CENTER for RETIREMENT RESEARCH at BOSTON COLLEGE

HEALTH, DISABILITY, AND THE EVOLVING NATURE OF WORK

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Abstract

This paper explores whether the evolving nature of work has impacted the relationship between health and work-related disability and disability applications through its impact on job demands. Using data from the Health and Retirement Study, supplemented with data on job demands from the Occupational Requirement Survey and Occupational Information Network, we document trends in the association of health and functioning with the risk of experiencing a work-limiting health event and applying for or receiving disability benefits, and assess whether the changing composition of jobs and job demands impacts the strength of this relationship.

The paper found that:

- Job requirements, in particular as they relate to work flexibility and physical demands, are important determinants of disability (DI) applications even accounting for personal health, demographic, and socioeconomic characteristics.
- The relationship between health status and disability applications partially varies by job demands and that relationship is changing over time. For example, the positive relationship between having two or more doctor-diagnosed health conditions and DI applications is attenuated as job flexibility increases and amplified as physical job requirements increase. Moreover, the magnitude of these effects has been larger since the Great Recession.
- Changes over time in job demands are driven primarily by within-occupation changes, meaning that the same jobs have higher requirements today than in the past. DI applicants, in contrast to other workers, their jobs have become more physically demanding over time and they are much more likely to be working in physically demanding jobs. At the same time, their jobs have become more cognitively demanding over time but they are less likely to be working in cognitively demanding jobs.

The policy implications of the findings are:

- Understanding how the evolving nature of work has impacted the relationship between health and work-related disability and disability applications is important for providing benefits to those most in need.

Introduction

The nature of work has changed dramatically as automation and technology, and their effects on job tasks, have increased. Notably, the share of physically demanding jobs has declined (Johnson and Karamcheva 2017; Johnson, Mermin, and Resseger 2007, 2011; Stapleton, Goodman, and Houtenville 2003). These trends have implications for all workers, but especially for those with health and disability issues. Certain health issues that once limited mobility, for example, may no longer prevent workers from successfully performing their job tasks. Indeed, recent research suggests that the share of workers with a health limitation that would prevent them from performing at least one essential requirement for their job has declined in recent decades (Rutledge, Zulkarnain, and King 2019). Evolving job demands may have widened the range of jobs available to American workers over the last two decades, albeit primarily for those with at least some college education (Lopez Garcia, Maestas, and Mullen 2020).

This paper explores whether the evolving nature of work has impacted the relationship between health and work-related disability and disability applications through its impact on job demands. Using data from the Health and Retirement Study (HRS), supplemented with data on job demands from the U.S. Department of Labor's Occupational Requirement Survey (ORS) and the department's Occupational Information Network (O*NET), we document trends in the association of health and functioning with the risk of experiencing a work-limiting health event and applying for or receiving Social Security Disability Insurance (DI) benefits, and assess whether the changing composition of jobs and job demands impacts the strength of this relationship. We find that workers are increasingly employed in occupations that require more qualifications but are less physically strenuous and offer greater workplace flexibility and less hazardous work environments. Job conditions, however, have not improved for all workers. Controlling for other characteristics, we find that job flexibility is negatively related and physical requirements are positively related with reporting work-limiting health conditions and DI applications/receipt. Moreover, these relationships appear to have grown stronger since the Great Recession. In contrast, poor environmental conditions are not significantly related to either of the two outcomes of interest. Overall, the association between poor health and DI applications seems to have strengthened after the Great Recession, with job demands modifying this relationship only to a limited extent. For example, we find that jobs offering more

workplace flexibility reduce the likelihood of DI applications for people with multiple diagnosed health conditions.

Background

Previous studies have examined the relationship between job demands and health and disability (and age, which is highly correlated with both).[1] These studies generally find a strong correlation between health and disability and job demands, where disability and work-limiting health conditions are more prevalent among workers in physically demanding jobs. Other studies have examined the relationship between job demands and applications for DI benefits.[2] Many of these studies find a strong correlation between DI receipt and job demands, with more physically demanding jobs associated with higher rates of DI receipt and non-routine cognitive job demands associated with lower rates of DI receipt.[3] This paper examines the intersection of these relationships using new information on job requirements from the ORS, a nationally representative establishment-based survey that provides information on the key requirements for successfully performing critical functions of different jobs, including physical demands, cognitive and mental demands, poor environmental conditions, and education, training, and experience (Bureau of Labor Statistics 2020).

While most prior job requirement studies[4] relied on the O*NET to construct typologies of objective job demands, the ORS has several distinct advantages. In contrast to the O*NET, the ORS provides more comprehensive information on the cognitive and mental requirements for a job (Bureau of Labor Statistics 2017). Moreover, while the O*NET lacks a full set of job requirements needed for disability adjudication, the ORS was designed with this purpose in mind (Gittleman, Monaco, and Nestoriak 2016).

[1] See Belbase, Sanzenbacher, and Gillis (2016), Dembe et al. (2014), Hudomiet et al. (2017), Nicholas, Done and Baum (2020), Rutledge, Zulkarnain, and King (2019), and Stapleton, Goodman, and Houtenville (2003).
[2] See Harrati and Schmitz (2020), Nicholas, Done and Baum (2020), Rutledge, Zulkarnain, and King (2019), and Wu (2019).
[3] Harrati and Schmitz 2020, however, suggest that access to opportunities (which are influenced by race and ethnicity, education, and socioeconomic status) is more strongly associated with DI than job demands.
[4] See Belbase, Sanzenbacher, and Gillis (2016), Hudomiet et al. (2017); Johnson, Mermin, and Resseger (2011), Nicholas, Done and Baum (2020), and Schimmel Hyde, Wu, and Gill (2020).

Data

The data for this analysis starts with the HRS, a large national survey of older Americans conducted by the University of Michigan for the National Institute on Aging. The HRS began in 1992 with interviews from a sample of non-institutionalized Americans born between 1931 and 1941 (when they were ages 51 to 61) and their spouses (regardless of age). Respondents are interviewed every two years. The survey interviewed additional cohorts in subsequent years so that it now represents the U.S. population ages 51 and older.[5]

The HRS is particularly appropriate for this study. It provides detailed longitudinal information on health status, impairments, work-related disability, disability applications, and employment history, as well as other individual characteristics and economic resources. The restricted-access HRS also provides detailed occupation codes, which we use to merge information from the ORS and the O*NET to describe the job requirements of respondents' current and previous jobs. We do this using a crosswalk between Census codes in the HRS and Standard Occupation Classification (SOC) codes in the ORS and O*NET.[6]

The ORS is a nationally representative survey of establishments in private industry and state and local government, conducted by the Bureau of Labor Statistics. Its purpose is to collect information needed to understand the requirements, as they pertains to critical job functions, of a full range of U.S. jobs. It measures four requirements: 1) cognitive and mental requirements (i.e., the soft skills needed for specific jobs and the demands related with the use of judgment, decision-making, interaction with others, and adaptability to changes in a job); 2) education, training, and experience; 3) poor environmental conditions (i.e., various hazards at or in proximity to where the job is being performed); and 4) physical requirements. Although comprehensive, the ORS by design excludes several categories of workers, including those employed by federal and quasi-federal agencies, workers in agriculture, forestry, fishing, and hunting establishments, contractors and workers employed by private households, self-employed workers, unpaid workers and volunteers, those receiving long-term disability compensation, and those working overseas.

[5] In 1993, the survey added adults born before 1924 (when they were age 70 or older) and their spouses. In 1998, it added adults born between 1924 and 1930 (when they were ages 68 to 74) and their spouses. Every six years, beginning in 1998, the HRS adds another new sample of Americans ages 51 to 56.

[6] See https://sites.google.com/site/phudomiet/research/ for the crosswalk.

In our research, we use the preliminary second wave estimates from the 2021 reference year, which includes three of the five samples planned for the full second wave of the survey. There are 14,500 private and 3,000 state and local establishments that provided information as of 2021, representing almost 136 million civilian workers. Although preliminary, the advantage of the second ORS wave is that it includes cognitive and mental requirements, which are important in the context of disability-related research. For example, cognitive and mental requirements information could allow us to understand whether individuals with mental health issues may be able to perform certain jobs (e.g., jobs that provide flexibility with respect to the work pace), and no similar data exist from other sources (Cluskey and Monaco 2021). In our descriptive and inferential analyses, we rely on indices of job demands that summarize information on select job requirements from each category of requirements. Our index of job flexibility is based on select cognitive and mental requirements variables that focus on the flexibility of performing a job: not having a supervisor, being able to pause work, performing self-paced work, and being able to telework. The education, training, and experience index summarizes information on credentials required for a job: a bachelor's degree, prior work experience, on-the-job training, and specific vocational preparation of 2 years or more.[7] The poor environmental conditions index includes: exposure to extreme cold or heat, hazardous contaminants, heavy vibrations, heights, humidity, loud noise, wetness, frequent or constant outdoors exposure, and proximity to moving mechanical parts. Finally, the physical requirements index summarizes information on the need to work in low postures (i.e., crawling, crouching, kneeling, or stooping), climb structures (e.g., ladders, scaffolds, work-related ramps or stairs), have good (far and/or peripheral) vision, have foot or leg control, be able to hear remote speech and other sounds (not including hearing over the phone), lift or carry at least 25 pounds at least occasionally, push or pull with feet/legs and/or arms/hands, reach overhead, and possess heavy or very heavy strength levels. Each individual job requirement included in an index is first dichotomized and coded as 1 if above a 25 percent threshold (i.e., if at least 25 percent of jobs in an occupation satisfy the requirement) and 0

[7] Since our index of education, experience, and training requirements is highly correlated with the job flexibility index, and the model specification that included both indices suffered from multicollinearity, we use the education, experience, and training requirements index in the descriptive analysis only.

otherwise, and the resulting indicator variables are summed up to derive an index for each of the four groups of ORS job requirements.[8]

The O*NET is a database that describes the job demands of occupations based on a catalog of job attributes, including requirements (such as skills, abilities, and work styles) and how the work is performed (e.g., activities and work contexts). O*NET rates each job attribute from 1 to 5, where 1 indicates that a job attribute is "not important" to performing the job and 5 indicates that a job attribute is "extremely important." Our main O*NET analyses use O*NET 5.0, which was released in April 2003 and is recommended as the starting point for longitudinal analyses,[9] and O*NET 21.1, which was released in November 2016. O*NET 5.0 uses the 2000 SOC codes and O*NET 21.1 uses the 2010 SOC codes. We use several O*NET produced crosswalks to make these comparable, including one for 2000 to 2006,[10] one for 2006 to 2009,[11] and another for 2009 to 2010.[12]

