195	719,615	5,206	66,883	275,177	70,204	1,631	35,479
Respiratory system	314,725	207,028	4,227	820	77,884	22,786	1,347	633
Skin and subcutaneous tissue	28,228	19,074	161	286	6,188	2,247	51	221
Other	32,546	17,303	106	1,559	10,860	1,439	28	1,251
Unknown	263,185	96,096	1,440	38,966	109,896	5,226	903	10,658

Source: SSA (2017b) Section 5, Table 69, [https://www.ssa.gov/policy/docs/statcomps/di\\_asr/2016/sect05.html#table69](https://www.ssa.gov/policy/docs/statcomps/di_asr/2016/sect05.html#table69)

## Appendix B: Regressions Predicting Receipt of Federal Disability Benefits 17-20 Months after Separation from Work

### Appendix B: Regressions Predicting Receipt of Federal Disability Benefits 17-20 Months after Separation from Work

The regressions in Exhibit B-1 show how the predicted probability of federal disability benefit receipt varies by participation in unemployment insurance, workers' compensation, public assistance, private disability insurance, job training, and health care in all three columns, adding individual worker characteristics in column two and job characteristics in column three.

The positive coefficients on public assistance indicate that those who participate in SNAP or TANF are more likely to wind up receiving federal disability benefits later. A similar pattern is true for private disability insurance and health care. Older workers are more likely to be awarded benefits (about 6 percent more likely at ages 42–47, about 13 percent more likely at ages 48–53, and about 30 percent more likely at ages 54–61). Workers in the Armed Forces industry are about 44 percent more likely to receive federal disability benefits 17–20 months after separation from work.

**Exhibit B-1. Predictors of receipt of federal disability benefits 17–20 months after separation from work**

	(1)	(2)	(3)
Any unemployment insurance participation	0.0180 (0.81)	-0.0216 (-0.98)	-0.0193 (-0.85)
Any workers' compensation	-0.00823 (-0.29)	0.00344 (0.12)	0.00408 (0.14)
Any public assistance (incl. SNAP/TANF)	0.0861*** (4.36)	0.104*** (4.91)	0.105*** (4.84)
Any private disability benefit receipt	0.236*** (6.99)	0.226*** (6.36)	0.231*** (6.16)
Job training/education enrollment	-0.0930** (-3.11)	-0.0348 (-1.10)	-0.0276 (-0.85)
Any health care visits	0.102*** (5.74)	0.0927*** (5.22)	0.0888*** (4.87)
<b>Time period</b>			
Panel began 2004	0.0151 (0.68)	0.0106 (0.47)	0.0176 (0.36)
Panel began 2008	0.130*** (5.88)	0.114*** (5.02)	0.118* (2.38)
<b>Individual characteristics</b>			
High school graduate		0.0296 (1.24)	0.0152 (0.62)
Some college		-0.00344 (-0.15)	-0.0288 (-1.21)
BA or better		-0.0575 (-1.94)	-0.0900** (-2.74)
Black		0.0501* (2.08)	0.0447 (1.82)
Other race		-0.0123 (-0.38)	-0.00771 (-0.24)
Female		-0.0119 (-0.72)	-0.0340 (-1.73)

**Appendix B: Regressions Predicting Receipt of Federal Disability Benefits 17-20  
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	(1)	(2)	(3)
Age 24-29		0.0175 (0.56)	0.0150 (0.45)
Age 30-35		-0.0117 (-0.42)	-0.00474 (-0.16)
Age 36-41		0.0565 (1.88)	0.0419 (1.36)
Age 42-47		0.0653* (2.29)	0.0577 (1.95)
Age 48-53		0.129*** (4.32)	0.128*** (4.09)
Age 54-61		0.297*** (9.57)	0.292*** (9.11)
<b>Industry at last job</b>			
Agriculture, forestry, fishing, and hunting			-0.0715 (-1.30)
Mining			0.0570 (0.87)
Construction			0.0457 (0.98)
Manufacturing			0.0426 (0.88)
Wholesale and retail trade			0.00858 (0.21)
Transportation and utilities			0.0174 (0.35)
Information			-0.0145 (-0.20)
Financial activities			0.0718 (1.35)
Professional and business services			-0.00257 (-0.07)
Leisure and hospitality			0.000215 (0.01)
Other services			-0.0175 (-0.40)
Public administration			-0.0134 (-0.24)
Armed Forces			0.439** (2.89)
<b>Occupation at last job</b>			
Professional and related occupations			0.0835 (1.66)
Service occupations			0.0211 (0.48)
Sales and related occupations			0.0121 (0.24)
Office and administrative support occupations			0.0576 (1.20)
Farming, fishing, and forestry occupations			-0.0434 (-0.58)

