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Work-Related Injuries and Older Workers: Earnings, Labor Supply, Program Participation, and Retirement

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Abstract

Despite older workers accounting for a sizable share of the population that suffers serious work-related injuries and illnesses, little is known about the effects of workplace injuries that occur later in workers' careers, as workers plan for and approach retirement. This study examines the longitudinal trajectories of injured workers' earnings, labor supply, and program participation before and after injury onset and provides some of the first evidence on the implications of work-related injuries and illnesses for the timing of OASI claiming and receipt of benefits from Workers' Compensation (WC), SSDI, and SSI. The analysis focuses on a sample of older injured workers from the Health and Retirement Study data and classifies injuries according to work-relatedness and persistence (i.e., chronic versus not chronic). Results indicate sharp and immediate declines in earnings and employment upon injury – declines that contribute to marked increases in the likelihood of retirement and OASI claiming, as well as participation in SSDI and WC, and to a lesser extent, SSI. The study finds few differences in the trajectories of injured workers' economic outcomes based on whether the injury arose from work. Instead, the patterns tend to differ more by how persistent the injury is, though there are some subtle differences in program participation by source of injury. Finally, while workers who were accommodated by their employer at the time of injury are more likely to work in the year they first report the injury, accommodation does not correlate with earnings, program participation, or early OASI claiming.

Keywords: Older workers, disability, retirement preparedness, Old Age and Survivors Insurance, Social Security Disability Insurance, Supplemental Security Income

JEL Codes: H55, J14, J26, J22, J31

1 Introduction

Work-related injuries and illnesses impose substantial costs on affected workers, yet remarkably little is known about the impacts of on-the-job injuries on older workers' financial well-being, retirement outcomes, or reliance on government programs. A substantial number of workplace injuries (and illnesses, henceforth implied) are incurred by older workers as they approach retirement age. In 2020, workers ages 55 and older accounted for 23 percent of non-fatal occupational injuries and illnesses (Bureau of Labor Statistics 2021). These workers have little time left in their careers for their labor supply and earnings to recover, and they may face more difficulty in physically recovering from their injuries than would younger workers. Indeed, while overall rates of workplace injury are lower among older workers than their younger counterparts, older workers have the highest incidence rate of days-away-from-work cases (Bureau of Labor Statistics 2021), suggesting they are more likely to incur injuries that reduce their ability to continue working.

The extant literature on work-related injuries and illnesses documents that up to ten years after injury, prime-aged workers who are injured on the job have lower earnings and labor force participation (e.g., Reville 1999; Boden and Galizzi 1999; 2003; Dong et al. 2016). Galizzi and Zagorsky (2009) find that injured workers face significant reductions in net worth relative to those who are never injured, at least in the short- to medium-term, and several other studies document evidence of injured workers facing material hardship (Morse et al. 1998), increased borrowing (Keogh et al. 2000), and substantial drops in consumption (Bronchetti 2012). Such financial consequences are likely to have lasting impacts on injured workers' wealth and their ability to save for retirement.

Yet the existing research on the determinants of retirement or on the effects of workplace injuries and illnesses has little to say about injuries that occur later in workers' careers, as workers plan for and approach retirement. Research on disabilities that limit work more generally provides related evidence on the longitudinal impacts of work-limiting disabilities (e.g., Charles 2003; Mok et al. 2008; Meyer and Mok 2019) and how late-in-life disabilities can affect retirement timing and preparedness (e.g., Johnson et al. 2006; Schimmel Hyde et al. 2022), but these studies do not separately identify those disabilities that arose from work. Work-related injuries may affect individuals differently than health impairments incurred outside of work because workers injured on the job have access to medical and wage replacement benefits from the Workers' Compensation (WC) insurance program and additional job protections.

This paper provides some of the first evidence on how older workers' labor market outcomes, program participation, and retirement behavior evolve following a workplace injury. Classifying work-limiting health impairments as chronic or non-chronic, this paper studies the trajectories of employment, earnings and participation in WC, SSI, and SSDI, for workers injured on the job and those who incur work-limiting health impairments outside of work, employing an empirical approach developed by Jacobson, LaLonde, and Sullivan (1993) and used by Charles (2003), Mok et al. (2008), and Meyer and Mok (2019). The analysis also sheds light on how workplace injuries impact the timing of retirement and OASI claiming,

which remains an open empirical question. That is, a work-related injury may make it physically difficult for an individual to continue to work, leading to earlier claiming. However, the injury may also cause reductions in income and wealth, leaving injured workers with less retirement security and prolonging their working years. Retirement behavior is investigated using both self-reported information on retirement status and administrative data on OASI claiming.

The paper analyzes how older workers' financial well-being and retirement behavior change after injury using the Health and Retirement Study (HRS). While the research design and the use of self-reported disability preclude interpreting the findings as reflecting the causal impacts of being injured at work, the results provide important new evidence on the evolution of earnings, program participation, and retirement/OASI claiming before and after injury onset for these groups, controlling for many potential confounders. Additionally, the HRS contains detailed information on accommodations provided to injured workers by employers, allowing an examination of patterns in accommodation over time and whether outcomes differ for those who received accommodation from their employer.

The results show that older workers with work-related injuries experience dramatic decreases in labor supply and earnings and increased participation in SSDI, early OASI claiming, and self-reported early retirement, relative to six years prior to injury. For most outcomes, the patterns of these changes are similar to those experienced by older workers with injuries that did not arise at work. The key exception is that there is an increase in WC participation in the first two years following injury only for those whose injury was work-related. In some cases, the magnitude of the changes differs by whether the injury arose at work (conditional on whether the injury is chronic or not) and may suggest that the provisions afforded those experiencing workplace injuries (i.e., greater job security or WC benefits) may have some protective effects. For example, those with chronic injuries that arose at work experience smaller reductions in employment and earnings than those with chronic injuries that did not arise from work. Overall, however, the persistence of the injury tends to matter much more for workers' post-injury outcomes than whether the injury originated at work, with chronic injuries involving significantly larger detrimental changes.

A meaningful fraction of injured workers report receiving some accommodations from their employers at the time their injuries began to limit their ability to work. However, comparing outcomes for injured workers who received on-the-job accommodations to those who did not reveals that those who received accommodation are somewhat more likely to be working in the wave in which the injury is first reported. Beyond that, there are few statistically significant differences between the trajectories of earnings and program participation (i.e., SSDI and SSI) for those who are accommodated and those who are not.

This study contributes to the existing literature on work-related injuries and on disability, more generally, in several ways. To the authors' knowledge, it is the first study to analyze how older workers' earnings, program participation, and retirement/OASI claiming evolve after a workplace injury. While prior research has studied the long-run impacts of disability on earnings, labor supply, and material well-being (Meyer and Mok 2019) and on retirement (Johnson et al. 2006; Schimmel-Hyde et al. 2022), these papers do not separate work-limiting health impairments that arose from work and those that were acquired outside

of work.[1] Second, within the literature on workplace injuries, many papers compare one group of work-related injuries (usually fairly severe ones, e.g., cases that involve days away from work) to a group of less severe work injuries (e.g., those not involving days away from work).[2] The present study instead compares these estimates to those for workers with injuries of similar persistence that were acquired outside of work, as well as to a group of never-injured workers. An additional contribution is the inclusion of women in the analysis, whereas many related papers in the general disability literature focus only on male household heads, despite women accounting for more than half of non–work-related health impairments and experiencing larger economic consequences following a workplace injury than men (e.g., Boden and Galizzi 1999; 2003).[3] Finally, the paper contributes to the mixed evidence in the literature on the relationship between WC and SSDI (e.g., Guo and Burton 2012; McInerney and Simon 2012; O'Leary et al. 2012).

The paper proceeds as follows: Section 2 describes the HRS data and the identification of the samples of work-injured, non-work injured, and never-injured workers. Section 3 lays out the empirical methods and discusses the merits of self-reported disability measures and how they affect the interpretation of the results. Section 4 presents estimates of the earnings, labor supply, program participation, and retirement outcomes associated with the onset of a new work-related injury and how these outcomes differ by whether workers were accommodated by their employers at the time of injury. Section 5 concludes by discussing the implications of the findings and directions for future work.

2 Data

The analysis of changes in retirement expectations, preparedness, and outcomes upon workplace injury uses the Health and Retirement Study (HRS), one of the only nationally representative data sets that allows for the identification of injuries related to work without conditioning on WC receipt and also provides sufficient longitudinal information on financial and retirement outcomes for older workers.[4] An additional feature of the HRS data is

[1] Dworksy and Powell (2022) proxy for SSDI claiming and early OASI receipt by estimating the hazard of labor force exit at the age of 55, when SSDI eligibility criteria become more generous, and age 62, the earliest age of OASI claiming. They find labor force exits at age 55 consistent with increased SSDI receipt, but no evidence of labor force exits consistent with early OASI claiming. This paper instead uses administrative measures of SSDI receipt and early OASI claiming to address these questions.

[2] See, e.g., Boden and Galizzi 1999; 2003; Seabury et al. 2014; Galizzi and Zagorsky 2009; Dong et al. 2016; and Dworksy and Powell 2022.