We categorize O*NET job attributes into four domains representing different types of job demands: physical, cognitive, difficult work conditions, and stressful work conditions. We use the typology developed by Johnson, Mermin, and Resseger (2007, 2011) and Johnson and Karamcheva (2017) and make several adjustments. Physical job demands include the need for strength (dynamic, explosive, static, and trunk), handling and moving objects, stamina, bending, climbing structures, keeping or regaining balance, kneeling, crouching, stooping, crawling, standing, walking, running, quick reaction time, gross body equilibrium, making repetitive motions, performing general physical activities, using hands to manipulate objects, arm-hand steadiness, extant flexibility, finger dexterity, manual dexterity, and good vision (depth perception, far vision, and near vision). Cognitive job demands include reasoning (deductive, inductive, and mathematical), originality, written expression, thinking creatively, complex problem solving, judgment and decision making, science, getting information, processing information, letters and memos, making decisions and solving problems, active learning, critical thinking, working with computers, and electronic mail. Difficult conditions include exposure to

[8] To test the sensitivity of our findings, we also increased the threshold to 33.3 percent and, alternatively, 50 percent of jobs in an occupation. The results (not shown) of our descriptive and inferential analyses remain largely consistent.
[9] https://www.onetcenter.org/db_transitional.html
[10] https://www.onetcenter.org/taxonomy/2006/walk.html
[11] https://www.onetcenter.org/taxonomy/2009/walk.html
[12] https://www.onetcenter.org/taxonomy/2010/walk.html

cramped workspaces, contaminants, hazardous conditions, hazardous equipment, whole body vibrations, indoors that are not environmentally controlled, outdoors, very hot or cold temperatures, and distracting or uncomfortable noise levels. Stressful conditions include dealing with unpleasant or angry people, establishing and maintaining interpersonal relationships, social perceptiveness, frequency of conflict situations, level of competition, time pressure, and updating and using relevant knowledge.

Our analyses use pooled data from the 1998 through 2016 HRS waves.[13] We focus on respondents ages 55 to 61. We include those currently working as well as those not working because they have a work limitation, disability, or because they receive DI benefits. For those not working, we record the occupation of their most recent job. We exclude respondents who missed a full interview in any wave, had zero weights, or had missing detailed occupation codes, work limitations, disability, or DI information. Our sample includes 12,500 respondents representing 26,621 person-years in the ORS analyses and 13,706 respondents representing 30,010 person-years in the O*NET analyses.

Our outcomes of interest are work-related limitations and DI applications and receipt. Work-related limitations indicate whether the respondent reports having a disability or that health limits the kind or amount of paid work. DI indicates whether the respondent applied for or receives DI benefits. Our models also control for various demographic, socioeconomic, and health characteristics of respondents. Demographic controls include age, HRS sample cohort (HRS, born 1931 to 1941, War Babies born 1942 to 1947, Early Baby Boomers born 1948 to 1953, Mid Baby Boomers born 1954 to 1959, Late Baby Boomers born 1960 to 1965), sex, race and ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, and Asian/Native American/other), and relationship status (married or partnered, divorced or separated, widowed, and never married). Socioeconomic controls include educational attainment (less than a high school diploma, high school diploma or GED, some college, and college degree or above), and household income and household wealth (both transformed using inverse hyperbolic sine transformation). Health controls include self-rated health (excellent or very good, good, and fair or poor), poor mental health (coded as 1 if a respondent reported experiencing at least two

[13] Although the HRS is currently available through 2018, the detailed occupation codes are not yet available.

symptoms of depression in the week prior to the interview, 0 otherwise),[14] and two or more physician-diagnosed health conditions.[15] Additionally, to account for the possible impact of the Great Recession, several of our analyses distinguish the period following the recession (i.e., survey wave 2010 and later) from the period preceding it.[16]

Methods

We begin by documenting trends in how health and impairments are associated with the risk of experiencing a work-limiting disability and applying for disability benefits. In addition to examining overall trends, we also explore trends by cohort and, in the supplementary analysis, trends stratified by the sex, race and ethnicity, and educational attainment.

Multivariate Analyses

We next model the likelihood of experiencing a work-limiting health condition and applying for DI, and examine how these relationships vary by health status and job demands. More specifically, we fit a recursive bivariate probit model, which allows us to estimate two dichotomous processes that are related to one another (Nichols 2011; Greene 2012). The first one is a work-limiting health condition, specified in the equation below as a binary indicator, *L*, and the second one is a DI application indicator, *D*. The recursive bivariate probit empirical model is specified below as a function of a vector of respondents' health characteristics (H_{it}), job demands (J_i), and other demographic and socioeconomic factors (X_{it}), where *i* represents the respondent and *t* represents time. It also includes *L* as a predictor in the DI application equation to reflect the idea that a self-reported work limitation is likely to be strongly related with the decision to apply for disability benefits. Because of endogeneity, the correlation between ε_{it}^{L} and ε_{it}^{D} is not equal to zero, but the bivariate probit allows us to estimate the correlation between the two processes and gives unbiased estimates of the parameters. Since there are multiple

[14] The symptoms include feeling: 1) depressed, 2) lonely, 3) sad, 4) everything an effort, 5) having a restless sleep, 6) could not get going, 7) feeling happy, and 8) enjoyed life. As the last two items are positive, they are coded as one in the absence of a respondent reporting that she/he felt happy or enjoyed life during the reference period.
[15] The conditions include: 1) high blood pressure or hypertension, 2) diabetes or high blood sugar, cancer or a malignant tumor of any kind except skin cancer, 3) chronic lung disease except asthma such as chronic bronchitis or emphysema, 4) heart attack, 5) coronary heart disease, angina, congestive heart failure, or other heart problems, 6) stroke or transient ischemic attack, 7) emotional, nervous, or psychiatric problems, and 8) arthritis or rheumatism.
[16] Although the recession officially lasted between December 2007 and June 2009, its full impact on the variables of interest in this study would be observed in the 2010 wave of the HRS.

observations for each respondent, we use robust standard errors to account for heteroskedasticity.

$$L_{it} = \beta_{0L} + H_{it}\beta_{1L} + J_i\beta_{2L} + X_{it}\beta_{3L} + \varepsilon_{it}^{L}$$
$$D_{it} = \alpha_{0L} + H_{it}\alpha_{1D} + J_i\alpha_{2D} + X_{it}\alpha_{3D} + \alpha_{4D}L_{it} + \varepsilon_{it}^{D}$$

We first proceed by fitting a model with sociodemographic controls only, sequentially adding health characteristics and job demands (model specifications 2 and 3), followed by a full model that includes interactions of health characteristics and job demands for the full sample and stratified by pre- and post-Great Recession periods (model specifications 4 through 6).

Although a bivariate probit allows us to model related processes, we also want to account explicitly for the full impact of job demands on disability applications. To do so, we next specify a *structural equation model* with a system of equations (logistic regressions) that allows us to capture both direct and indirect relationships between disability applications and predictors of interest. We estimate this model for the full sample (model specification 1) as well as stratified by pre- and post-Great Recession periods (specifications 2 and 3).

Decomposition of Changes Over Time in Job Demands

Because the ORS data currently lacks historical information on job requirements, we next use the O*NET data to analyze changes in occupational requirements over time. First, we consider changes in the average rating of job attributes for respondents' jobs. Then we consider changes in the share of older workers who are employed in jobs with high demands, which we define as having at least one job attribute with a rating of 4 or 5.

We decompose the total change in job demands into within-occupation and between-occupation changes. The within-occupation change captures changes in the average attribute rating for each occupation (or changes in the share of occupations with high demands) weighted by the distribution of occupations in period 1. The between-occupation change captures changes in the composition of occupations weighted by the average attribute rating for each occupation in period 2 (or the share of jobs with high demands in period 2).[17] Our decomposition is computed as:

[17] Our methodology is similar to the methodology in Lopez Garcia, Maestas, and Mullen (2020).

Total Change = Within-Occupation Change + Between-Occupation Change

$$\sum_{n=1}^{N}(s_{n,P2}X_{n,P2}) - (s_{n,P1}X_{n,P1}) = \sum_{n=1}^{N} s_{n,P1}(X_{n,P2} - X_{n,P1}) + \sum_{n=1}^{N} X_{n,P2}(s_{n,P2} - s_{n,P1})$$

where $s_{n,p}$ is occupation n's share of all occupations in period P and $X_{n,p}$ is the average attribute rating of occupation n in period P. Job requirements have declined over time when the within-occupation change in job demands is negative and they have increased over time when the within-occupation change is positive. Fewer workers are in these jobs when the between-occupation change is negative, and more workers are in these jobs when the between-occupation change is positive.

We analyze changes in jobs demands for each domain (physical, cognitive, difficult work conditions, and stressful work conditions). Within each job demand domain, we compare changes in job demands for older workers without work-related health limitations, those with work-related limitations who did not apply for disability benefits, and those who applied for or receive DI benefits.

We pool HRS waves to increase our sample size and then compare changes in job demands between an earlier period (pooled years that include 1998, 2000, and 2002) and a later period (pooled years that include 2012, 2014, and 2016). We assign the 2003 O*NET attributes to the earlier period and the 2016 O*NET attributes to the later period.

Results

Between 1998 and 2016, job flexibility and education, training, and experience indices increased, while poor environmental conditions and physical requirements indices generally declined, although these patterns largely disappeared in more recent HRS survey waves (Table 1). This suggests that, on the whole, workers are increasingly employed in occupations that require more qualifications but offer greater workplace flexibility and less hazardous work environments and are less physically strenuous.

As expected, those not reporting any work limiting health issues who neither applied for nor receive disability benefits are employed in jobs that require the highest average level of education and offer most the workplace flexibility as well as the least hazardous and physically challenging work conditions (Figure 1). Among older adults with a work-limiting health

condition, those who applied for or receive DI benefits work in considerably more challenging jobs than those who did not apply for these benefits. Breaking these results down into pre- and post-Great Recession periods, we find that those applying for or receiving DI benefits follow a distinct pattern relative to others: on average, they are in occupations that have decreasingly less workplace flexibility and lower educational and training requirements, yet are increasingly environmentally hazardous and especially physically strenuous (Table 2). Given that this runs counter to overall trends in job requirements, it suggests that those who apply for and receive DI benefits may comprise an increasingly select subset of workers. It is unclear, however, to what extent this might be a period or a cohort difference, given that when we compare DI applicants and recipients in the War Babies (WB) and Early Baby Boomers (EBB) cohorts, two cohorts in our sample that are fully comparable, we find that the occupations of EBB workers are environmentally and physically more challenging than those of WB workers, although there is no clear distinction with respect to the other two indices (Figure 2). Patterns by period for those with and without work-limiting health conditions who have not applied for or received DI benefits also largely correspond to the observed differences between WB and EBB cohorts.