## Appendix B: Regressions Predicting Receipt of Federal Disability Benefits 17-20 Months after Separation from Work

	(1)	(2)	(3)
Installation, maintenance, and repair occupations			-0.0778 (-1.52)
Production occupations			-0.0123 (-0.21)
Transportation and material moving occupations			-0.0637 (-1.20)
Armed Forces			0.0708 (1.32)
Constant	0.0347 (1.51)	-0.0649 (-1.86)	-0.297*** (-3.87)
Number of observations	2,503	2,503	2,402

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ;  $t$  statistics in parentheses.

Note: Excluded categories are no HS degree for education, male for sex, white for race, 18-23 for age, "Educational and health services" for industry, and "Management, business, and financial occupations" for occupation.

Source: Authors' analysis of SIPP data, 2001-2013.

The regressions in Exhibit B-2 show how the predicted probability of federal disability benefit receipt varies by pathway. In these regressions, participation in unemployment insurance, workers' compensation, and job training are ignored, and pathways are defined by participation in public assistance, private disability insurance, and health care. Private disability benefits may begin before or after public assistance receipt, or in the same month (defining three types of pathway), or only one may be received (two types of pathway), or neither may be received in the 16 months following separation from work (one type of pathway). Each of these six types of pathways may be observed among those who have a health care visit, and among those who do not. The predicted effect of each distinct pathway, relative to the excluded category of no participation (the excluded category followed a pathway with no health care visit, no private disability and no public assistance), on the chance of receiving federal disability benefits 17-20 months after job separation is shown in all three columns, adding individual worker characteristics in column two and job characteristics in column three.

Exhibit B-3 documents the prevalence of each of these 12 possible alternative pathways. The ninth possibility, with no health care visit, and private disability starting the same month as public assistance, is not observed in the data, and therefore shows prevalence zero and no further statistics.

### **Exhibit B-2. Predictors of receipt of federal disability benefits 17–20 months after separation from work, using alternative pathways that limit attention to health care, private disability, and public assistance touchpoints but separate pathways by timing of private disability and public assistance**

	(1)	(2)	(3)
Any health care visit, private disability starts before public assistance	0.494*** (3.60)	0.507** (3.28)	0.477*** (3.31)
Any health care visit, private disability starts after public assistance	0.606*** (5.60)	0.484*** (3.88)	0.515*** (3.75)
Any health care visit, private disability starts same month as public assistance	0.163 (1.35)	0.224 (1.79)	0.235 (1.95)

## Appendix B: Regressions Predicting Receipt of Federal Disability Benefits 17-20 Months after Separation from Work

	(1)	(2)	(3)
Any health care visit, no private disability but public assistance	0.184*** (7.17)	0.191*** (7.17)	0.187*** (6.80)
Any health care visit, private disability but no public assistance	0.351*** (8.23)	0.335*** (7.69)	0.341*** (7.35)
Any health care visit, no private disability and no public assistance	0.0962*** (5.07)	0.0744*** (3.95)	0.0687*** (3.57)
No health care visit, private disability starts before public assistance	0.0314 (0.17)	0.0321 (0.18)	-0.0311 (-0.19)
No health care visit, private disability starts after public assistance	-0.110* (-2.47)	-0.177*** (-3.49)	-0.199*** (-4.26)
No health care visit, no private disability but public assistance	0.0917* (2.21)	0.0842* (2.09)	0.0894* (2.20)
No health care visit, private disability but no public assistance	0.190 (1.66)	0.126 (0.92)	0.116 (0.83)
<b>Time period</b>			
Panel began 2004	0.0272 (1.26)	0.0165 (0.74)	0.0201 (0.41)
Panel began 2008	0.144*** (6.70)	0.118*** (5.34)	0.118* (2.40)
<b>Individual characteristics</b>			
High school graduate		0.0295 (1.23)	0.0153 (0.63)
Some college		-0.00604 (-0.27)	-0.0310 (-1.31)
BA or better		-0.0591* (-1.99)	-0.0920** (-2.79)
Black		0.0472 (1.95)	0.0419 (1.70)
Other race		-0.0194 (-0.61)	-0.0131 (-0.41)
Female		-0.0107 (-0.65)	-0.0320 (-1.64)
Age 24-29		0.0181 (0.59)	0.0135 (0.42)
Age 30-35		-0.00876 (-0.32)	-0.00384 (-0.13)
Age 36-41		0.0623* (2.13)	0.0457 (1.50)
Age 42-47		0.0673* (2.41)	0.0571 (1.94)
Age 48-53		0.134*** (4.59)	0.131*** (4.26)