[3] See, e.g., Charles 2003; Meyer and Mok 2019; Woock 2009. In the HRS sample, women account for 47 percent of the work-related injuries and constitute 56 percent of the injured-outside-of work sample.

[4] The Survey of Income and Program Participation (SIPP) and the National Longitudinal Survey of Youth (NLSY, 1979) are the other nationally representative surveys that permit identification of work-related injuries without conditioning on WC receipt. However, the NLSY79 focuses on injuries affecting prime-aged workers, and each panel of the SIPP lasts only two and a half to four years, making a study of the longer-run, longitudinal impacts of workplace injuries impossible.

the ability to link to administrative Social Security Administration (SSA) data, which contains administrative measures of Social Security earnings, receipt of SSI and SSDI, and the timing of OASI claiming. The HRS also asks respondents whether their employer provided accommodations to them following injury.

2.1 Identifying Work-Related Injuries and Illnesses in the HRS

The project examines workplace injuries that occur later in workers' careers, as workers near retirement age, for a sample of workers from the HRS, using survey years 1992 to 2018. The HRS is a biennial longitudinal survey of a nationally representative sample of Americans nearing (or of) retirement age.[5] In addition to detailed information on demographic characteristics, employment, income, and wealth, the HRS includes several questions that allow the identification of individuals who have experienced work-limiting health impairments and to determine whether the impairment was work-related. Being able to identify such workers without conditioning on WC receipt is crucial because WC take-up is likely to be endogenous with respect to many of the outcomes of interest.

The primary sample includes workers who are at least 40 years old and experience a work-limiting health impairment between two waves of the survey. Individuals who incur a work-limiting health impairment (i.e., "injury") before they reach age 65 are identified based on responses to the question, "Do you have any impairment or health problem that limits the kind or amount of paid work you can do?" Because the research is focused on the impacts of new injuries on workers, the respondent must have been working without a work-limiting health problem in the survey wave prior to injury onset.

Work-related injuries are distinguished from injuries incurred outside of work based on whether the respondent indicated that the injury was "...in any way caused by the nature of [the respondent's] work" or "was the result of an accident or injury that...occurred at work. . . ." This leaves 3,631 unique individuals who experienced a work-limiting health impairment, or 27 percent of the overall analysis sample of HRS respondents. Of these, 32 percent (1,147) had health impairments that were caused by their work.[6] While the main analysis compares outcomes for those who were injured at work relative to those who experience a non–work-related injury of similar severity, at times the analysis compares those who are injured (at work or not) to those workers who never experience a work-limiting health impairment (N=10,007). Never-injured respondents must be observed working at least two waves during their 50s and must not have reported a work-limiting health impairment in 1992 (or the first wave of the survey in which they are observed). Approximately 61 percent of respondents in the overall sample are able to be matched to the SSA administrative data (N=8,333); those experiencing a work-limiting injury are somewhat more likely than never-injured workers to match to the administrative records (N=2,457, 817 of whom have an injury that is work-related).

[5]The 1992 cohort of the HRS included individuals born between 1931 and 1941 (who were then aged 51 to 61) and their spouses (of any age). This study excludes the AHEAD cohort because individuals in this cohort were ages 69 and older in 1992, and this paper examines workplace injuries arising before age 65.

[6]Appendix Table 1 provides details on sample construction and sample sizes in the HRS.

2.2 Persistence of Injury

One would expect changes in these economic outcomes to differ based on whether the worker has incurred an injury that is minor and/or temporary (e.g., a broken bone) or suffers a more lasting condition (e.g., a severed limb). The HRS contains a follow-up question that asks those experiencing a new work-limiting health impairment whether they expect the health problem to be temporary, i.e., to last fewer than three months. However, only 11 percent of the HRS sample believes the injury to be temporary at the time of onset. Therefore, the study classifies injuries as "chronic" if two years after onset, respondents still report that they are limited in the kind or amount of work they can do. According to this definition, 34 percent of those experiencing new work-limiting health impairments in the HRS have injuries that are chronic (35 percent of those who match to the SSA administrative data).

2.3 Earnings, Income, Program Participation, and OASI Claiming

The project estimates regression-implied changes in labor supply, as measured by whether the respondent is currently working for pay at the time of interview, and earnings. Two measures of earnings are used as dependent variables: (1) the administrative measure of earnings used by the Social Security Administration to calculate benefits and (2) self-reported wage and salary income in the last calendar year.[7] Self-reports are included to examine whether there are changes in earnings above the Social Security taxable maximum, to include workers not covered by Social Security and in order to take advantage of a larger sample.[8]

The project also examines how program participation evolves following the onset of an injury, with measures of self-reported participation in WC and administrative measures of SSI and SSDI receipt, as well as retirement behavior after injury, comparing self-reports of retirement with administrative data on OASI claiming.[9] In addition to tracking the trajectories of retirement status and OASI benefit receipt, a regression analysis explores the relationship

[7] This is constructed as the sum of WAGE_TIPS_SS and SEI_FICA in the Detailed Earnings Record. For HRS respondents with earnings information in this file at least once between 1992–2018, administrative earnings are set to zero in years they do not appear. HRS respondents who are never in the Detailed Earnings Record between 1992–2018 are excluded from this analysis.

[8] To reduce the influence of outliers in the event study regressions, which use OLS, self-reported earnings are top-coded at the 99th percentile.

[9] Administrative data on WC income are not available, and the HRS data include self-reports of a combined measure of whether respondents receive SSI *or* SSDI in a given year. For the years 1994–2018, administrative measures of SSI and SSDI receipt are constructed from the Disability Analysis File using the variables indicating whether SSI or SSDI was in current pay status in that year (SSI94–SSI18 and SSDI94–SSDI18). In years in which either of these measures was missing for a respondent who appears in the Disability Analysis File, receipt was set to zero. The project infers consent to have SSA records linked by whether a respondent appears in the Detailed Earnings Record at any point between 1992–2018. For HRS respondents never in the Disability Analysis File between 1994–2018 (but who were presumed to have given consent to have their SSA records linked because they appear in the Detailed Earnings Record), SSI and SSDI receipt are set to zero in all years 1994–2018.

between injury group and whether the worker claimed OASI benefits before their normal retirement age.[10]

Finally, to shed light on the combined effect of earnings losses, increased program participation, and early claiming of OASI on financial well-being, the paper also tracks the trajectory of self-reported household income after injury, which includes earned income as well as unearned income, like transfer income from SSDI, OASI, WC, SSI, and other social programs. When the respondent indicates that they are married, total household income is divided by two so that changes in income can be directly compared to changes in respondent earnings.[11]

2.4 Employer Accommodation of Injured Workers

The project also tests whether trajectories following injury differ by whether or not the worker was accommodated by their employer at the time of injury. The HRS collects detailed information on whether an injured worker is provided accommodation and what types of accommodation are provided (e.g., changed work hours, different job duties, someone to help, etc.). Specifically, the analysis in Section 4.4 relies on the HRS questions that ask those with work-limiting health impairments, "At the time your health started to limit your ability to work, did your employer do anything special to help you out so that you could stay at work?" and "Does your employer currently do anything special to make it easier for you to stay at work?"

2.5 Individual and Job Characteristics by Injury Source and Persistence

Appendix Tables 2 and 3 demonstrate that many demographic, injury, and job characteristics (in the wave before injury onset) differ by injury group. Those whose injury is work-related are more likely to be male and have lower levels of education, relative to those with injuries incurred outside of work. They are much more likely to experience musculoskeletal injuries and less likely to experience heart conditions or cancer. And those with work-related injuries also worked more hours prior to injury, are more likely to work in manufacturing and work as operators, and are less likely to work in the service industry or in managerial or professional specialty occupations.

[10] Age at OASI claiming is constructed from the Cross-Year Respondent Benefits File (ben1A_R.txt) as the difference in year first claimed OASI (either from initial entitlement DOEI_YR when primary type of benefit at initial entitlement, DOEITOB=1 "Retired Worker", or current entitlement DOEC_YR when initial entitlement was not "Retired Worker" and primary type of benefit at current entitlement, DOECTOB=1 "Retired worker") and year of birth (DOB_YR). Respondents who appear in this file for other benefits and never claimed OASI have age at OASI claiming set to "missing," and respondents who never appear in this file (i.e., never received OASI benefits on their own work history, a spouse's, or as a survivor) also have age at OASI claiming set to missing if they appear in the Detailed Earnings File and are thus presumed to have given consent to link their SSA records.

[11] This adjusted measure of household income is topcoded at the 99th percentile to reduce the influence of outliers.

Table 1 presents descriptive statistics illustrating how job and retirement preparedness in the wave prior to injury ($t-2$) differ by whether the injury arose at work or not, controlling for whether the injury was chronic or not, and how these measures change between the wave prior to injury ($t-2$) and the wave following the injury ($t+2$). Throughout, all monetary values are reported in 2020 dollars, inflated using the CPI-U. The self-reported measures are reported in the top panel, and the administrative measures are in the bottom panel.