Our sample profile suggests that almost three times as many adults ages 55-61 report some work-limiting health issue than apply for or receive DI benefits (Table 3). Our sample comprises a similar proportion of women and men, with about 79 percent of them being non-Hispanic whites and an increasing share of people of color over time. Although the share of married or partnered adults ages 55-61 remains high and relatively stable over time, there is an increase in the share of never married and a decline in the share of widowed adults. Our analytic sample has also become better educated over time. Their health profile, however, has remained relatively unchanged over time—with slightly fewer adults reporting excellent or very good health and slightly more reporting two or more physician-diagnosed health conditions, but somewhat offset by a small decline in the proportion of those reporting poor mental health.

Multivariate Analyses

The first model specification in Table 4, which controls for demographic and socioeconomic characteristics of respondents, shows that age and being a widow(er) are positively related with having a work-limiting health condition and applying for disability benefits. Conversely, Hispanics, better educated individuals and those with more resources are

less likely to have a health-related work limitation and apply for disability benefits. Additionally, being non-Hispanic Black is associated with a higher likelihood of having a work-limiting health condition and being divorced/separated with a lower likelihood. Relative to the original HRS cohort, other cohorts are less likely to report having work-limiting health conditions and DI applications, with the likelihood of DI applications falling with each successive cohort.

In the second model specification we add subjective and objective measures of health, which are strongly positively associated with the outcomes of interest. The third specification adds job requirements indices and the results suggest that job flexibility is negatively related with work-limiting health conditions and that DI applications/receipt, and physical requirements are positively related with those outcomes, whereas poor environmental conditions are not significantly related with either of the two outcomes. Importantly, the association between health and work-limitations and DI application/receipt is largely unchanged. The fourth model specification adds interactions of health variables with the indices of job requirements. The main effects of the health measures on work limitations remain positive and statistically significant. Most main effects of the health measures on DI applications also remain positive; however, the coefficient on fair/poor health does not reach statistical significance and the coefficient on mental health issues becomes negative albeit statistically insignificant. The interaction terms suggest that the positive association between two or more health conditions and work limitations and DI applications is attenuated for more flexible jobs, and that the positive association between mental health issues and work limitations increases the worse the environmental conditions are. The interaction terms for fair/poor health and job flexibility and for fair/poor health and physical requirements are also statistically significant; however, their signs are the opposite of what we would expect. A possible explanation could be that people in fair or poor health self-select into jobs that better accommodate their health, making them less likely to report work-related limitations or to apply for disability benefits. This conjecture, however, requires further examination.

Stratifying the model by pre- and post-Great Recession periods (fifth and sixth model specifications, respectively), we find that objective health measures are more strongly positively associated with work limitations and all health measures are more strongly positively associated with DI applications in the period following the Great Recession. Moreover, the effect of job

requirements on the relationship between health measures and work limitations and DI applications has, in some cases, changed since the Great Recession. For example, job flexibility matters more after the recession with respect to its effect on the relationship between two or more health conditions and both work limitations and DI applications. Additionally, poor environmental conditions matter more after the recession with respect to their effect on the relationship between mental health issues and DI applications.[18] We generally find similar results using O*NET.[19]

In Table 5, we repeat the analysis from the recursive bivariate probit model specifications 4-6 using a structural equation model approach to account for the indirect effects of health, job demands, and other predictors on disability applications through their effects on work limitations. Some health measures (i.e., fair/poor health and two or more health conditions) have a direct positive relationship with disability applications, even after controlling for health-related work limitations; however, all health measures exhibit a strong indirect impact on DI applications through their association with work limitations. Regarding job demands, only physical job requirements has a statistically significant positive direct and indirect association with disability applicants; its direct effect is only marginally significant while its indirect effect is strongly significant.

Similar to the bivariate probit regression results, in some model specifications, the interaction terms for fair/poor health (as well as good health) and job flexibility and physical requirements exhibit statistically significant relationships with DI applications but with opposite signs than what we initially expected. Conversely, the interaction of two or more physician-diagnosed health conditions and job flexibility is negatively, while the interaction of two or more physician-diagnosed health conditions and physical job demands is positively associated with DI applications after the recession. Additionally, the interaction of mental health issues and poor environmental conditions is positively associated with DI applications after the recession. Other model predictors, including demographic and socioeconomic control variables, also exhibit strong indirect links with DI applications through their association with work-limiting health

[18] Based on the preliminary descriptive analysis and prior evidence, we also examine models with three-way interactions of health characteristics and job demands with sex, race and ethnicity, and educational attainment, respectively. Selected results from this analysis are presented in Appendix A.
[19] These results are presented in Appendix B.

conditions, suggesting that their overall impact on DI applications is substantially larger than their direct impact on this outcome of interest.

Decomposition of Changes Over Time in Average Rating of Older Workers' Job Attributes

Next, we decompose the change in job demands over time. Using O*NET, we find that older workers are less likely over time to be employed in sales, precision production/repair, and operator/laborer occupations and they are more likely to be employed in professional and technician occupations (Table 6). DI recipients are less likely than other workers to be in professional occupations in both early and later years. Moreover, their representation in these occupations has declined over time while it has increased for other workers. Although older workers overall are more likely over time to be employed as technicians, the increase is driven entirely by other workers—DI recipients experienced no change (or even a slight decline). DI recipients are also more likely than other workers to be in food/cleaning service and personal care occupations in both periods and their representation in these occupations has increased over time while it has declined for other workers. Sales occupations have also become more common for DI recipients, but less common for other workers. Despite some changes in the occupational composition of workers, DI recipients are most likely to be employed as operators and laborers, workers with limitations who do not collect DI benefits are most likely to be employed in office or administrative occupations, and workers without work limitations are most likely to be in management and professional occupations; this pattern has not changed over time.

Considering older workers' job demands measured using the average rating of their job attributes, we find that job demands have increased over time for all workers and in every job demand domain that we observe (Table 7). The smallest increase is in physical job demands, followed by difficult work conditions, cognitive job demands, and stressful work conditions. Workers who applied for or receive DI benefits experienced the largest increase in job demands with physical requirements, difficult work conditions, and stressful work conditions, and the smallest increase in job demands with cognitive requirements.

Next, we consider how much of the observed increase in older workers' job demands is because today's jobs have higher requirements than the same jobs did in previous years (i.e., within-occupation change) or because today's workers are more likely than in previous years to

be employed in jobs that have relatively high job requirements (i.e., between-occupation change).

We first describe decomposing the change in job demands over all workers. We find, as in Lopez Garcia, Maestas, and Mullen (2020), that the changes over time are driven primarily by within-occupation changes (Table 8). Moreover, within-occupation changes are positive for every job domain indicating that all job requirements have increased over time. Between-occupation changes are negative (-0.015) for physical job requirements and difficult work conditions (-0.033), indicating that older workers are less likely over time to be employed in jobs with these requirements, and they are positive for cognitive job requirements (0.022) and stressful work conditions (0.003) indicating that workers are becoming more likely over time to be employed in jobs characterized by these demands.

There are differences, however, by work limitations and DI application. Within the domain of physical job requirements, the between-occupation change is positive for DI applicants indicating that over time they are more likely to work in these jobs. This contrasts with workers without work limitations and those with work limitations who do not receive DI for whom the between-occupation change is negative. Within the domains of cognitive job requirements and stressful work conditions, between-occupation changes are negative for DI applicants indicating that over time they are less likely to work in these jobs. For other workers, between-occupation job changes are positive. Finally, the between-occupation change for jobs with difficult work conditions is negative for all workers but smallest for DI applicants. So, while DI applicants, like other workers, are less likely over time to work in jobs with difficult work conditions, they experienced a smaller decline. Overall, these results are consistent with the notion that DI applicants follow a distinct pattern of changes relative to other workers and may be increasingly select with respect to the characteristics of jobs that they work in.

Decomposition of Changes Over Time in Share of Older Workers in Jobs with High Demands

Next, we examine changes over time in the proportion of older workers in jobs with high demands, defined as job attribute ratings of 4 or 5. Between the 1998-2002 and 2012-2016 periods, the overall share of older workers in jobs with high physical demands jobs declined, while the share in jobs with high cognitive demands increased (Table 9). Older workers are also

more likely over time to be in jobs with highly difficult work conditions and jobs that are highly stressful.

As expected, older workers who applied for or receive DI benefits are most likely to have jobs that are highly physical or have highly difficult work conditions, and they are least likely to have jobs that are highly cognitive or have highly stressful work conditions. In contrast, older adults without work-related limitations and who do not receive DI benefits are least likely to have jobs that are highly physical and they are most likely to have jobs that are highly cognitive or have highly stressful work conditions. In the 2012-2016 period, for example, 53.3 percent of DI applicants and beneficiaries are or were in jobs with high physical demands, compared with 33.6 percent of older adults with work-related limitations but who did not apply for or do not receive DI benefits and only 28.4 of older adults without work limitations. In contrast, 56.8 percent of DI applicants and beneficiaries have jobs with high cognitive requirements compared with 75.2 percent of respondents with work limitations but no DI benefits, and 79.7 percent of those without work limitations. Seemingly counterintuitive is the relationship between stressful work conditions and work limitations and DI. We find fewer workers in highly stressful jobs among those who applied for or receive DI benefits (49.0 percent) than among those with work limitations and no DI benefits (57.0 percent) and those with no work limitations and no DI benefits (62.0 percent).

Importantly, these relationships have changed over time. Although the overall prevalence of workers in highly physical jobs has declined over time, DI applicants and beneficiaries are more likely to work in these jobs in later years than they were in earlier years—an increase from 47.4 to 53.3 percent. In contrast, those who have not applied for DI benefits have become less likely to work in highly physical jobs. All workers, regardless of work limitations or DI application status, are more likely to have jobs with high cognitive demands in later years than in earlier years. Still, even in the 2012-2016 period, DI applicants and beneficiaries are least likely to work in these jobs.