**Appendix B: Regressions Predicting Receipt of Federal Disability Benefits 17-20  
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	(1)	(2)	(3)
Age 54-61		0.303*** (10.05)	0.295*** (9.34)
<b>Industry at last job</b>			
Agriculture, forestry, fishing, and hunting			-0.0687 (-1.24)
Mining			0.0552 (0.84)
Construction			0.0493 (1.07)
Manufacturing			0.0416 (0.87)
Wholesale and retail trade			0.0157 (0.38)
Transportation and utilities			0.0222 (0.44)
Information			-0.00943 (-0.13)
Financial activities			0.0867 (1.62)
Professional and business services			0.000118 (0.00)
Leisure and hospitality			0.00256 (0.07)
Other services			-0.0132 (-0.30)
Public administration			-0.0129 (-0.23)
Armed Forces			0.459* (2.98)
<b>Occupation at last job</b>			
Professional and related occupations			0.0896 (1.79)
Service occupations			0.0206 (0.47)
Sales and related occupations			0.00854 (0.17)
Office and administrative support occupations			0.0593 (1.24)
Farming, fishing, and forestry occupations			-0.0447 (-0.59)

## Appendix B: Regressions Predicting Receipt of Federal Disability Benefits 17-20 Months after Separation from Work

	(1)	(2)	(3)
Construction and extraction occupations			-0.0752 (-1.47)
Installation, maintenance, and repair occupations			-0.0138 (-0.23)
Production occupations			-0.0554 (-1.05)
Transportation and material moving occupations			0.0756 (1.41)
Armed Forces			-0.314*** (-4.02)
Constant	0.0241 (1.09)	-0.0638 (-1.91)	-0.0588 (-1.07)
Number of observations	2,503	2,503	2,402

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ;  $t$  statistics in parentheses.

Note: Excluded category followed a pathway with no health care visit, no private disability and no public assistance. Excluded categories are no HS degree for education, male for sex, white for race, 18-23 for age, "Educational and health services" for industry, and "Management, business, and financial occupations" for occupation.

Source: Authors' analysis of SIPP data, 2001-2013.

### Exhibit B-3. Prevalence of alternative pathways, using timing of private disability and public assistance in definition, and fractions receiving DI/SSI, with earnings, or neither 17-20 months after separation from work.

Alternative pathway	Prevalence (percent)	Percent with DI/SSI in months 17-20	Percent with earnings in months 17-20	Percent with neither in months 17-20
Any health care visit, private disability starts before public assistance	0.52	70.48	26.66	2.86
Any health care visit, private disability starts after public assistance	0.46	37.72	50.64	11.63
Any health care visit, private disability starts same month as public assistance	0.54	31.21	23.65	45.14
Any health care visit, no private disability but public assistance	17.82	26.78	41.95	31.27
Any health care visit, private disability but no public assistance	6.96	39.63	29.45	30.92
Any health care visit, no private disability and no public assistance	53.65	17.34	52.24	30.42
No health care visit, private disability starts before public assistance	0.13	20.37	0	79.63
No health care visit, private disability starts after public assistance	0.07	0	0	100
No health care visit, private disability starts same month as public assistance	0			
No health care visit, no private disability but public assistance	4.31	16.66	46.95	36.39
No health care visit, private disability but no public assistance	0.65	22.74	19.17	58.09
No health care visit, no private disability and no public assistance.	14.88	6.53	59.26	34.21