Table 1: Changes in Work, Retirement, and Program Participation, HRS 1992-2018

	Non-chronic Injuries		*Chronic Injuries*	
	(1)	(2)	(3)	(4)
	Caused	Not caused	Caused	Not caused
HRS (Self Reported Information)	by work	by work	by work	by work
Working for pay (t–2)	1.00	1.00	1.00	1.00
Working for pay (t)	0.62	0.68**	0.49	0.42*
Working for pay (t+2)	0.57	0.66***	0.33	0.31
Earnings (t–2)	44,192	50,562**	47,856	43,666
Earnings (t)	37,647	41,427	33,424	31,870
Earnings (t+2)	28,774	33,200*	16,032	13,900
Currently retired (t)	0.16	0.16	0.21	0.30***
Currently retired (t+2)	0.28	0.25	0.41	0.52***
Age first retired	63.6	64.3*	62.1	61.6
Employer accommodation, time of injury	0.21	0.12***	0.22	0.14***
Employer accommodation (t)	0.20	0.16*	0.16	0.14
Employer accommodation (t+2)	0.02	0.02	0.14	0.15
Received WC (t–2)	0.03	0.01***	0.03	0.01*
Received WC (t)	0.07	0.02***	0.18	0.02***
Received WC (t+2)	0.02	0.01*	0.13	0.01***
Received SSDI or SSI (t)	0.05	0.03***	0.05	0.14***
Received SSDI or SSI (t+2)	0.10	0.05***	0.16	0.24***
Household income, div by 2 if married (t–2)	61,061	58,040	47,742	52,238
Household income, div by 2 if married (t)	48,535	53,373	40,283	46,772*
Household income, div by 2 if married (t+2)	49,282	54,868	37,659	39,294
N	648	1,147	291	918
HRS linked to SSA Administrative data				
SSA Earnings (t–2)	27,512	30,529*	29,845	26,404
SSA Earnings (t)	17,820	22,647***	13,695	14,375
SSA Earnings (t+2)	16,486	19,922**	8,040	8,400
Claiming OASI (t)	0.09	0.12	0.10	0.12
Claiming OASI (t+2)	0.17	0.23***	0.18	0.21
Age first claim OASI	64.1	63.8***	64.1	64.2
Received SSDI (t)	0.12	0.06***	0.21	0.23
Received SSDI (t+2)	0.14	0.07***	0.31	0.30
Received SSI (t)	0.03	0.01	0.02	0.05*
Received SSI (t+2)	0.02	0.01	0.01	0.04*
N	542	907	222	626

Notes: Asterisks in Columns 2 and 4 reflect statistically significant differences between the mean for work injuries and the mean for non-work injuries; * p<0.10, ** p<0.05, *** p<0.01. Sample includes those observed in the waves both prior to and after injury onset. Survey waves are two years apart. Dollar amounts are in 2020 dollars. We do not report retirement, OASI claiming, or SSDI or SSI receipt in $t-2$; values are near zero because we condition on working for pay in the period prior to injury.

Some changes are experienced broadly across all groups and do not differ by whether the injury was chronic or arose from work. Across the board, older workers who become injured experience large drops in employment upon injury. For example, though by definition they were all working in the wave prior to injury, only 31–33 percent of older workers with chronic injuries and 57–66 percent of non-chronically injured older workers are working two years after the injury. Similarly, all groups are substantially more likely to self-report retirement or claim OASI after injury onset. Other changes clearly differ by whether the injury persisted more than two years. For example, earnings losses are much greater for those experiencing chronic injuries, but they do not differ much by whether the injury occurred at work; this is true both for self-reported earnings and the administrative measure of Social Security taxable earnings. And, those experiencing chronic injuries are far more likely to claim SSDI post-injury, according to the administrative data. Other outcomes differ by work-relatedness. Those experiencing workplace injuries are much more likely to be accommodated by their employer at the time of injury and, not surprisingly, much more likely to receive WC benefits.

3 Methods

3.1 Empirical Analysis

The empirical analysis employs an event-study design similar to those of Charles (2003), Mok et al. (2008), and Meyer and Mok (2019) to examine the trajectories of earnings, labor supply, and program participation of workers whose work-limiting health impairments were caused by their work and of those whose injuries occurred outside of work. That is, the empirical approach involves estimating fixed effects models of the following form:

$$y_{it} = \alpha_i + \delta_t + \phi_s + \Gamma X_{it} + \sum_j \sum_k \gamma_j^k A_{kit}^j + \epsilon_{it} \tag{1}$$

where y is the outcome of interest (e.g., earnings or indicators for working for pay, retirement, or receipt of WC, SSI, or OASI benefits) for person i in year t; α is an individual fixed effect; δ and ϕ are sets of year and state fixed effects, respectively; X is a set of controls that vary over time; and A is a dummy variable that equals one if the individual belongs to work-injury group j in year t and is k years away from injury onset, where $k \in [-4, 10]$. The key parameters of interest are the coefficients γ, which measure the change in the dependent variable k years from onset of injury, for injured workers in group j, relative to their value six years prior to the injury.

Injury groups, indexed by j, are defined by whether the impairment was chronic and whether it was work-related. Including the group of healthy individuals who are never observed experiencing a work limitation improves the precision of the estimated coefficients on the controls in X. Controlling for individual characteristics that affect the likelihood of a health impairment or injury at work and that also relate to our outcome variables, as well as time and state fixed effects, the analysis treats the incidence of a work limitation, and whether it occurs at work, as random.

While this approach estimates the long-run, dynamic patterns of earnings, labor supply, and program participation after injury, there are some important outcomes of interest that are observed at a single point in time. For example, individuals have one date at which they claim SSDI or OASI. For outcomes such as these, the project estimates a straightforward regression model:

$$y_{it} = \beta_1 InjGrp_1 + \beta_2 InjGrp_2 + \beta_3 InjGrp_3 + \beta_4 InjGrp_4 + X_{it} + \delta_t + \phi_s + \epsilon_{it} \qquad (2)$$

where the injury group variables are indicators for the four source-severity categories (Work-Severe, Nonwork-Severe, Work-Nonsevere, Nonwork-Nonsevere), X_{it} is a vector of individual characteristics, including age and its square, sex, marital status, family size, race/ethnicity, and education (less than high school, high school degree, some college, and college or more) and full sets of industry and occupation dummies. The parameters of interest, $\beta_1 - \beta_4$, reflect the difference in the outcome for injury group j, relative to the group of workers who never experience a work-limiting impairment during the survey, controlling for these other factors. The controls in X_{it} are all measured at the respondent's first interview (rather than, e.g., in the wave prior to injury) for consistency across the sub-samples of injured and never-injured workers.[12] The regressions also include sets of year and state fixed effects, which control for when the individual is first observed in the survey and where they lived at the time.

3.2 Self-Reported Measures of Injury

This study uses self-reports of work-limiting health impairments throughout, as opposed to defining work limitations based on SSDI receipt or according to some objective measure of disability. To the extent that self-reported disability or health status may be endogenous to the outcomes of interest, these estimates cannot be interpreted as reflecting purely causal impacts of incurring a work-related injury. For example, if respondents who lose their jobs or stop working report having a work-limiting health impairment in order to justify their employment status, these estimates of employment changes upon incurring a new work-limiting health impairment would be overstated.

Nonetheless, past literature also provides evidence in support of using self-reports to define health impairments or disability. Benitez-Silva et al. (2004) use HRS data to study bias in self-reported disability measures similar to the one in this paper and find that respondents do not systematically misreport their health or disability status in anonymous non-governmental surveys. Others point out the limitations of alternative measures. Given that many health impairments and disabilities cannot be identified by obvious physical markers, self-reports paint a more complete picture of health and impairment than objective measures one might imagine. In addition, defining work limitations by conditioning on SSDI receipt would leave out the roughly 20 percent of working adults who are not insured by SSDI (Autor and Duggan, 2006), as well as those who do not file for SSDI (for reasons which may be endogenous to outcomes of interest) and those whose claims for SSDI are denied. Importantly, denial of

[12]The one exception is the industry and occupation controls, which are measured at the wave prior to injury for injured workers and for the never-injured at the first wave in which we observe the respondent working.

an SSDI claim does not necessarily indicate that a worker is not impaired and/or is able to work (Bound, 1989). Meyer and Mok (2019, 54) sum up these arguments, writing, "Given that alternative definitions have their own endogeneity problems or are often too narrow, we believe that self-reported disability status responses, while not perfect, offer the best available method of measurement."

4 Results

4.1 Older Workers' Labor Supply and Earnings after Injury

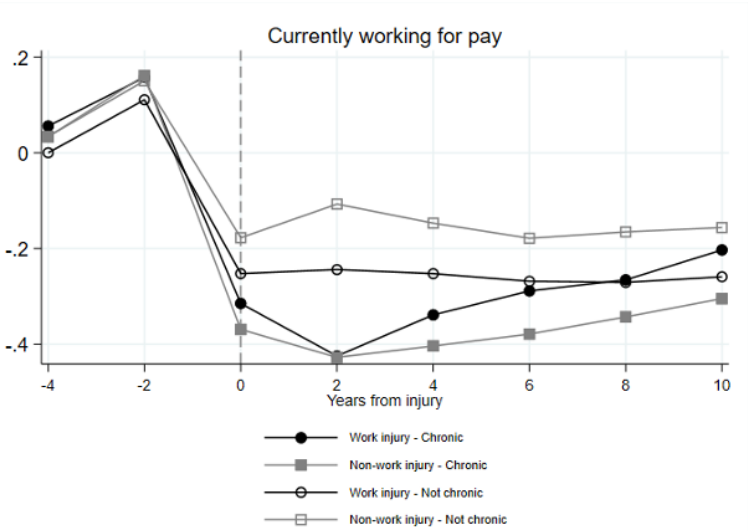
The results reveal dramatic changes in the trajectories of workers' earnings and employment after a new-onset workplace injury, documenting marked decreases in wage and salary income and the likelihood of working for pay.