Table 10 shows that the overall decline of workers in jobs with high physical demands is accounted for by a decline in both within- and between-occupation changes (bolded numbers). That is, fewer jobs in later years have high physical job requirements (within-occupation change) and older workers are less likely to be in these jobs (between-occupation change). In contrast, the overall increase of workers in jobs with high cognitive demands is accounted for by an

increase in both within- and between-occupation changes. That is, more jobs in later years have high cognitive job requirements and older workers are more likely to be in these jobs. The within-occupation change also shows that more jobs in later years have highly difficult work conditions and highly stressful work conditions, while the between-occupation changes show that older workers are less likely to be in these jobs.

Again, there are differences by work limitations and DI application. Within the domain of high physical requirements, both the within and between-occupation changes are positive for DI applicants but negative for other workers. Moreover, the within-occupation change is substantially smaller than the between-occupation change for DI applicants, but the opposite is true for other workers. For DI applicants, their jobs have become somewhat more highly physically demanding over time but they are much more likely to be working in these highly physical jobs. For other workers, their jobs have become less physically demanding over time and they are somewhat less likely to be working in highly physical jobs.

Older workers who applied for or receive DI benefits experienced a smaller percentage point increase over time in jobs with high cognitive demands than did other older workers. However, while the between-occupation change is positive for the latter group of older workers, it is negative for DI beneficiaries. That is, over time, DI beneficiaries, in contrast to other workers, are less likely to work in jobs with high cognitive demands. Regarding highly difficult and highly stressful work conditions, decomposing the changes does not reveal large differences between workers by work limitation and DI application status. All older workers' jobs in later years are more likely to have highly difficult or highly stressful work conditions; however, all older workers are less likely to be in these jobs. Their notably larger between-occupation change suggests that DI applicants are especially less likely to be in highly stressful jobs in later years than they were in earlier years.

Discussion

This paper examines whether changes in the composition of jobs in the economy and job demands has altered systematically the relationship between health status and experiencing work-limiting disability or applying for DI benefits. Our findings suggest that Americans are increasingly working in jobs that require more education, experience, and training, but also offer more workplace flexibility, whereas poor environmental conditions and especially physical

requirements are arguably becoming less challenging on average. Simultaneously, those applying for and/or receiving DI benefits come from an increasingly select group of workers facing worsening job conditions and increasing work requirements. Model results confirm that job requirements, in particular as they relate to work flexibility and physical demands, are important determinants of DI applications even accounting for personal health, demographic, and socioeconomic characteristics, and tentatively suggest that this relationship may have strengthened over time. The strength of the relationship between workplace flexibility and disability application is consistent with prior findings that, among all the job requirements, work environment is most comparable in importance to relevant personal characteristics such as socioeconomic status or race/ethnicity (Harrati and Schmitz 2020). Furthermore, we find that the relationship between health status and disability applications partially varies by job demands and has changed over time. For example, the positive relationship between having two or more physician-diagnosed health conditions and DI applications is attenuated as job flexibility increases and amplified as physical job requirements increase. Moreover, the magnitude of these effects is larger after the Great Recession than before. The results improve our understanding of how well different measures of physical, cognitive, and mental health correlate with work disability and disability applications in the context of today's job demands, and if and how the relationship has changed over time. Furthermore, the decomposition analysis gives us a better sense of how job requirements have changed within occupations. This is a critical consideration in the context of recent evidence (e.g., Lopez Garcia et al. 2020) on the high importance of intra-occupational vis-à-vis inter-occupational trends in job requirements for disability applications, a finding that is also strongly supported in our analysis.

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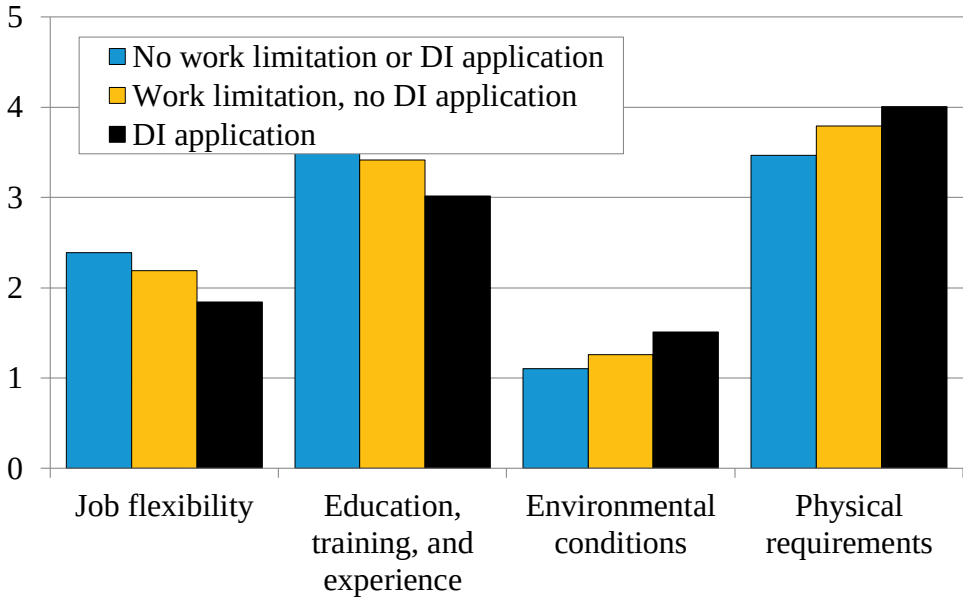
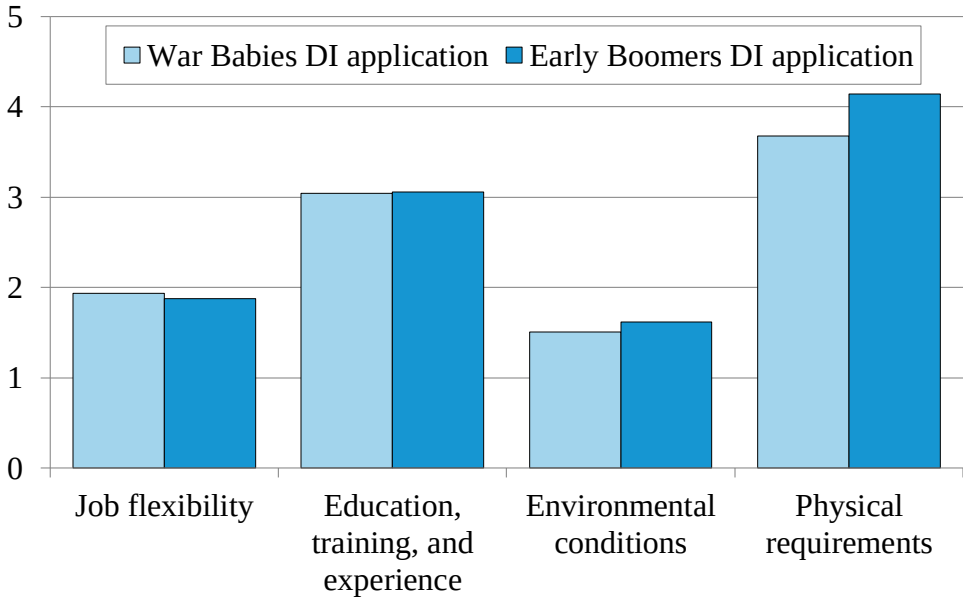
Figures

Figure 1. *ORS Job Requirements by Work Limitation and DI Application Status*



Sources: ORS 2021; HRS 1998-2016.

Figure 2. *ORS Job Requirement Indices for DI Applicants, by Cohort*



Sources: ORS 2021; HRS 1998-2016.

Tables

Table 1. *ORS Job Requirement Indices, by Year*

Year	Job flexibility	Education, training, and experience	Poor environmental conditions	Physical requirements
1998	2.238	3.448	1.209	3.614
2000	2.294	3.478	1.189	3.610
2002	2.325	3.488	1.132	3.490
2004	2.325	3.493	1.143	3.525
2006	2.293	3.502	1.122	3.425
2008	2.317	3.508	1.134	3.457
2010	2.383	3.537	1.054	3.421
2012	2.394	3.572	1.096	3.555
2014	2.366	3.530	1.177	3.623
2016	2.380	3.576	1.153	3.546

Sources: ORS 2021; HRS 1998-2016.

Table 2. *ORS Job Requirement Indices, by Period*

	Before Great Recession		
	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	2.35	2.13	1.89
Education, training, and experience	3.53	3.38	3.04
Poor environmental conditions	1.11	1.30	1.49
Physical requirements	3.46	3.82	3.79
	After Great Recession		
	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	2.43	2.26	1.79
Education, training, and experience	3.60	3.46	2.98
Poor environmental conditions	1.09	1.21	1.54
Physical requirements	3.47	3.76	4.25
	Change in index value after relative to before Great Recession		
	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	3.7%	6.1%	-5.0%
Education, training, and experience	2.0%	2.4%	-2.1%
Poor environmental conditions	-2.3%	-7.3%	3.3%
Physical requirements	0.3%	-1.4%	12.0%

Sources: ORS 2021; HRS 1998-2016.

Table 3. *Sample Means for the ORS-Based Analysis, by Period*

	Before Great Recession	After Great Recession	Total
Work-limiting health condition	0.13	0.14	0.14
Disability application or receipt	0.05	0.06	0.05
Cohort			
HRS	0.18		0.09
War Babies	0.49		0.25
Early Baby Boomers	0.33	0.31	0.32
Mid Baby Boomers		0.60	0.29
Late Baby Boomers		0.09	0.04
Age (in years)	57.71	57.81	57.76
Female	0.52	0.50	0.51
Race and ethnicity			
Non-Hispanic White	0.82	0.77	0.79
Non-Hispanic Black	0.09	0.10	0.09
Hispanic	0.07	0.09	0.08
Other	0.03	0.04	0.04
Relationship status			
Married/partnered	0.73	0.72	0.73
Divorced/separated	0.17	0.17	0.17
Widowed	0.05	0.03	0.04
Never married	0.04	0.08	0.06
Educational attainment			
Less than high school degree	0.10	0.06	0.08
High school degree/GED	0.32	0.28	0.30
Some college	0.27	0.30	0.28
College degree or above	0.32	0.36	0.34
IHS household income	12.00	11.88	11.94
IHS household wealth	12.02	10.73	11.39
Self-reported health status			
Excellent/very good	0.54	0.52	0.53
Good	0.29	0.31	0.30
Fair/poor	0.16	0.17	0.17
Two or more health conditions	0.36	0.40	0.38
Any mental health issue	0.28	0.25	0.26
Job flexibility index	2.30	2.37	2.34
Poor environmental conditions index	1.11	1.11	1.11
Physical requirements index	3.45	3.52	3.48
N	14,361	12,260	26,621

Sources: ORS 2021; HRS 1998-2016.

