Characterizing Trajectories of Work, Disability and Health in Work and Retirement: A Multistate Analysis

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A growing body of research explores the complex relationships between disability, employment, and health. Transitions from work to disability have a range of direct, negative effects on labor force participation, unemployment, lifetime earnings (Breslin et al. 2007), and permanent exclusion from the labor market. Transitions into short- and long-term disability are associated with increased medical costs (Sears et al. 2013) and psychological distress (Bültmann 2002). A number of health conditions are associated with an increased risk of workplace disability, including rheumatoid arthritis, diabetes (Virtanen 2015), musculoskeletal problems, depression (Kessler et al., 1999), and neuroticism. Aspects of working conditions, including psychosocial factors (Sullivan, 2013, Iles 2008), task monotony, and experienced stress of daily activities, are predictors of disability (Appelberg et al., 1996).

Previous research on these topics is limited by at least two problems. First, little research attempts to account for the endogeneity between employment, health, and disability. That is, studies explore the effects of health on disability or vice versa but rarely in a manner that acknowledges the bidirectional relationships at play. Second, most studies rely on data collected over short time frames, with either limited or delayed follow-up. Such data limit the conclusions that can be drawn about long-term trajectories and may mask significant variations. Many studies that observe rates of transitions back to work after a health shock or disability episode, for example, find rates of return to work (a measure of success) to be quite high. Longer-term data, however, may reveal a different pattern.

In this paper, we bring to bear a large set of administrative data that allow us to track the employment, health, and disability of a large cohort (n=42,146) of workers at Alcoa, a major U.S. manufacturing firm. These data are both dynamic – capturing changes to employees' job characteristics, health, and employment status as they occur – and long-term, following individuals so long as they are employed at the firm. We use these data to characterize the trajectories of work and disability across the employment tenure and to explore variations in the trajectory by demographic characteristics, health, and working conditions. To do so, we employ two techniques. First, we use sequence and cluster analyses to derive a typology of working tenures. Second, we use multinomial logistic regression to model the varying likelihood of cluster membership by worker and job characteristics.

The clustering process described above yields eight groups (ASW of 0.723). Table 1 provides a schematic of the clusters. We collapse these clusters into three typologies based on their similarity: "Regular Work," "Short STD," and "Disruptive Work."

Multinomial logistic regressions examine the associations between a number of demographic, job, and health-related characteristics and membership in the three composite groups. Neither age at first employment nor race have significant effects on tenure classification. Sex is significantly associated with membership: being a woman increases the odds of inclusion in the Disruptive Work type.

The number of outpatient hospitalization visits for heart disease, hypertension, and musculoskeletal conditions are all associated with significantly lower odds of membership in the Regular Work clusters. Health appears to be strongly associated with work trajectories in the Disruptive Work typology in a number of ways. First, with regard to risk score, a one-standard-deviation increase in risk score raises the odds of inclusion in this typology more than 1.4 times. Secondly, hospitalizations of arthritis, heart disease, hypertension, asthma and depression all increase the risk of inclusion in this category. Exposure to cumulative total particulate matter increases the odds of inclusion in both Short STD and Disruptive Work (with the highest odds for the latter). Exposure to total particulate matter increases the likelihood of being in the Disruptive Work category, has nearly no effect on the Disruptive Work group, and slightly decreases the likelihood of being in the Short STD group.

Our analysis reveals a number of interesting conclusions. First, there are a large number of distinct and diverse work patterns. While the majority of workers in this sample have very stable working patterns, there are a number of divergent patterns, some that can be viewed as quite disruptive to job performance and work productivity.

Some demographic and health characteristics are particularly salient in this analysis. Of particular interest, for example, is the high likelihood of women being included in the Disruptive Work typology. Certainly, given that this sample refers to manufacturing, the women working in this sample may be select in a number of observable and unobservable ways. Little is known about women working in manual labor, and these results point to the importance of further exploration into this special population.

There also appear to be important gradients related to health characteristics and chronic disease. A particular highlight is the finding that depression increases the likelihood of being in a Disruptive Work typology but not any other category. Depression is often overlooked as a potential driver of job disruption relative to other chronic disease, though evidence does point to its importance in labor market participation and worker productivity (Lerner et al., 2008).

Table 1. *Cluster Sequences and Typologies*

Cluster sequences	Typology	N	Percent sample
Work	Regular work	12,656	30.0%
Work-terminate	Regular work	11,246	25.6
Work-retire	Regular work	4,736	11.2
Work-STD-work	Short leave	5,432	11.9
Work-STD-work-term	Short leave	2,683	6.3
Work-LOA-work	Short leave	1,713	4.1
Wk-STD-Wk-STD-Wk	Disruptive	3,132	7.4
Wk-STD-Wk-STD-Wk-STD-Wk	Disruptive	1,462	3.5

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