Figure 1 displays the results of an event-study specification for older workers in the HRS, where the dependent variable is an indicator equaling one if the respondent is currently working for pay. In the first wave in which respondents are observed reporting a work-limiting health impairment, those with chronic workplace injuries are 31 percentage points less likely to be working for pay, relative to six years prior to injury onset. Their likelihood of working for pay dips even further by the next wave and then remains 20–27 percentage points lower over the ten years post-injury, relative to six years prior to injury onset. While those with less-chronic workplace injuries experience smaller initial declines in their employment, their likelihood of working for pay from the time of onset to ten years post-injury is nonetheless 24–27 percentage points lower than it was six years prior to injury. Those with injuries incurred outside of work follow similar patterns, conditioning on the severity of the injury. However, among those with non-chronic injuries, individuals who incur non–work related injuries experience significantly smaller declines in employment than those whose injuries originate at work (11–18–percentage point declines). For the chronically injured, the employment declines are larger in magnitude for injuries originating outside of work.

Given that workplace injuries are associated with large drops in employment upon injury for older workers, it is not surprising that their earnings also decline significantly after onset and stay depressed several years after injury (see Figure 2).

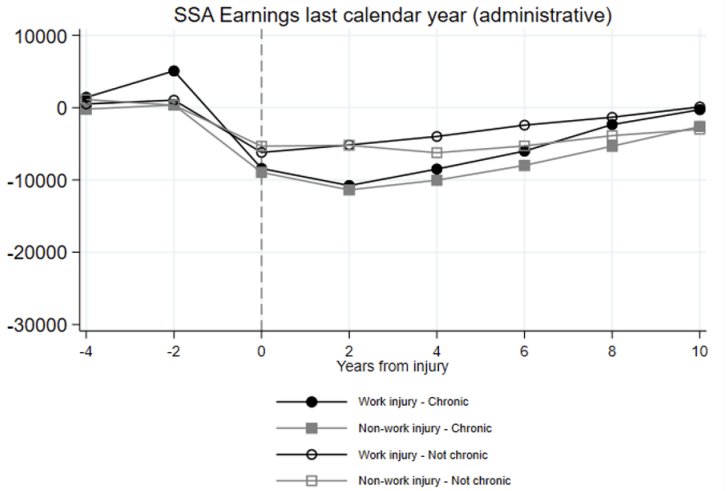
On average, the annual administrative measure of wage and salary income of those with chronic workplace injuries is approximately $8,400 lower in the year of injury than it was six years before injury. Earned income for this group begins to recover eight years after injury but is still lower than that in the pre-injury period for several more years. Those with non-chronic work-related injuries experience an initial decline in earnings of approximately $6,100, relative to six years before the injury, and their earnings remain depressed for the next eight years until recovering at the tenth year after injury. Overall, the magnitudes of the coefficients are quite similar for those with work and non-work injuries, conditioning on whether the injury is chronic, but a similar pattern emerges within chronic status as that observed for employment. Among chronic injuries, workers' earnings losses are slightly smaller for injuries that are work-related, whereas for non-chronic injuries, earnings losses

Figure 1: Change in Probability Currently Working for Pay, before and after Injury Onset (Sample: HRS, 1992–2018)



Notes: Graph plots coefficients from individual-level fixed effects regression of indicator for working for pay on indicators for being in injury group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects.

Figure 2: Change in SSA Earnings, before and after Injury Onset (Sample: HRS, 1992–2018)

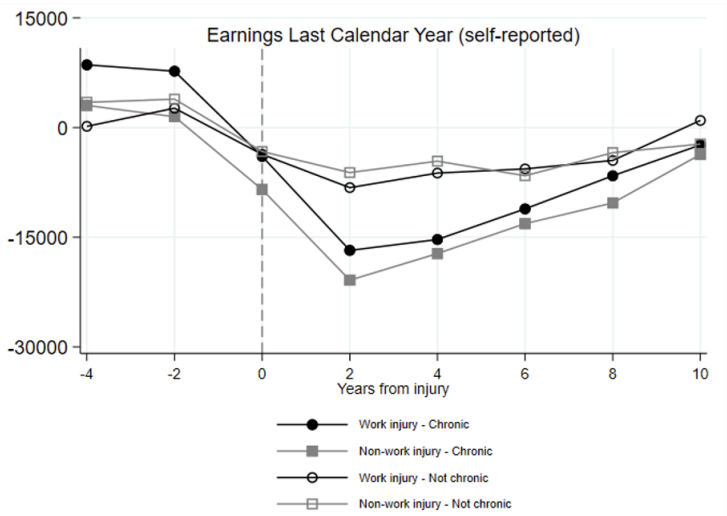


Notes: Graph plots coefficients from individual-level fixed effects regression of SSA administrative earnings last calendar year on indicators for being in injury group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects.

are slightly larger among those whose injuries are caused by work. This would be consistent with WC or protections for injured workers providing some modest benefits for those with chronic injuries whose injury arose from work. The protections do not appear to extend to those with non-chronic injuries.

Figure 3 displays changes in self-reported earnings, which are not constrained by the Social Security taxable maximum. Not surprisingly, in many years the magnitude of the earnings losses is even larger than that in Figure 2, though the general pattern of recovery by eight to ten years post-injury is the same as that in the administrative data.

Figure 3: Change in Self-Reported Earnings, before and after Injury Onset
(Sample: HRS, 1992–2018)



Notes: Graph plots coefficients from individual-level fixed effects regression of self-reported earnings on indicators for being in injury group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects. Earnings are top-coded at the 99th percentile.

4.2 Program Participation

In response to reduced earnings and employment, individuals experiencing an injury might participate in public programs such as WC, SSI, or SSDI. WC is likely available only to individuals whose injury is work-related, whereas SSI or SSDI could be available to individuals with non–work-related injuries, as well. Figure 4 shows that, as expected, receipt of WC benefits increases dramatically in the first wave the injury is reported for those experiencing a work-related injury. For those with chronic work-related injuries, the probability of receiving WC benefits rises 14 percentage points, relative to six years before injury while for those with non-chronic workplace injuries, it rises 6 percentage points. There is no change for those with non–work-related injuries. By two years after injury, those with non-chronic work-related injuries are no longer any more likely to receive WC. Although the effect falls

over time for those with chronic work-related injuries, they remain more likely to receive WC for the first two years post-injury. This suggests that WC provides short-term income support to those experiencing a work-related injury.

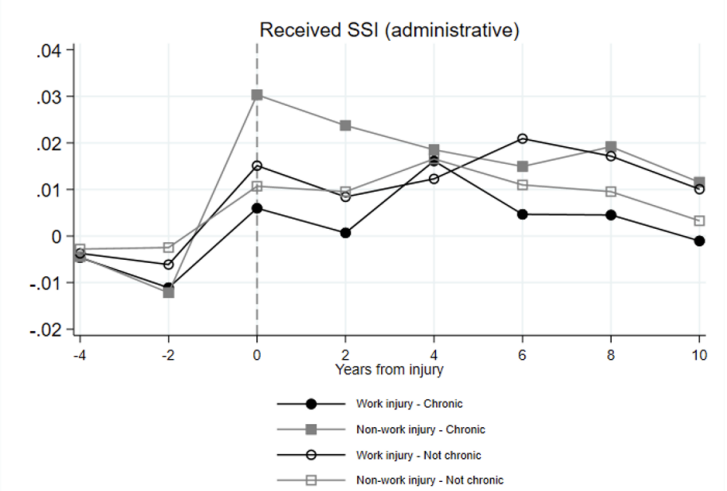
Figure 4: Change in Workers' Compensation Receipt, before and after Injury Onset (Sample: HRS, 1992–2018)

Notes: Graph plots coefficients from individual-level fixed effects regression of indicator for receiving WC cash benefits last calendar year on indicators for being in injury group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects.

Figure 5 examines receipt of SSI. Notably, there is a small but significant increase in SSI receipt upon injury for all groups except for those with work-related, chronic injuries. Those with chronic, non–work-related injuries are the most likely to receive SSI in the first wave they report their injury (an increase of approximately 3 percentage points) followed by work, non-chronic (increases of approximately 2 percentage points) and non-work, non-chronic (increases of approximately 1 percentage point). For these groups, the increased rate of SSI receipt tends to persist throughout the post-injury period.