Table 4. *Recursive Bivariate Probit Results for the ORS-Based Analysis*

	(1)		(2)		(3)		(4)		(5)		(6)	
	Work limitation	**DI application**	**Work limitation**	**DI application**	**Work limitation**	**DI application**	**Work limitation**	**DI application**	**Work limitation**	**DI application**	**Work limitation**	**DI application**
Cohort (ref. HRS)												
War Babies	-0.0983*	-0.0877	-0.1288**	-0.1471*	-0.1289**	-0.1438*	-0.1281**	-0.1416*	-0.1298**	-0.0926		
Early Baby Boomers	-0.0986*	-0.1105+	-0.1568***	-0.1860**	-0.1599***	-0.1889**	-0.1588***	-0.1872**	-0.1884***	-0.2176*		
Mid Baby Boomers	-0.0917*	-0.1414*	-0.1324**	-0.2142**	-0.1346**	-0.2175**	-0.1323**	-0.2157**			0.0434	-0.0585
Late Baby Boomers	-0.1231*	-0.1464	-0.2409***	-0.2432+	-0.2449***	-0.2584+	-0.2403***	-0.2596+			-0.0482	-0.1789
Age (in years)	0.0336***	0.0765***	0.0204***	0.0789***	0.0204***	0.0795***	0.0210***	0.0800***	0.0103	0.0888***	0.0306***	0.0515***
Female	0.0536*	-0.0314	0.0162	-0.0608	0.0328	-0.0596	0.0347	-0.0595	0.0054	-0.0315	0.0561	-0.0060
Race and ethnicity (ref. non-Hispanic White)												
Non-Hispanic Black	-0.0818*	0.1892***	-0.1781***	0.1956***	-0.1896***	0.1798**	-0.1909***	0.1824**	-0.1671**	0.2635***	-0.2295***	-0.0871
Hispanic	-0.3146***	-0.1664+	-0.4346***	-0.2006*	-0.4410***	-0.2123*	-0.4340***	-0.2060*	-0.3559***	-0.0673	-0.4562***	-0.4908***
Other	-0.0173	-0.0553	-0.1151	-0.0540	-0.1166	-0.0490	-0.1251+	-0.0579	-0.1346	-0.2098	-0.1296	-0.0730
Relationship status (ref. married/partnered)												
Divorced/separated	0.0717*	-0.0474	0.0168	-0.0387	0.0170	-0.0383	0.0153	-0.0329	-0.0288	-0.1077	0.0492	0.0402
Widowed	0.1365**	0.0644	0.0970+	0.1056	0.0984+	0.1065	0.0968+	0.1021	-0.0468	-0.0328	0.2493**	0.3491***
Never married	0.0408	-0.0533	0.0193	-0.0186	0.0169	-0.0255	0.0120	-0.0215	-0.0946	0.1200	0.0507	-0.0323
Educational attainment (ref. less than high school degree)												
High school degree/GED	-0.0834*	-0.1574*	0.0753+	-0.1512*	0.0860+	-0.1350*	0.0795+	-0.1331+	0.1041+	-0.1493+	0.0887	-0.0184
Some college	-0.0976*	-0.2361**	0.1702***	-0.2298**	0.1929***	-0.1922*	0.1853***	-0.1904*	0.1542*	-0.2421*	0.2616***	0.0730
College degree or above	-0.3580***	-0.4180***	0.0384	-0.4389***	0.0829	-0.3649***	0.0785	-0.3675***	0.0203	-0.2573*	0.1810*	-0.1882
IHS household income	-0.0909***	-0.0392**	-0.0679***	-0.0514***	-0.0661***	-0.0496***	-0.0657***	-0.0492***	-0.1186***	-0.0587**	-0.0473***	-0.0565***
IHS household wealth	-0.0210***	-0.0091*	-0.0090***	-0.0104***	-0.0088***	-0.0101***	-0.0088***	-0.0102***	-0.0055+	-0.0117**	-0.0105***	-0.0128***
Self-reported health status (ref. excellent/very good)												
Good			0.4491***	0.0355	0.4467***	0.0325	0.3939***	0.0517	0.3923***	-0.0662	0.3805***	0.3274+
Fair/poor			1.1974***	0.2003+	1.1938***	0.2004+	1.1889***	0.2983	1.3064***	0.1414	1.0319***	0.8603***
Two or more health conditions			0.4496***	0.4406***	0.4503***	0.4388***	0.5819***	0.5622***	0.5387***	0.4772**	0.6576***	0.8539***
Any mental health issue			0.3951***	0.0521	0.3915***	0.0465	0.3483***	-0.0576	0.2756**	0.0799	0.4418***	0.1214
Job flexibility					-0.0253*	-0.0703**	-0.0236	-0.0352	-0.0025	-0.0310	-0.0433	-0.0486
Poor environmental conditions					-0.0042	-0.0139	-0.0191	-0.0319	0.0118	-0.0207	-0.0673*	-0.0744
Physical requirements					0.0142*	0.0138	0.0290*	0.0257	0.0037	0.0407	0.0616**	0.0384
Good health * Job flexibility index							0.0378	0.0406	0.0149	0.1104+	0.0697+	0.0213

Good health * Poor environmental conditions index							0.0158	0.0018	-0.0454	0.0535	0.0925**	0.0266
Good health * Physical requirements index							-0.0134	-0.0255	0.0161	-0.0498	-0.0490*	-0.0301
Fair/poor health * Job flexibility index							0.0630*	0.0396	0.0289	0.0651	0.1047*	0.0714
Fair/poor health * Poor environmental conditions index							-0.0009	0.0434	-0.0274	0.0320	0.0405	0.0562
Fair/poor health * Physical requirements index							-0.0319*	-0.0572*	-0.0207	-0.0544+	-0.0427*	-0.0535+
Two or more health conditions * Job flexibility index							-0.0476*	-0.0942*	-0.0448	-0.0462	-0.0599+	-0.1401**
Two or more health conditions * Poor environmental conditions index							-0.0083	-0.0213	-0.0139	-0.0100	0.0001	-0.0141
Two or more health conditions * Physical requirements index							-0.0059	0.0226	0.0039	-0.0210	-0.0201	0.0321
Any mental health issue * Job flexibility index							-0.0206	0.0017	-0.0113	-0.0777	-0.0327	0.0428
Any mental health issue * Poor environmental conditions index							0.0327+	0.0174	0.0481*	-0.0427	0.0166	0.0674*
Any mental health issue * Physical requirements index							0.0108	0.0188	0.0066	0.0394+	0.0124	0.0072
Work limitation		2.9679***		2.3839***		2.3831***		2.3779***		2.7851***		0.0298
Constant	-1.5061***	-6.1966***	-2.1229***	-6.4264***	-2.1618***	-6.4012***	-2.2304***	-6.5324***	-0.9631+	-6.9962***	-3.2507***	-4.5807***
N	26,621		26,621		26,621		26,621		14,361		12,260	

Notes: *** p<0.001; ** p<0.01; * p<0.05; + p<0.1.
Sources: ORS 2021; HRS 1998-2016.

Table 5. *Structural Equation Model Results for the ORS-Based Analysis*

	Direct effects						Indirect effects on DI application		
	(1)		(2)		(3)		(1)	(2)	(3)
	DI application	**Work limitation**	**DI application**	**Work limitation**	**DI application**	**Work limitation**			
Cohort (ref. HRS)									
War Babies	-0.2596+	-0.2442**	-0.2227	-0.2510**			-0.9936***	-1.0239***	
Early Baby Boomers	-0.3373**	-0.2974***	-0.4721**	-0.3597***			-1.2102***	-1.4675***	
Mid Baby Boomers	-0.4029**	-0.2516**			-0.2426	0.0797	-1.0237***		0.3275
Late Baby Boomers	-0.6267**	-0.4189***			-0.6051*	-0.0550	-1.7046***		-0.2260
Age (in years)	0.1523***	0.0398***	0.1759***	0.0204	0.0897**	0.0580***	0.1618***	0.0834	0.2382***
Female	-0.0666	0.0649	-0.0118	0.0025	-0.0913	0.1056	0.2639	0.0103	0.4339
Race and ethnicity (ref. non-Hispanic White)									
Non-Hispanic Black	0.2918**	-0.3642***	0.4373**	-0.3215***	0.1213	-0.4255***	-1.4821***	-1.3117***	-1.7486***
Hispanic	-0.5034**	-0.8230***	-0.2644	-0.6921***	-0.6747**	-0.8598***	-3.3490***	-2.8239***	-3.5338***
Other	-0.1060	-0.2590+	-0.4897	-0.2792	0.0755	-0.2441	-1.0538+	-1.1390	-1.0032
Relationship status (ref. married/partnered)									
Divorced/separated	-0.0976	0.0339	-0.2745+	-0.0434	0.0232	0.0767	0.1381	-0.1772	0.3150
Widowed	0.2270	0.1757+	-0.0801	-0.0757	0.5320*	0.4652**	0.7149+	-0.3090	1.9120**
Never married	-0.1255	0.0228	0.0661	-0.1023	-0.2258	0.0857	0.0929	-0.4175	0.3521
Educational attainment (ref. less than high school degree)									
High school degree/GED	-0.1824	0.1366+	-0.1526	0.1814+	-0.1568	0.1169	0.5558+	0.7400+	0.4803
Some college	-0.2772+	0.3441***	-0.3409+	0.2756*	-0.1883	0.4567***	1.4000***	1.1244*	1.8769***
College degree or above	-0.6815***	0.1396	-0.4807*	0.0271	-0.7826**	0.2991*	0.5679	0.1106	1.2291*
IHS household income	-0.1089***	-0.1143***	-0.1790***	-0.2024***	-0.0773**	-0.0814***	-0.4652***	-0.8257***	-0.3344***
IHS household wealth	-0.0200***	-0.0155***	-0.0258**	-0.0107*	-0.0158*	-0.0178***	-0.0631***	-0.0436*	-0.0733***
Self-reported health status (ref. excellent/very good)									
Good	0.3335	0.7896***	0.0860	0.7850***	0.5420	0.7828***	3.2129***	3.2030***	3.2174***
Fair/poor	0.9942**	2.1386***	1.0396**	2.3479***	0.9034	1.8604***	8.7022***	9.5796***	7.6461***
Two or more health conditions	1.1489***	1.0857***	1.2664***	0.9777***	0.9864*	1.2589***	4.4178***	3.9889***	5.1740***
Any mental health issue	-0.0019	0.6156***	0.3198	0.4730**	-0.3739	0.7830***	2.5050***	1.9299**	3.2180***
Job flexibility	-0.0873	-0.0733	-0.1032	-0.0353	-0.0747	-0.1062	-0.2982	-0.1440	-0.4365
Poor environmental conditions	-0.0805	-0.0363	-0.0466	0.0339	-0.1146	-0.1500*	-0.1478	0.1383	-0.6166*
Physical requirements	0.0888+	0.0674**	0.1287+	0.0105	0.0321	0.1402***	0.2742**	0.0427	0.5764***
Good health * Job flexibility index	0.0800	0.0917+	0.2852*	0.0434	-0.1373	0.1484+	0.3730+	0.1771	0.6100+
Good health * Poor environmental conditions index	0.0194	0.0350	0.0935	-0.0963+	-0.0760	0.2017**	0.1423	-0.3927+	0.8289**
Good health * Physical requirements index	-0.0684	-0.0356	-0.1137	0.0309	-0.0147	-0.1114**	-0.1447	0.1259	-0.4578**
Fair/poor health * Job flexibility index	0.0987	0.1356*	0.2175	0.0676	-0.0485	0.2167*	0.5517*	0.2760	0.8908*
Fair/poor health * Poor environmental conditions index	0.0932	0.0061	0.0658	-0.0619	0.0784	0.1113+	0.0250	-0.2526	0.4574+
Fair/poor health * Physical requirements index	-0.1390**	-0.0638*	-0.1563*	-0.0355	-0.0953	-0.0929*	-0.2597*	-0.1447	-0.3817*
Two or more health conditions * Job flexibility index	-0.1750*	-0.0811+	-0.1238	-0.0666	-0.2294+	-0.1085	-0.3301+	-0.2717	-0.4458
Two or more health conditions * Poor environmental conditions index	-0.0388	-0.0167	-0.0257	-0.0207	-0.0192	-0.0026	-0.0678	-0.0845	-0.0105