## Appendix C: SIPP Data Details

We used sample weights from wave two, the first wave in our sample, and we used the final weight variable WPFINWGT. We define “job separation” or exit from earnings as a drop from positive to zero personal earnings (TPEARN), and our sample is defined for those who have never received Social Security payments before (defined by variable TAGESS). We define those leaving work for health reasons using variables ERSEND1 and ERSEND2. We define work disability using variable EDISAB (Does ... have a physical, mental, or other health condition that limits the kind or amount of work ... can do at a job or business?).

We code unemployment insurance receipt using variables ER05, ER06, and ER07. We code workers’ compensation receipt using variable ER10. We code private disability insurance receipt using variables ER13 and ER14. PA is any participation value coded in variables ER20, ER21, ER24, ER27, EPATYP1, EPATYP2, EPATYP3, EPATYP4, EPATYP5, EPATYP6, or EPATYP7. Job training or education is defined by variables EJOBTRN and REENROLL.

Health care, utilization is drawn from Topical Modules for wave four, seven, and 10 in 2008 (<https://www.census.gov/programs-surveys/sipp/tech-documentation/topical-modules/topical-modules-2008.html>); in wave three and six in 2004 (<https://www.census.gov/programs-surveys/sipp/tech-documentation/topical-modules/topical-modules-2004.html>); and in waves three, six, and nine in 2001 (<https://www.census.gov/programs-surveys/sipp/tech-documentation/topical-modules/topical-modules-2001.html>).

We define DI and SSI receipt using variables ER01A and ER03A, respectively.

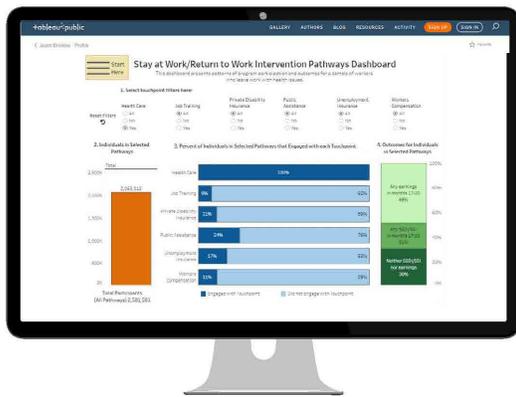
**Exhibit C-1. Sum of Weights in SIPP Wave 2 by Survey Year**

Survey Year	18-61	18-61, health issues, job separation
2001	134,141,942	1,544,943
2004	133,195,296	2,363,414
2008	147,860,227	3,980,543

Appendix D: Stay-at-Work/Return-to-Work: Pathway Dashboard Guide



# Stay at Work/Return to Work Early Intervention Pathways: How to Use the Pathway Dashboard



**Stay-at-Work/Return-to-Work (SAW/RTW)** programs are intended to help workers who experience an illness or injury to remain at work or, for those workers who have separated from employment, to return as soon as medically feasible. When a worker experiences illness or injury that may lead to a work disability, no uniform or coordinated service delivery system currently exists to help the worker keep working. Instead, these individuals must navigate a range of uncoordinated systems with different goals and rules on their own.

We developed an online dashboard that illustrates the different kinds of pathways that individuals follow from the point of job separation. **This instructional sheet explains how to use that dashboard.** The pathways are defined by an individual's engagement with a set of service delivery 'touchpoints' across six systems:

	Health Care		Private Disability Insurance		Unemployment Insurance
	Job Training		Public Assistance		Workers' Compensation

The dashboard also presents the distribution of outcomes for workers who follow different pathways. We report three different outcomes in the period 17 to 20 months following job separation:

- Receipt of federal disability benefits (DI or SSI), with or without work at the same time
- Return to work, without receipt of federal disability benefits
- Neither work nor receipt of federal disability benefits

**To view the dashboard, visit**  
<https://www.dol.gov/agencies/odep/topics/saw-rtw/intervention-pathways>



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