The project examines changes in SSDI receipt using both the OLS regression framework for one-time outcomes (see Table 2) and the event study framework (see Figure 6). For all four groups there are striking increases in SSDI receipt after injury that are much larger than the increases observed in either SSI or WC receipt. For those with chronic injuries, the overall increases range from 32–33 percentage points, while for those with non-chronic injuries, they range between 11–13 percentage points (Table 2). Figure 6 also demonstrates that for those with chronic injuries, the magnitude of the effect does not differ much by whether the injury arose at work. However, those with non-chronic injuries that arose at work are much more likely to receive SSDI than their counterparts whose injuries did not stem from work.

Figure 5: Change in SSI Receipt, before and after Injury Onset (Sample: HRS, 1992–2018)



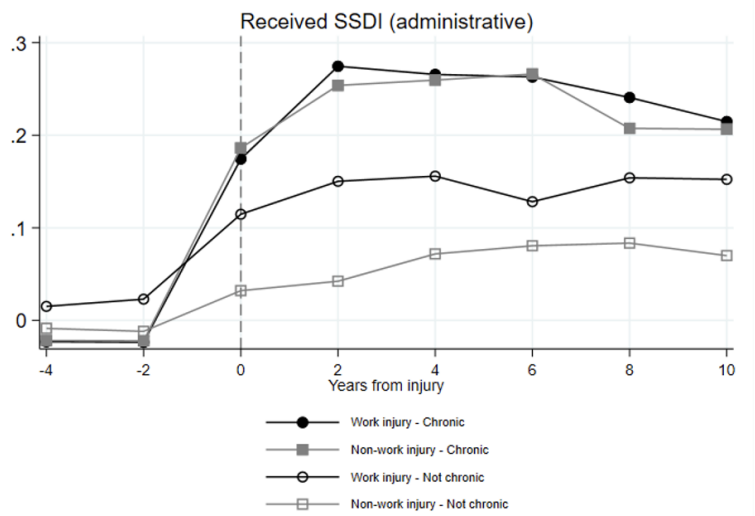
Notes: Graph plots coefficients from individual-level fixed effects regression of indicator for administrative measure of SSI receipt on indicators for being in injury group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects.

Table 2: Work-Related Injuries and Retirement and Work at Older Ages, HRS 1992-2018

	(1) Retire Early (Self-rep.)	(2) Claim OASI in Sample Period	(3) Claim OASI Before NRA	(4) Claim OASI Before NRA (no SSDI)	(5) Ever Claim SSDI
Work injury–Chronic	0.286***	0.128***	0.000	0.170***	0.318***
	(0.044)	(0.041)	(0.045)	(0.052)	(0.025)
Non-work injury–Chronic	0.375***	0.075*	-0.038	0.066	0.328***
	(0.039)	(0.036)	(0.040)	(0.045)	(0.022)
Work injury–Not chronic	0.150***	0.093**	0.037	0.091**	0.125***
	(0.039)	(0.036)	(0.040)	(0.044)	(0.022)
Non-work injury–Not chronic	0.114***	0.067*	0.063	0.115***	0.100***
	(0.038)	(0.035)	(0.039)	(0.043)	(0.021)
N	8,330	8,330	8,330	7,668	8,330
R^2	0.21	0.47	0.27	0.29	0.24
Mean, Never injured	0.177	0.394	0.290	0.290	0.004
Mean, Chronic work	0.590	0.698	0.410	0.574	0.365
Mean, Chronic non-work	0.661	0.613	0.349	0.470	0.360
Mean, Non-chronic work	0.405	0.526	0.348	0.394	0.171
Mean, Non-chronic non-work	0.374	0.553	0.409	0.453	0.127

Notes: Results from linear probability models; * p<0.10, ** p<0.05 *** p<0.01. All regressions include controls for age (single year-of-age dummies), education, sex, race/ethnicity, marital status, and number of people in household, all observed at the first interview, as well as a set of industry/occupation dummies, observed at wave prior to injury for injured and at first wave we observe for never injured, state fixed effects, and year effects to control for the year of first interview. Sample includes those who are 40–62 years old at first interview.

Figure 6: Change in SSDI Receipt, before and after Injury Onset (Sample: HRS, 1992–2018)



Notes: Graph plots coefficients from individual-level fixed effects regression of indicator for administrative measure of SSDI receipt on indicators for being in injury group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects.

The contrast between these increases (Figure 6) and those for SSI is perhaps not surprising, given that these injured workers are likely to be eligible for SSDI and likely to fail to meet the income and asset tests of the SSI program. (Mean self-reported annual earnings for these workers are between $43,666 and $50,562 in the wave prior to injury.) The estimated increases in SSDI receipt are sustained over the ten years post-injury.

Altogether, each of these groups experiences sizable increases in the likelihood of receiving SSDI benefits and much smaller increases in the likelihood of WC or SSI receipt. For all but the SSI program, the biggest increases in participation are experienced by those with chronic injuries. The most sustained uptick in program participation is in the SSDI and SSI programs; WC receipt declines after the first survey following injury. There are some differences in patterns of program participation by whether the injury was work-related. Those with work-related injuries experience greater increases in the likelihood of receiving WC benefits, and among those with non-chronic injuries, the increase in the likelihood of receiving SSDI benefits is greater among those whose injury incurred at work.

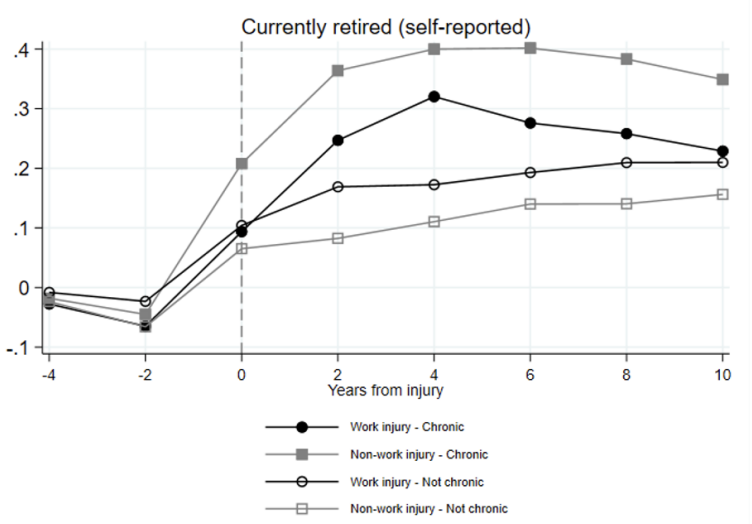
4.3 OASI Claiming, Retirement, and Household Income

4.3.1 Likelihood of retirement after injury onset.

The trajectories of earnings and labor supply presented above suggest that workplace injuries may significantly affect decisions about retirement timing. Whether injured workers work

longer at lower levels of employment and earnings in order to be financially prepared for retirement or claim OASI and retire earlier due to a reduction in their physical capacity for work is an empirical question. The results strongly suggest that on average, the latter effect dominates. Figure 7 demonstrates dramatic increases in the probability of self-reported retirement when workers are injured on the job. For instance, if the impairment is caused by work and is chronic, the probability of retirement increases by 9 percentage points in the first wave in which the individual reports having been injured, 25 percentage points by the second year after the injury is first reported, and 32 percentage points after four years (all relative to six years prior to injury). Perhaps not surprisingly, the groups most likely to report they are retired are the groups that were least likely to be working in Figure 1. Those with chronic work-related injuries are somewhat less likely to report retirement than those with chronic non–work-related injuries, and those with non-chronic work-related injuries are more likely to say they are retired than those with non-chronic, non–work-related injuries. Note that for most groups and years, the magnitude of the effect on retirement is smaller than the corresponding magnitude for working, suggesting that many of the labor market exits captured in Figure 1 were considered temporary at the time. For example, at the time of injury, those with chronic work-related injuries were 31 percentage points less likely to be working but only 9 percentage points more likely to be retired.

Figure 7: Change in Self-Reported Retirement, before and after Injury Onset
(Sample: HRS, 1992–2018)



Notes: Graph plots coefficients from individual-level fixed effects regression of indicator for reporting oneself as retired on indicators for being in injury group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects.

These effects are large, but recall that they are based on a self-reported measure of current retirement status. Many individuals in the sample cycle into and out of retirement as measured by this variable. In order to better understand how retirement behavior is affected by injury, and how social insurance programs are used to support these injured workers, it is crucial to examine a more objective measure that indicates a permanent and near-complete reduction of labor supply, like the initiation of OASI benefits.

The project turns to SSA administrative data on OASI claiming to examine how claiming decisions differ for these injury groups. Consistent with the self-reports of retirement discussed above, Column 2 of Table 2 shows that even conditional on age, those experiencing an injury late in their careers are more likely to claim OASI during the sample period than those who were never injured. Column 3 examines whether this corresponds to increased early OASI claiming, before the "normal retirement age" (NRA). Somewhat surprisingly, there is no increase in early claiming among individuals in this group relative to those who never experienced a work-limiting injury. However, recall the dramatic increase in SSDI receipt described above; for those individuals receiving SSDI benefits, the benefit converts to an OASI benefit at full retirement age. This institutional feature coupled with the large increase in SSDI receipt might be obscuring any increase in the average likelihood of claiming OASI before full retirement. Therefore, the sample in Column 4 omits those receiving SSDI. Among this sample of respondents who have a choice about when to claim OASI, there is a statistically significant increase in the likelihood of claiming before full retirement age of 7–17 percentage points (note p=0.11 for those with non-chronic, work-related injuries). Notably, the increase is largest for those with chronic injuries that originated at work, and the coefficient estimates for the other groups are not statistically significantly different from one another.