Two or more health conditions * Physical requirements index	0.0358	-0.0174	-0.0520	0.0009	0.1312*	-0.0475	-0.0709	0.0035	-0.1954
Any mental health issue * Job flexibility index	0.0085	-0.0265	-0.1644+	-0.0056	0.2112*	-0.0491	-0.1077	-0.0230	-0.2017
Any mental health issue * Poor environmental conditions index	0.0414	0.0547+	-0.0593	0.0817+	0.1493+	0.0303	0.2226+	0.3335+	0.1247
Any mental health issue * Physical requirements index	0.0321	0.0172	0.0816+	0.0098	-0.0200	0.0186	0.0702	0.0399	0.0767
Work limitation	4.0691***		4.0801***		4.1100***				
Constant	-12.7427***	-4.1659***	-13.5824***	-1.9178*	-9.3425***	-6.0834***			
N	26,621		14,361		12,260		26,621	14,361	12,260

Notes: *** p<0.001; ** p<0.01; * p<0.05; + p<0.1.
Sources: ORS 2021; HRS 1998-2016.

Table 6. *Distribution of Occupations among Workers Ages 55 to 61 in Early and Later Years, by Work Limitation and DI Application*

	Pooled years 1998-2002				**Pooled years 2012-2016**			
	All	No work limitation, no DI application	Work limitation, no DI application	DI application	All	No work limitation, no DI application	Work limitation, no DI application	DI application
Management	16.4	17.3	13.0	8.3	16.3	17.6	10.8	5.7
Professional	16.1	17.1	11.0	9.8	18.4	19.5	14.9	7.7
Technician	2.2	2.3	1.6	1.8	4.0	4.1	4.3	1.6
Sales	10.8	10.7	12.6	10.3	9.4	9.1	10.2	12.6
Office/Admin	15.5	15.4	16.5	15.7	15.3	15.2	17.3	12.6
Precision production/Repair	11.0	10.9	11.4	12.0	10.2	10.2	10.2	11.0
Operator/Laborer	15.3	14.8	15.7	21.0	13.6	13.2	13.7	19.2
Protective service	1.6	1.6	1.8	1.6	1.5	1.4	1.4	2.1
Food/Cleaning service	6.2	5.6	9.0	11.2	6.2	5.4	8.1	14.5
Personal care	5.0	4.5	7.4	8.3	5.2	4.3	9.0	13.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 7. *Average Rating of the Job Attributes of Workers Ages 55 to 61 in Early and Later Years, by Job Demand Domain and by Work Limitation and DI Application*

	Pooled years 1998-2002			
	All	No work limitation, no DI application	Work limitation, no DI application	DI application
Physical requirements	2.200	2.186	2.246	2.334
Cognitive requirements	2.860	2.891	2.738	2.582
Difficult work conditions	1.782	1.774	1.813	1.854
Stressful work conditions	2.627	2.647	2.556	2.421
	Pooled years 2012-2016			
	All	No work limitation, no DI application	Work limitation, no DI application	DI application
Physical requirements	2.246	2.225	2.305	2.475
Cognitive requirements	3.340	3.368	3.264	3.040
Difficult work conditions	2.069	2.059	2.094	2.171
Stressful work conditions	3.376	3.384	3.361	3.283
	Absolute change over time			
	All	No work limitation, no DI application	Work limitation, no DI application	DI application
Physical requirements	0.0462	0.0384	0.0583	0.1403
Cognitive requirements	0.4803	0.4777	0.5256	0.4580
Difficult work conditions	0.2865	0.2849	0.2806	0.3172
Stressful work conditions	0.7493	0.7363	0.8054	0.8627

Table 8. *Decomposition of Change in Average Rating of the Job Attributes of Workers Ages 55 to 61, by Job Demand Domain and by Work Limitation and DI Application*

	Within Occupation	Between Occupation	Total Change
Physical Requirements	**0.061**	**-0.015**	**0.046**
No work limitation no DI application	0.058	-0.019	0.038
Work limitation, no DI application	0.073	-0.015	0.058
DI application	0.102	0.039	0.140
Cognitive Requirements	**0.459**	**0.022**	**0.481**
No work limitation no DI application	0.452	0.026	0.478
Work limitation, no DI application	0.504	0.022	0.526
DI application	0.514	-0.056	0.458
Difficult Work Conditions	**0.319**	**-0.033**	**0.287**
No work limitation no DI application	0.318	-0.034	0.285
Work limitation, no DI application	0.327	-0.047	0.281
DI application	0.332	-0.015	0.317
Stressful Work Conditions	**0.747**	**0.003**	**0.750**
No work limitation no DI application	0.733	0.003	0.736
Work limitation, no DI application	0.808	-0.002	0.805
DI application	0.875	-0.012	0.863

Table 9. *Percentage of Workers Ages 55 to 61 in Jobs with High Demands in Early and Later Years, by Job Demand Domain and by Work Limitation and DI Application*

	Pooled years 1998-2002			
	All	No work limitation, no DI application	Work limitation, no DI application	DI application
High physical requirements	36.3	35.1	40.9	47.4
High cognitive requirements	53.5	55.5	46.0	35.3
Highly difficult work conditions	3.6	3.5	3.5	4.6
Highly stressful work conditions	32.9	33.6	30.3	25.5
	Pooled years 2012-2016			
	All	No work limitation, no DI application	Work limitation, no DI application	DI application
High physical requirements	30.3	28.4	33.6	53.3
High cognitive requirements	78.0	79.7	75.2	56.8
Highly difficult work conditions	19.7	19.7	18.6	21.5
Highly stressful work conditions	60.9	62.0	57.0	49.0
	Absolute change over time			
	All	No work limitation, no DI application	Work limitation, no DI application	DI application
High physical requirements	-6.0	-6.7	-7.2	5.9
High cognitive requirements	24.4	24.2	29.2	21.5
Highly difficult work conditions	16.1	16.2	15.1	16.9
Highly stressful work conditions	28.0	28.4	26.7	23.5

Table 10. *Decomposition of Change in Percentage of Workers Ages 55 to 61 in Jobs with High Demands, by Job Demand Domain and by Work Limitation and DI Application*

	Within Occupation	Between Occupation	Total Change
High Physical Requirements	**-0.049**	**-0.011**	**-0.060**
No work limitation no DI application	-0.053	-0.014	-0.067
Work limitation, no DI application	-0.060	-0.013	-0.072
DI application	0.015	0.044	0.059
High Cognitive Requirements	**0.229**	**0.015**	**0.244**
No work limitation no DI application	0.225	0.017	0.242
Work limitation, no DI application	0.270	0.022	0.292
DI application	0.248	-0.033	0.215
Highly Difficult Work Conditions	**0.181**	**-0.019**	**0.161**
No work limitation no DI application	0.181	-0.019	0.162
Work limitation, no DI application	0.174	-0.023	0.151
DI application	0.187	-0.018	0.169
Highly Stressful Work Conditions	**0.285**	**-0.005**	**0.280**
No work limitation no DI application	0.286	-0.001	0.284
Work limitation, no DI application	0.287	-0.020	0.267
DI application	0.287	-0.052	0.235

Appendix A

The analysis presented in the appendix tables focuses on key sociodemographic characteristics, including sex, race and ethnicity, and educational attainment, trends in job demands over time by those characteristics, and how they may shape the relationship between job demands and the health characteristics of interest. Table A1 reveals that, on average, men work in occupations that are substantially more physically challenging and performed in more hazardous environments, but also offer somewhat more workplace flexibility than the occupations in which women work. However, for those suffering from work-related health limitations who did not apply for disability benefits, the gender gap in job flexibility disappeared following the Great Recession, driven by a stronger increase in job flexibility for women than men. This is also true for those who applied for or receive DI benefits as the value of the job flexibility index moderately increased for women and substantially declined for men. Women in this group also had a substantially stronger increase in the physical requirements index then men. Therefore, the gender gap in occupational requirements narrowed in the years following the Great Recession.