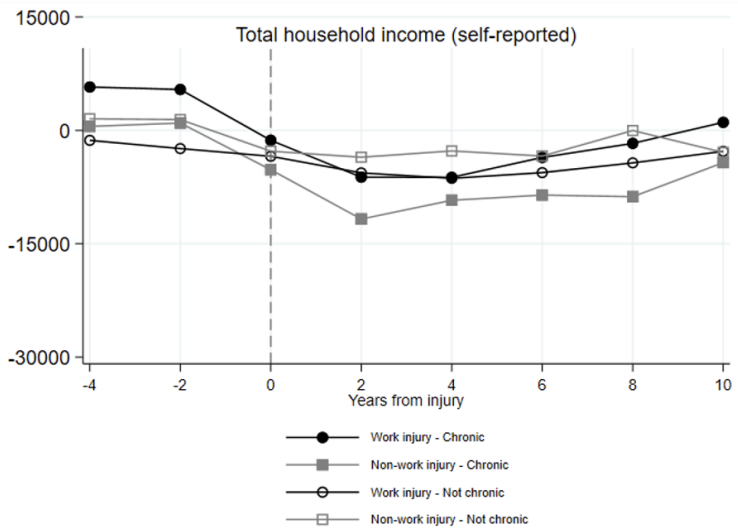
The means at the bottom of Table 2 indicate that the majority of injured workers in the analysis sample either receive SSDI or claim OASI early. Approximately 36 percent of those with chronic injuries receive SSDI and 13–17 percent of those with non-chronic injuries receive SSDI (Column 5). To compare differences in the rate of early OASI claiming, it is instructive to consult Column 4, which excludes those who receive SSDI. Whereas 29 percent of the never injured respondents claim OASI early, between 39–57 percent of those who are injured claim OASI early. Altogether (i.e., summing the means in Columns 3 and 5), between 71–78 percent of those with chronic injuries and between 52–54 percent of those with non-chronic injuries either claim OASI early or receive SSDI. This suggests that these two SSA programs provide important, lasting income support for workers experiencing an injury late in their careers, including those with work-related injuries, who were likely eligible for WC benefits.

4.3.2 Changes in total household income (including benefits).

The large declines in earnings described in section 4.1.1 might be offset by income from SSDI and early OASI claiming. Figure 8 presents changes in total household income, which include this unearned income. Though there are no significant differences by work-relatedness, all workers injured late in their career experience persistent losses of several thousand dollars of income in the post-injury years. In nearly all cases, however, the losses in income are

smaller in absolute value than the corresponding losses in (self-reported) earnings, which suggests that other sources of income, such as SSDI or early OASI claiming, are offsetting earnings losses to some extent. For example, those with chronic injuries experience losses in total household income of approximately $5,000 to $11,700 after injury; in contrast, self-reported earnings losses are larger, ranging from roughly $6,600 to $20,900. Similarly, those with non-chronic injuries experience losses of income between $3,500 and $6,300 in some years post injury, while their self-reported earnings losses persist for more years and are of greater magnitude (between $3,600 and $8,200). While other sources of income help to offset earnings losses due to injury, injured workers nonetheless face persistent income losses of several thousand dollars, reflecting important changes in material well-being experienced by those who incur late-in-career injuries.

Figure 8: Change in Total Household Income, before and after Injury Onset
(Sample: HRS, 1992–2018)



Notes: Graph plots coefficients from individual-level fixed effects regression of total household income (divided by 2 when individual is married) on indicators for being in injury group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects. Income is top-coded at the 99th percentile.

4.4 Role of Employer Accommodation

4.4.1 Patterns in employer accommodation.

The 1990s and early 2000s witnessed a dramatic increase in employers providing accommodations to workers with work-limiting health impairments.[13] Such accommodations may allow workers to maintain employment and earnings when injured. Overall, approximately 16 percent of injured workers receive accommodation from their employer at the time of injury, and those injured at work are more likely to receive accommodation (21 percent) than those with injuries incurred outside of work (13 percent). There are also differences in the likelihood of accommodation by worker level of education, type of injury, industry, and occupation (see Appendix Table 4). Those with at least a high school degree are more likely to receive accommodation than those without a high school degree. When considering type of injury, those with musculoskeletal injuries are most likely to receive accommodation, and those with heart problems or neurological or sensory injuries or illnesses are the least likely. Workers employed in industries like agriculture, mining, or wholesale or in occupations like management and construction are least likely to receive accommodation, while public sector employees and production and clerical workers are most likely to receive accommodation.

Figure 9 presents estimates of regression-implied changes in the likelihood of receiving accommodation at work from an employer in a given wave for the sample of respondents who are working. In the wave in which the respondents first report their injuries, all four groups experience an increase in accommodation from their employer ranging between 13–19 percentage points, but the largest increases in accommodation in the wave in which the respondent first reports the injury are for those with non-chronic injuries–the respondents that experienced the smallest reductions in working for pay following injury. However, by two years after injury, the likelihood of accommodation remains elevated by 11–12 percentage points for those with chronic injuries, while those with non-chronic injuries (who by definition no longer report the injury as limiting their ability to work) are significantly *less* likely to receive accommodation. By four years post-injury, the increase in accommodation (relative to six years prior to injury) is very similar for all four injury groups, ranging between no relative increase and 4–5 percentage points more likely to be accommodated. This modest increase in the likelihood of being accommodated by one's employer persists for several more years.

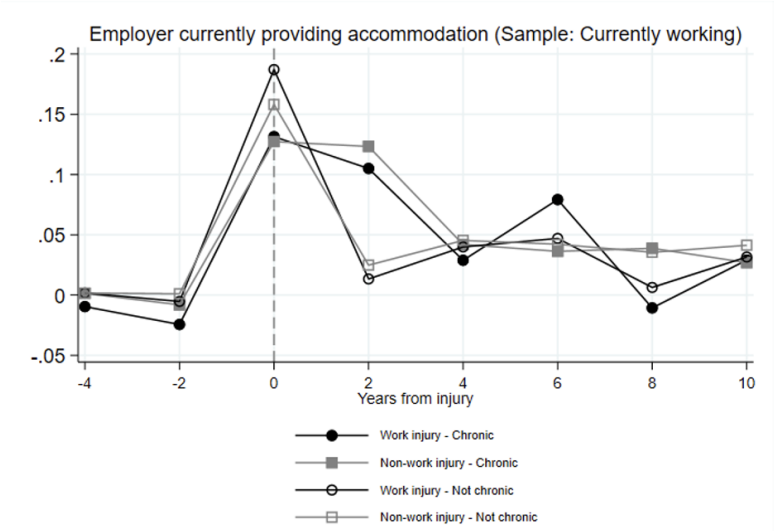
4.4.2 Correlation between accommodation and economic outcomes.

Figure 10 illustrates whether post-injury trajectories in employment, earnings, and program participation differ by whether the employer accommodated the injured worker *at the time the worker was injured*.[14] That is, they present the estimates of equation 1 where the

[13] See Ruser (1999) or Bronchetti and McInerney (2015) for evidence on employer accommodation of workers injured on the job.

[14] The HRS also includes a measure of whether the worker was being accommodated at the time of the interview, but we do not use this variable due to endogeneity concerns, as a worker can only be accommodated by his employer if he is still working for pay. Whether a worker is provided accommodations at the time

Figure 9: Change in Likelihood Employer Provides Accommodation, before and after Injury Onset (Sample: HRS, 1992–2018)



Notes: Graph plots coefficients from individual-level fixed effects regression of indicator for currently being accommodated on the job by employer on indicators for being in injury group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects.

dependent variable not only varies by where the injury occurred (work/non-work), whether it was chronic or not, and year relative to injury but also varies by whether the injured worker was accommodated by their employer at the time of the injury. For ease of interpretation, the eight lines are shown across two graphs, one for chronic injuries and one for non-chronic injuries.

As shown in panels a and b, injured workers who received accommodation from their employer are more likely to be working in the wave the injury is first reported.[15] However, in subsequent waves, the correlation between accommodation at time of injury and likelihood of work in later years changes sign in most waves, and changes in employment are only significantly different by accommodation status for those with non-chronic, work-related injuries. This could reflect that accommodation has no effect on older injured workers' likelihood of continuing to work, or it could reflect that only a small number of injured workers received accommodation. (Only 12–22 percent of injured workers were accommodated by their

the injury is incurred may still be endogenous to our outcomes of interest (e.g., if injured workers who are most attached to the labor force are most likely to request accommodation), but endogeneity concerns are arguably lessened relative to measures of employer accommodation *after* the injury.

[15] Among those with chronic work-related injuries, the estimated change in the likelihood of work is noticeably smaller in magnitude for those who are accommodated by their employers; however, this difference is not statistically significant.

employer at the time of injury, as shown in Table 1).