Compared with non-Hispanic Whites, non-Hispanic Blacks and Hispanics on average work in occupations that offer less job flexibility, have lower educational requirements, but are more physically challenging and performed in more hazardous environments (Table A2). The main change over time has been a narrowing of the racial/ethnic gap in occupational requirements, especially with regard to physical requirements and poor environmental conditions, for people with work-limiting health conditions but no DI application.

With respect to educational attainment, as expected, those without college degrees work in occupations that offer less job flexibility and are more physically and environmentally challenging (Table A3). Over time, those applying for DI are increasingly coming from occupations that are physically and environmentally more challenging and offer less flexibility. This trend holds regardless of educational attainment although it is particularly pronounced for those with at least a college degree.

Table A1. *ORS Job Requirement Indices, by Sex and Period*

	Male			Female		
	Before Great Recession			**Before Great Recession**		
	No work limitation or DI application	Work limitation, no DI application	DI application	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	2.50	2.25	2.12	2.19	2.02	1.71
Education, training, and experience	3.61	3.43	3.26	3.44	3.33	2.88
Poor environmental conditions	1.49	1.80	2.06	0.72	0.85	1.06
Physical requirements	4.17	4.63	4.87	2.71	3.08	2.99
	After Great Recession			**After Great Recession**		
	No work limitation or DI application	Work limitation, no DI application	DI application	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	2.54	2.29	1.81	2.31	2.23	1.78
Education, training, and experience	3.67	3.46	3.04	3.52	3.46	2.93
Poor environmental conditions	1.50	1.76	2.10	0.64	0.75	1.09
Physical requirements	4.19	4.53	5.22	2.69	3.12	3.49
	Change in index value after relative to before Great Recession			**Change in index value after relative to before Great Recession**		
	No work limitation or DI application	Work limitation, no DI application	DI application	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	1.8%	1.9%	-14.8%	5.7%	10.5%	4.1%
Education, training, and experience	1.7%	0.8%	-6.6%	2.4%	3.9%	1.7%
Poor environmental conditions	0.5%	-2.2%	2.0%	-10.6%	-11.9%	3.5%
Physical requirements	0.4%	-2.1%	7.2%	-0.9%	1.4%	16.7%

Sources: ORS 2021; HRS 1998-2016.

Table A2. *ORS Job Requirement Indices, by Race and Ethnicity and Period*

	Non-Hispanic White			Non-Hispanic Black and Hispanic		
	Before Great Recession			**Before Great Recession**		
	No work limitation or DI application	Work limitation, no DI application	DI application	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	2.43	2.17	2.01	1.94	1.89	1.54
Education, training, and experience	3.63	3.43	3.11	3.05	3.10	2.82
Poor environmental conditions	1.04	1.25	1.41	1.54	1.68	1.63
Physical requirements	3.33	3.69	3.68	4.18	4.54	4.15
	After Great Recession			**After Great Recession**		
	No work limitation or DI application	Work limitation, no DI application	DI application	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	2.53	2.29	1.85	2.04	2.05	1.52
Education, training, and experience	3.70	3.52	3.00	3.17	3.14	2.91
Poor environmental conditions	1.00	1.22	1.46	1.44	1.26	1.75
Physical requirements	3.31	3.73	4.12	4.12	3.93	4.64
	Change in index value after relative to before Great Recession			**Change in index value after relative to before Great Recession**		
	No work limitation or DI application	Work limitation, no DI application	DI application	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	4.1%	5.7%	-7.9%	5.1%	8.8%	-0.9%
Education, training, and experience	2.1%	2.4%	-3.6%	3.9%	1.3%	3.4%
Poor environmental conditions	-3.5%	-2.4%	3.6%	-6.6%	-25.1%	7.7%
Physical requirements	-0.6%	1.1%	12.2%	-1.5%	-13.3%	11.6%

Sources: ORS 2021; HRS 1998-2016.

Table A3. *ORS Job Requirement Indices, by Education and Period*

	Non-Hispanic White			Non-Hispanic Black and Hispanic		
	Before Great Recession			**Before Great Recession**		
	No work limitation or DI application	Work limitation, no DI application	DI application	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	2.43	2.17	2.01	1.94	1.89	1.54
Education, training, and experience	3.63	3.43	3.11	3.05	3.10	2.82
Poor environmental conditions	1.04	1.25	1.41	1.54	1.68	1.63
Physical requirements	3.33	3.69	3.68	4.18	4.54	4.15
	After Great Recession			**After Great Recession**		
	No work limitation or DI application	Work limitation, no DI application	DI application	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	2.53	2.29	1.85	2.04	2.05	1.52
Education, training, and experience	3.70	3.52	3.00	3.17	3.14	2.91
Poor environmental conditions	1.00	1.22	1.46	1.44	1.26	1.75
Physical requirements	3.31	3.73	4.12	4.12	3.93	4.64
	Change in index value after relative to before Great Recession			**Change in index value after relative to before Great Recession**		
	No work limitation or DI application	Work limitation, no DI application	DI application	No work limitation or DI application	Work limitation, no DI application	DI application
Job flexibility	4.1%	5.7%	-7.9%	5.1%	8.8%	-0.9%
Education, training, and experience	2.1%	2.4%	-3.6%	3.9%	1.3%	3.4%
Poor environmental conditions	-3.5%	-2.4%	3.6%	-6.6%	-25.1%	7.7%
Physical requirements	-0.6%	1.1%	12.2%	-1.5%	-13.3%	11.6%

Sources: ORS 2021; HRS 1998-2016.

Finally, we rerun the recursive bivariate probit (specifications 4-6 from Table 4) adding triple interactions with sex, race and ethnicity, and educational attainment, respectively. The results presented in Table A4 show only statically significant or marginally significant triple interaction terms. The main takeaway is that, for the most part, these sociodemographic characteristics do not substantially modify the effect of job demands on the relationship between health and the outcomes of interest, especially as it relates to DI applications. In particular, being female is not related with any significant triple interaction term in the DI application regressions other than the higher likelihood of applications for those in good health with the same level of environmental job demands.

For race and ethnicity, most differences in DI applications are observed for "others" (i.e., Asians, Native Americans, and others) relative to non-Hispanic Whites, but it is unclear what the substantive relevance of these results is without detailed information about race and ethnicity. For Hispanics, the likelihood of work limitations before Great Recession was higher for those in good health relative to non-Hispanic Whites in good health working in jobs with same environmental demands. The likelihood of work limitations after the Great Recession was higher for Hispanics with two or more doctor-diagnosed health conditions and any mental health issues relative to non-Hispanic Whites working in jobs with the same environmental demands and offering same job flexibility, respectively.

Finally, individuals with some college and in good health or a college degree and two or more health conditions who are working in jobs offering the same level of flexibility as those of their peers with less education, were less likely to apply for DI before the Great Recession. More recently, a lower likelihood of DI applications is found only among those in fair or poor health with at least a high school education and working in jobs with the same environmental demands as those with less education.

Notwithstanding the described differences, the effect of job demands on the relationship between health and work limitations and DI applications does not appear to vary systematically by any of the three sociodemographic characteristics examined here. This suggests that the models with two-way interactions presented in Table 4 of the main text are appropriate.

Table A4. *Recursive Bivariate Probit Results for the ORS-Based Analysis*

	(1)		(2)		(3)	
	Work limitation	**DI application**	**Work limitation**	**DI application**	**Work limitation**	**DI application**
Female						
Fair/poor health *Female * Job flexibility index	-0.1574**		-0.2588**			
Good health * Female * Poor environmental conditions index						0.2109*
Fair/poor health * Female * Physical requirements index					-0.0772+	
Two or more health conditions * Female * Poor environmental conditions index	0.0764+		0.1102*			
Race and ethnicity						
Good health * NH Black * Job flexibility index			0.1962+			
Good health * Hispanic * Job flexibility index				-0.4987*		
Good health * Other * Job flexibility index			0.4122+	-0.7345*		
Good health * NH Black * Poor environmental conditions index			0.1410*			
Good health * Hispanic * Poor environmental conditions index	0.1884*		0.2875*			
Good health * Other * Poor environmental conditions index	0.2719*		0.4858**	-0.4320+		0.6503+
Fair/poor health * Other * Poor environmental conditions index	0.4404**		0.3913+	-0.5151**	0.4644*	0.5662+
Good health * Hispanic * Physical requirements index			-0.1184+		0.1055+	
Fair/poor health * Other * Physical requirements index	-0.1548*			0.2433+	-0.1915+	
Two or more health conditions * Other * Job flexibility index		0.5457*		1.0208**		
Two or more health conditions * NH Black * Poor environmental conditions index						0.2057+
Two or more health conditions * Hispanic * Poor environmental conditions index	0.1104*				0.1529*	0.2260*
Two or more health conditions * Other * Poor environmental conditions index			-0.3772+	0.7316***		
Two or more health conditions * Other * Physical requirements index				-0.2518*		
Any mental health issue * Hispanic * Job flexibility index					0.1832*	
Any mental health issue * NH Black * Poor environmental conditions index					0.1244*	0.1469+
Any mental health issue * NH Black * Physical requirements index					-0.0683+	
Any mental health issue * Hispanic * Physical requirements index				0.1408+		
Educational attainment						
Good health * Some college * Job flexibility index		-0.3150+		-0.5709*		
Good health * HS/GED * Poor environmental conditions index		-0.1795+				-0.3609+
Good health * College * Poor environmental conditions index				0.9086+		
Fair/poor health * HS/GED * Poor environmental conditions index						-0.4537*
Fair/poor health * College * Poor environmental conditions index				1.1878*		-0.5418*
Good health * HS/GED * Physical requirements index					-0.1359+	
Good health * College * Physical requirements index					-0.1567+	
Two or more health conditions * HS/GED * Job flexibility index			0.1897+			
Two or more health conditions * College * Job flexibility index				-0.4222*		
Two or more health conditions * HS/GED * Poor environmental conditions index		-0.1242+		-0.1892*		

Two or more health conditions * College * Poor environmental conditions index		-0.4123+	
Two or more health conditions * Some college * Physical requirements index			0.1699+
Any mental health issue * Some college * Poor environmental conditions index		-0.1963+	
Any mental health issue * Some college * Poor environmental conditions index	0.3927*		
Any mental health issue * HS/GED * Physical requirements index	-0.0876+		
N	26,621	14,361	12,260

Notes: ** p<0.01; * p<0.05; + p<0.1.
The three model specifications include a full set covariates equivalent to that presented in Table 4, model specifications 4 through 6, respectively, as well as a full set of triple interactions of which only the ones that reach marginal statistical significance or higher are included in the table.
Sources: ORS 2021; HRS 1998-2016.

Appendix B

Table B1 presents the recursive bivariate probit results for the O*NET based analysis. It uses HRS waves 1998 through 2016 and assigns O*NET 5.0 (2003) to HRS waves 1998 through 2006, O*NET 15.1 (2011)[20] to HRS waves 2008 through 2012, and O*NET 21.1 (2016) to HRS waves 2014 and 2016.

The first model specification controls for demographic and socioeconomic characteristics. The second model specification also controls for subjective and objective measures of health. The coefficients in these models have similar signs and magnitudes as in the ORS based analysis (Table 4). Importantly, the health measures are strongly positively associated with work-limiting health conditions and DI applications/receipt.

The third specification adds job requirements. As with ORS job flexibility, which is conceptually broadly similar to O*NET cognitive job demands, cognitive job demands are negatively related with work-limiting health conditions and DI applications/receipt. While physical requirements are marginally positively associated with work-limiting conditions using ORS, their association is statistically insignificant using O*NET. Different from our expectations, O*NET difficult work conditions are negatively and statistically significantly associated with work limitations. However, they are not statistically correlated with DI applications/receipt. Finally, O*NET stressful work conditions are not statistically associated with either work conditions or with DI applications/receipt. Importantly, the association between health measures and work-limitations and DI application/receipt is largely unchanged.

The fourth model specification adds interactions of health and job requirements. The main effects of the health measures on work limitations remain positive and statistically significant. The main effects of two or more health conditions and mental health issues on DI applications also remain positive; however, the coefficients on good health and fair/poor health become negative albeit statistically insignificant. As with ORS job flexibility, the positive association between two or more health conditions and work limitations is attenuated for those with O*NET cognitive job demands. In contrast to ORS job flexibility, however, O*NET cognitive job demands appear to have no effect on the positive association between two or more health conditions and DI applications. The interaction terms for fair/poor health and physical job

[20] O*NET 15.1 was released in February 2011 and uses the 2010 SOC codes.

demands and for fair/poor health and cognitive job demands are also statistically significant; however, their signs are the opposite of what we would expect.

Stratifying the model by pre- and post-Great Recession periods (fifth and sixth model specifications, respectively), we find that objective health measures are more strongly positively associated with work limitations and all health measures are more strongly positively associated with DI applications in the period following the Great Recession. Although we find that the main effect of physical job demands on DI applications is stronger after the Great Recession, there is no clear pattern indicating that the effect of job requirements on the relationship between health measures and work limitations and DI applications has changed over time. Again, the signs of several coefficients are the opposite of what we would expect.

Table B1. *Recursive Bivariate Probit Results for the O*NET-Based Analysis*

	(1)		(2)		(3)		(4)		(5)		(6)	
	Work limitation	**DI application**	**Work limitation**	**DI application**	**Work limitation**	**DI application**	**Work limitation**	**DI application**	**Work limitation**	**DI application**	**Work limitation**	**DI application**
Cohort (ref. HRS)												
War Babies	-0.0980**	-0.0892	-0.1215**	-0.1438*	-0.1147**	-0.1308+	-0.1136**	-0.1307+	-0.1172**	-0.0913		
Early Baby Boomers	-0.0964**	-0.1190+	-0.1461***	-0.1864**	-0.1288***	-0.1582*	-0.1257**	-0.1580*	-0.1629**	-0.2109*		
Mid Baby Boomers	-0.0854*	-0.1450*	-0.1216**	-0.2163**	-0.0984*	-0.1813*	-0.0940*	-0.1816*			0.0312	-0.0601
Late Baby Boomers	-0.1089+	-0.1481	-0.2274***	-0.2492+	-0.2010**	-0.2096	-0.1971**	-0.2087			-0.0684	-0.1609
Age (in years)	0.0329***	0.0757***	0.0194***	0.0775***	0.0203***	0.0795***	0.0210***	0.0799***	0.0112	0.0869***	0.0264**	0.0520***
Female	0.0581*	-0.0308	0.0148	-0.0610	0.0067	-0.0641	0.0090	-0.0633	-0.0007	-0.0220	0.0226	-0.0524
Race and ethnicity (ref. non-Hispanic White)												
Non-Hispanic Black	-0.0811*	0.1898***	-0.1796***	0.1937***	-0.1886***	0.1838**	-0.1914***	0.1836**	-0.1621**	0.2462***	-0.2403***	-0.0956
Hispanic	-0.3069***	-0.1610+	-0.4313***	-0.1919*	-0.4363***	-0.1959*	-0.4284***	-0.1945*	-0.3626***	-0.0783	-0.4516***	-0.4855***
Other	-0.0119	-0.0915	-0.0980	-0.0826	-0.1043	-0.0870	-0.1112	-0.0854	-0.1286	-0.2450	-0.1183	-0.0915
Relationship status (ref. married/partnered)												
Divorced/separated	0.0741*	-0.0456	0.0173	-0.0428	0.0184	-0.0438	0.0169	-0.0461	-0.0539	-0.0912	0.0705	0.0397
Widowed	0.1113*	0.0951	0.0740	0.1264	0.0712	0.1190	0.0726	0.1171	-0.0664	-0.0070	0.2143**	0.3441***
Never married	0.0437	-0.0277	0.0194	0.0087	0.0163	0.0049	0.0127	-0.0038	-0.0671	0.1608	0.0457	-0.0337
Educational attainment (ref. less than high school degree)												
High school degree/GED	-0.0782+	-0.1508*	0.0791+	-0.1443*	0.0976*	-0.1173+	0.0858*	-0.1219+	0.0988+	-0.1645*	0.1038	0.0378
Some college	-0.0866*	-0.2589***	0.1808***	-0.2540***	0.2165***	-0.1938**	0.2035***	-0.1980**	0.1582**	-0.2614**	0.2886***	0.1207
College degree or above	-0.3599***	-0.4120***	0.0366	-0.4322***	0.0851	-0.3422***	0.0824	-0.3449***	0.0369	-0.2640*	0.1685*	-0.1514
IHS household income	-0.0894***	-0.0392**	-0.0663***	-0.0503***	-0.0645***	-0.0474***	-0.0643***	-0.0471***	-0.1188***	-0.0512**	-0.0448***	-0.0563***
IHS household wealth	-0.0210***	-0.0086*	-0.0094***	-0.0100***	-0.0090***	-0.0095***	-0.0090***	-0.0095***	-0.0053+	-0.0110**	-0.0107***	-0.0127***
Self-reported health status (ref. excellent/very good)												
Good			0.4664***	0.0299	0.4643***	0.0254	0.4594***	-0.1663	0.5319***	-0.2606*	0.2777*	0.1340
Fair/poor			1.1985***	0.1826+	1.1961***	0.1716+	1.1596***	-0.0124	1.1388***	-0.0428	1.0986***	0.6740***
Two or more health conditions			0.4489***	0.4297***	0.4501***	0.4282***	0.4763***	0.5279***	0.4922***	0.2809*	0.4801***	1.0006***
Any mental health issue			0.3996***	0.0665	0.3955***	0.0553	0.3817***	0.1671+	0.3936***	0.1626	0.3801***	0.3221**
Physical requirements					0.0218	0.0712	0.1043+	0.1256	0.0832	0.0593	0.1460	0.2647*
Cognitive requirement					-0.0999**	-0.1143*	-0.1080+	-0.1771	-0.0506	-0.2279	-0.1710	-0.1357
Difficult work conditions					-0.0801*	-0.0739	-0.1306*	-0.3016*	-0.1247	-0.2589	-0.1676	-0.3189+
Stressful work conditions					0.0170	-0.0060	-0.0289	0.0635	-0.0057	0.0009	-0.0532	0.0453
Good health * Physical requirements							-0.1044	0.0881	-0.1752*	0.1666	-0.0054	0.0534
Good health * Cognitive requirements							0.0322	0.1729	-0.1126	0.2671+	0.2693*	0.2055

Good health * Difficult work conditions							0.0290	0.1626	-0.0148	0.4153*	0.1132	0.0172
Good health * Stressful work conditions							0.0372	0.1024	0.0922	0.1111	-0.0052	0.0832
Fair/poor health * Physical requirements							-0.1173+	0.0653	-0.0306	0.0401	-0.2032+	-0.0688
Fair/poor health * Cognitive requirements							0.1562*	0.1535	0.1662+	0.1530	0.2264+	0.2603+
Fair/poor health * Difficult work conditions							-0.0606	0.1506	-0.0345	0.2361	0.0101	0.1106
Fair/poor health * Stressful work conditions							0.0269	0.1530	0.1489	0.0900	-0.0484	0.1442
Two or more health conditions * Physical requirements							-0.0325	-0.1127	-0.0846	-0.0849	0.0234	-0.1388
Two or more health conditions * Cognitive requirements							-0.0982+	0.0313	-0.0978	0.1797	-0.1216	-0.2359*
Two or more health conditions * Difficult work conditions							0.0696	0.0801	0.0816	-0.0707	0.0248	0.0425
Two or more health conditions * Stressful work conditions							0.0605	-0.2053*	0.0102	-0.0812	0.0923	-0.1995
Any mental health issue * Physical requirements							0.0392	-0.0477	0.0249	-0.0428	0.0337	0.0001
Any mental health issue * Cognitive requirements							-0.0117	-0.1689*	-0.0550	-0.1665	0.0154	-0.1022
Any mental health issue * Difficult work conditions							0.0608	0.0702	0.0561	-0.0101	0.1000	0.1763
Any mental health issue * Stressful work conditions							-0.0251	-0.0580	-0.1143	-0.1617	0.0326	0.0850
Work limitation		2.9635***		2.4023***		2.4289***		2.4324***		2.7718***		-0.0815
Constant	-1.4820***	-6.1610***	-2.0842***	-6.3579***	-2.1365***	-6.5135***	-2.1639***	-6.5292***	-0.9714+	-6.7847***	-2.8269***	-4.6047***
N	28,316		28,316		28,316		28,316		15,172		13,144	

Notes: *** p<0.001; ** p<0.01; * p<0.05; + p<0.1.
Sources: O*NET 5.0 (2003), O*NET 15.1 (2011), and O*NET 21.1 (2016); HRS 1998-2016.

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