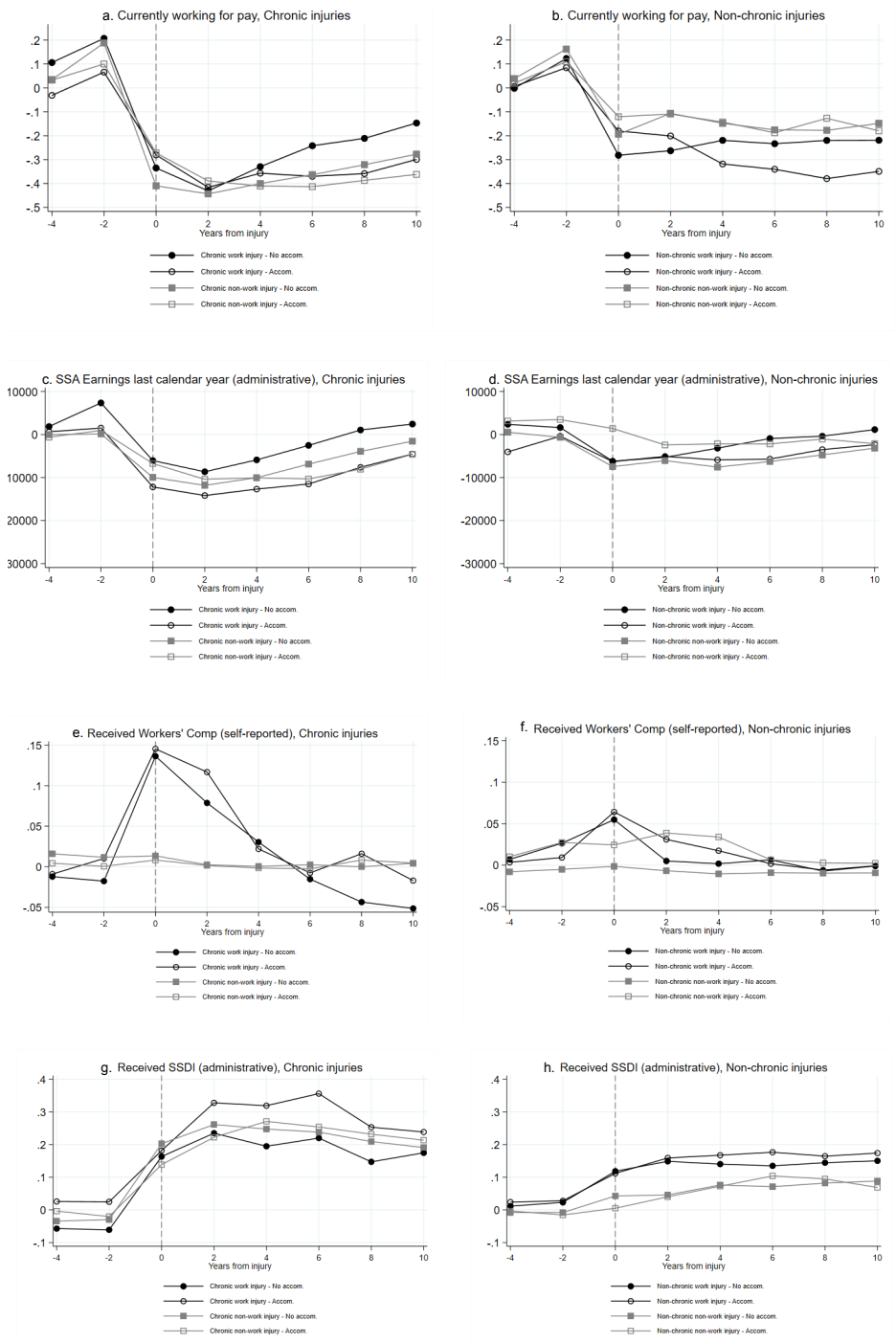
Among respondents who experience a work-related, non-chronic injury, those who receive accommodation from their employer are less likely to be working in the 6–10 years following injury. This illustrates important nuances in selection (i.e. which workers receive accommodations) that may differ by whether the injury is chronic or not. It may be that those who experience a non-chronic injury and receive accommodation are the least able-bodied to work, which would be consistent with the result described above–those who received accommodation at the time of injury are less likely to work 6–10 years post-injury than others in their same injury category. In contrast, those with a chronic injury who receive accommodation may be the most able to work.

Figure 10 reveals few statistically significant differences in the other outcomes (e.g., earnings and receipt of WC and SSDI) by accommodation status and few clear patterns (see panels c through h).[16] Table 3 presents regression estimates of the relationships between injury and the one-time outcomes reflecting early retirement and early OASI claiming (similar to Table 2) but adds interaction terms between the injury group dummies and an indicator for whether the respondent was accommodated at the time of injury. Again, there are not many differences in outcomes by accommodation status. The coefficient estimates are noisily estimated, and in many cases they are small relative to the coefficient estimates for the level term.

The results in this section suggest that a meaningful fraction of injured workers receive accommodation from their employers upon injury and that those who receive accommodation are somewhat more likely to be working in the wave the injury is first reported. Beyond that, there are few statistically significant differences for the other study outcomes and no clear pattern of the results. While we do not find evidence that accommodation is correlated with other study outcomes, we note that non-random selection into accommodation precludes drawing strong causal conclusions.

[16]The only statistically significant differences in earnings are among those with chronic work-related injuries six years after injury and those with non-work, non-chronic injuries in the wave the injury is first reported and four years post-injury. There is no consistent pattern in whether those who are accommodated have higher or lower earnings. The only statistically significant differences in WC receipt are among those with non-work-related, non-chronic injuries. For SSDI, the only statistically significant difference by accommodation status is among those with non–work, non-chronic injuries in the year the respondent first reports the injury.

Figure 10: Change in Outcomes by Accommodation Status, before and after Injury Onset (Sample: HRS, 1992–2018)



Notes: Graphs plot coefficients from individual-level fixed effects regression on indicators for being in injury-accommodation group j, k years from the onset of injury where $k \in [-4, 10]$; the reference period is six years prior to injury onset. Regressions also include controls for age (single year-of-age dummies), household size, marital status, and year and state fixed effects.

Table 3: Work-Related Injuries and Retirement and Work at Older Ages, HRS 1992-2018

	(1) Retire Early (Self-rep.)	(2) Claim OASI in Sample Period	(3) Claim OASI Before NRA	(4) Claim OASI Before NRA (no SSDI)	(5) Ever Claim SSDI
Work injury–Chronic	0.290***	0.099**	-0.029	0.130**	0.316***
	(0.049)	(0.045)	(0.050)	(0.058)	(0.027)
Non-work injury–Chronic	0.371***	0.072*	-0.037	0.074	0.319***
	(0.041)	(0.038)	(0.041)	(0.047)	(0.023)
Work injury–Not chronic	0.121***	0.097**	0.039	0.095**	0.116***
	(0.041)	(0.038)	(0.042)	(0.046)	(0.023)
Non-work injury–Not chronic	0.122***	0.054	0.057	0.106**	0.096***
	(0.039)	(0.036)	(0.040)	(0.044)	(0.022)
Work inj.–Chronic	-0.016	0.075	0.079	0.113	0.001
×Accommodated	(0.055)	(0.051)	(0.056)	(0.070)	(0.031)
Non-work injury–Chronic	0.007	0.010	0.002	-0.019	0.024
×Accommodated	(0.034)	(0.032)	(0.035)	(0.044)	(0.019)
Work injury–Not chronic	0.090**	-0.013	-0.004	-0.006	0.024
×Accommodated	(0.036)	(0.033)	(0.036)	(0.040)	(0.020)
Non-work injury–Not chronic	-0.039	0.055**	0.028	0.048	0.010
×Accommodated	(0.029)	(0.027)	(0.030)	(0.032)	(0.016)
N	8,330	8,330	8,330	7,668	8,330
R^2	0.22	0.47	0.27	0.29	0.24
Mean - Never injured	0.177	0.394	0.290	0.290	0.004
Mean - Chronic work	0.590	0.698	0.410	0.574	0.365
Mean - Chronic non-work	0.661	0.613	0.349	0.470	0.360
Mean - Non-chronic work	0.405	0.526	0.348	0.394	0.171
Mean - Non-chronic non-work	0.374	0.553	0.409	0.453	0.127

Notes: Results from linear probability models; * p<0.10, ** p<0.05 *** p<0.01. All regressions include controls for age (single year-of-age dummies), education, sex, race/ethnicity, marital status, and number of people in household, all observed at the first interview, as well as a set of industry/occupation dummies, observed at wave prior to injury for injured and at first wave we observe for never injured, state fixed effects, and year effects to control for the year of first interview. Sample includes those who are 40–62 years old at first interview.

5 Discussion and Conclusion

This paper examines long-run changes in economic outcomes, including earnings and labor supply, program participation (e.g., in WC, SSI, and DI), and retirement / OASI claiming, following a workplace injury. This paper provides the first look at the trajectories of these outcomes for older workers impacted by a work-related injury late in their careers. For the most part, older workers affected by work-related injuries experience sharp and persistent reductions in employment and earnings that are similar to the experiences of those who incur injuries outside of work. Their probability of receiving income support benefits from SSDI (and to a lesser extent, SSI) increases markedly following injury, as does their likelihood of retiring and claiming OASI early. Early OASI claiming is especially pronounced for those

who do not receive SSDI benefits. Those whose injury arose at work are more likely to receive benefits from WC in the first two years following injury. Even with these benefits, however, workers who are injured late in their careers experience significant decreases in total (earned and unearned) income.

The results indicate that labor market and retirement outcomes evolve similarly for older workers whose work-limiting health impairments are work-related and for those whose impairments are acquired outside of work. Although there are some subtle differences by work-relatedness, differences in the trajectories of labor market outcomes and SSDI and OASI claiming are more striking when comparing those with chronic and non-chronic injuries. Older workers with chronic injuries experience larger drops in employment and earnings than those with non-chronic injuries, and these gaps persist for at least 6–8 years after injury. All older injured workers experience significant increases in their probabilities of retirement and of early OASI claiming, although again, these increases are most pronounced for those with chronic injuries.

There are some important limitations of this work. Namely, only a small number of respondents experience a new injury–particularly a work-related injury–in the HRS. Nevertheless, many coefficient estimates are precisely estimated, allowing conclusions about differences in the trajectories of labor market outcomes and retirement across these groups. Second, the study relies on self-reports of work-limiting health impairments, which may be endogenous to the outcomes of interest, and thus, the estimates may not reflect purely causal impacts of incurring a work-related injury.

These findings highlight dramatic economic consequences for workers experiencing late-in-career workplace injuries and the need for policymakers to consider retirement security among these workers. Prior work has shown that those with work limitations that did not necessarily arise from work are more likely to claim OASI early (e.g., Li et al. 2008) and have fewer resources in retirement (e.g., Wu and Hyde 2019), but this paper provides what the authors believe to be the first evidence on retirement security for older adults who were injured at work later in their careers, as they are approaching retirement. This study shows that these individuals are more likely to retire (and claim OASI) at earlier ages, and changes in their earnings and household income suggest they may be less financially prepared for retirement. Both because the OASI benefit is a function of earnings, and workers with injuries experience persistently lower earnings, and because there is a penalty for claiming at ages younger than the normal retirement age, and workers with injuries retire at younger ages (and perhaps in poorer health), there are likely important implications for the adequacy of Social Security and other retirement benefits. Given that approximately 40 percent of individuals ages 65 and older receive at least half of their income from Social Security, and 13.8 percent receive over 90 percent of their income from Social Security, the lower monthly benefits that result from earlier claiming have lasting consequences (Dushi and Trenkamp 2021). And this work identifies a new group of workers that should be a part of policy conversations concerning benefit adequacy–workers who experience workplace injuries late in their careers.

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Appendix

Table A1: Workers Experiencing New Work-Limiting Health Impairments in the HRS, 1992–2018

A. *HRS Public-use Data*	Unique Individuals	Person-waves
Respondents to the HRS (excluding AHEAD cohort)	33,900	221,660
Drop if injured in 1992	26,024	177,883
Drop if <40 years of age at first interview	25,570	174,750
Meets work requirement Injured: Was working in wave prior to injury Not injured: Worked at least 2 waves while age 50-59	15,254	106,947
Drop if age>65 at injury for injured or if if age>65 at first interview for non-injured	13,672	91,492
Drop those who did not meet criteria to be in injury sample but did experience an injury 1994-2018 (e.g., injury status missing in $t-1$).	13,645	91,306
Drop if state of residence missing or outside U.S.	13,368	91,039
Final sample of non-injured workers (who did not experience any injuries 1994-2018)	10,007	61,063
Experienced first new injury in 1994-2018 (i.e., was not injured in prior wave)	3,631	29,976
Experienced a work-related injury	1,147	9,258
B. *HRS Linked to SSA Data*		
Drop those who could not be linked to corresponding observation in SSA administrative data	8,333	63,436
Final sample of non-injured workers (who did not experience any injuries 1994-2018)	5,876	41,180
Experienced first new injury in 1994-2018 (i.e., was not injured in prior wave)	2,457	22,256
Experienced a work-related injury	817	7,234

Table A2: Mean Demographic Characteristics of HRS Sample of Injured Workers

	(1) Work Not Chronic	(2) Non-work Not Chronic	(3) Work Chronic	(4) Non-work Chronic
Age at injury	57.3	57.9***	57.8	58.1
Male	0.53	0.45***	0.55	0.42***
Married	0.71	0.72	0.74	0.71
Non-Hispanic White	0.61	0.67***	0.64	0.67
Non-Hispanic Black	0.19	0.19	0.19	0.21
Non-Hispanic Other	0.03	0.03	0.04	0.02
Hispanic	0.17	0.11***	0.13	0.10*
Less than high school	0.23	0.16***	0.21	0.22
High school degree	0.36	0.35	0.46	0.36***
Some college	0.27	0.28	0.25	0.25
College or more	0.14	0.21***	0.08	0.17***
Musculoskeletal system, connective tissue	0.74	0.48***	0.79	0.43***
Heart, circulatory, and blood conditions	0.04	0.13***	0.04	0.20***
Allergies, sinusitis, tonsillitis	0.04	0.06	0.04	0.07*
Neurological and sensory conditions	0.04	0.06***	0.02	0.07***
Cancers/tumors or endocrine/digestive	0.03	0.10	0.02	0.07***
Other conditions (incl. emotional/psych.)	0.09	0.13***	0.07	0.11**
Injury type missing	0.02	0.03	0.02	0.04
# of waves observed after injury	4.29	4.45	5.83	5.23***
# of consec. waves report work limitation	1.00	1.00	2.83	3.76***
Expect inj. is temporary (<3mo) at onset	0.12	0.11	0.07	0.05
Observations	853	1559	292	923

Notes: Asterisks in Columns 2 and 4 reflect statistically significant difference between the mean for work injuries and the mean for non-work injuries, within chronic status; * p<0.10, ** p<0.05, *** p<0.01. Sample includes those who are 40–62 years old at first interview and were working for pay in the wave prior to injury. All variables measured at wave respondent first reports injury.

Table A3: Job Characteristics, Workers Experiencing a New Work-Limiting Health Impairment in HRS, 1992–2018
(All variables measured at wave prior to injury [i.e., two years before])

	(1) Work Not Chronic	(2) Non-work Not Chronic	(3) Work Chronic	(4) Non-work Chronic
Wage and salary income (2020$)	44,570	48,935*	47,350	42,750
	(46,629)	(58,475)	(55,181)	(47,278)
Hours worked per week	40.5	38.6***	40.65	38.68**
	(13.3)	(14.6)	(13.1)	(14.0)
Industry:				
Agriculture	0.02	0.03	0.04	0.02*
Mining and construction	0.10	0.07**	0.13	0.06***
Manufacturing	0.18	0.15**	0.21	0.15**
Transportation, communication, pub. util.	0.08	0.06**	0.08	0.05
Wholesale trade	0.04	0.02*	0.05	0.04
Retail trade	0.12	0.10	0.14	0.11
Finance, insurance, and real estate	0.04	0.06***	0.04	0.06
Services	0.38	0.46***	0.27	0.46***
Public Service	0.03	0.05**	0.04	0.05
Occupation:				
Manager	0.06	0.13***	0.05	0.09*
Professional services	0.13	0.17**	0.09	0.17***
Sales	0.08	0.10	0.08	0.10
Clerical, administrative support	0.10	0.14***	0.11	0.14
Personal services	0.23	0.21	0.20	0.24
Mechanics/repair, farming/forestry/fishing	0.06	0.05	0.07	0.05
Construction	0.07	0.04***	0.08	0.05*
Precision production	0.09	0.05***	0.09	0.05**
Operators	0.17	0.10***	0.22	0.11***
Observations	795	1441	266	841

Notes: Asterisks in Columns 2 and 4 reflect statistically significant differences between the mean for work injuries and the mean for non-work injuries, within chronic status; * p<0.10, ** p<0.05 *** p<0.01. Sample includes those who were 40–62 years old at first interview, were working for pay in the wave prior to injury, and have non-missing earnings, hours worked, industry, and occupation.

Table A4: Employer Accommodation of Injured Workers, by Worker Characteristics
(Sample: HRS 1992–2018)

	Share Receiving Accommodation at Time of Injury
All injured workers	0.160
Education	
Less than a high school degree	0.116
High school graduate	0.173
Some college	0.167
College or more	0.171
Injury Type	
Musculoskeletal system, connective tissue	0.187
Heart, circulatory, and blood conditions	0.122
Allergies, sinusitis, and tonsillitis	0.123
Neurological and sensory conditions	0.118
Cancers/tumors or endocrine/digestive	0.152
Other conditions (incl. emotional/psychological	0.132
Industry	
Agriculture	0.082
Mining and construction	0.099
Manufacturing	0.174
Transportation, communication, public utilities	0.127
Wholesale trade	0.100
Retail trade	0.176
Finance, insurance, and real estate	0.161
Services	0.166
Public service	0.211
Occupation	
Manager	0.129
Professional services	0.179
Sales	0.145
Clerical, administrative support	0.187
Personal services	0.170
Mechanics/repair, farming/forestry/fishing	0.124
Construction	0.106
Precision production	0.200
Operators	0.122
N	3,627

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