

Absenteeism, Health, and Disability in a Large Working Cohort

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1. Introduction and Background

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 (Jones et al. 2006, Virtanen et al., 2006) unemployment (Bratsberg et al. 2010, Stattin 2005) lifetime earnings (Breslin et al. 2007), and permanent exclusion from the labor market (Gallo et al 2009). Transitions into short- and long-term disability are associated with increased medical costs (Sears et al. 2014) and psychological distress (Bültmann et al. 2005). A number of health conditions are associated with increased risk of work-place disability, including rheumatoid arthritis (Backman et al. 2004, Sokka et al. 1999, Wolfe et al. 1999), diabetes (Virtanen et al. 2015), depression (Druss et al. 2000, Kessler et al. 1999) and asthma (Hakola et al. 2011, Eisner et al. 2006).

Moreover, transitions to disability are often the cumulative process of gradual health declines. As such, the effects of these declines could reveal themselves through a number of mechanism related to employment before the onset of disability. One such way mechanism may be through absenteeism at work; increased absenteeism may be a precursor to eventual disability events. Moreover, since the process of applying for a getting approval for disability is a lengthy one, absences might be used as a way to fill in the gaps of time while waiting for disability approval. Finally, the relationships between absenteeism and eventual disability may differ by disease.

Efforts to elucidate answers on this topic have been stymied by limited data availability. While evidence in European contexts provides growing evidence of a relationship between disease-specific absenteeism (often referred to as “sickness absence”) and negative employment outcomes (Wallman et al. 2009, Karlsson et al. 2008), the United States often lacks data similar to the registry data available in Europe. We utilize a unique database of daily absenteeism records of nearly 10,000 employees at a large manufacturing firm with a diversity of jobs and geographic locations, to carefully examine the patterns of absenteeism and health that are associated with short-term and long-term disability events in a working population.

In this paper, we aim to answer the following questions:

- What are the patterns of absenteeism in this working cohort?
- Are the patterns of absenteeism disease-specific?
- Are patterns of absenteeism predictive of subsequent disability events?
- If so, for what diseases?
- Do workers use absenteeism as a short-term or long-term substitute for disability events when opportunities for disability are unavailable or limited?

2. Data

This study relies on a unique dataset which links payroll data to health claims data from a large geographically diverse multinational aluminum manufacturing company, the American Manufacturing Cohort (AMC). We examine absenteeism in workers at seven sites from the years 2003 to 2008. The seven sites include both smelting plants and fabricating plants. The physical and psychosocial demands of the work vary substantially, but in general these jobs require some physical labor and many require repetitive movements.

The payroll data provides the date to construct the outcome of interest, absenteeism, which has previously been described in detail (Hill et al., 2008). For each employee and each day, we can then observe the date of the shift, its length, and whether the employee was absent for that shift. Absenteeism is differentiated from a paid sick day in the data. We use linked health claims data to identify incident cases of six health conditions: hypertension, arthritis, diabetes, asthma/COPD, IHD, and depression. These chronic conditions are selected because they are common and have previously been identified and validated in research using claims data (Modrek and Cullen, 2013, Horner and Cullen, 2016). We use CPT procedure codes and ICD9 diagnostic codes to determine health events.

Disability data is taken from health claims data as well. These data include dates for the start day and end day of a short- or long-term disability, the health reason linked to the disability episode, and, for some years, whether the disability event was denied or approved. As such, disability in this context is defined as employer-sponsored disability, and not federal Social Security Disability Insurance. (Further work is in progress linking these data to SSDI outcomes.). These data also include information on the disability insurance coverage amounts for workers. Workers may opt into health care plans that cover different percentages of their income while they are on disability leave; this coverage ranges from 40-100 percent of their income and a small percentage of workers have no coverage at all (slightly less than 4% of workers).

Table 1 describes the sample of workers for the entire sample, as well as separately for those with an employer-sponsored disability event during the analytical time period (2003-2008), and those without.

Table 1: Summary Statistics for Sample in AMC, 2003-2008

	<u>Full Sample</u>	<u>With STD Event</u>	<u>Without STD Event</u>
Female	7.84%	9.49%	6.75%
<u>Race/Ethnicity</u>			
White	79.69%	79.12%	80.06%
Black	11.40%	12.83%	10.45%
Hispanic	7.24%	6.87%	7.48%
Other	1.68%	1.18%	2%
Age (at Baseline)	42	44.5	40.7
Ever Absent 2+ consecutive days	57.75%	75.15%	46.27%
Maximum Absent Duration (Mean)	1.99	2.36	1.59
Total Absent Days (Mean)	5.10	6.20	4.00
Has any disability insurance coverage	96.62%	99.51%	94.71%
Coverage \geq 80%	10.93%	10.23%	11.88%
60% \leq Coverage $<$ 80%	3.84%	4.24%	3.30%
40% \leq Coverage $<$ 60%	74.32%	71.52%	78.09%
No Coverage	10.90%	14.02%	6.73%
Observations	9,738	3,700	6,038

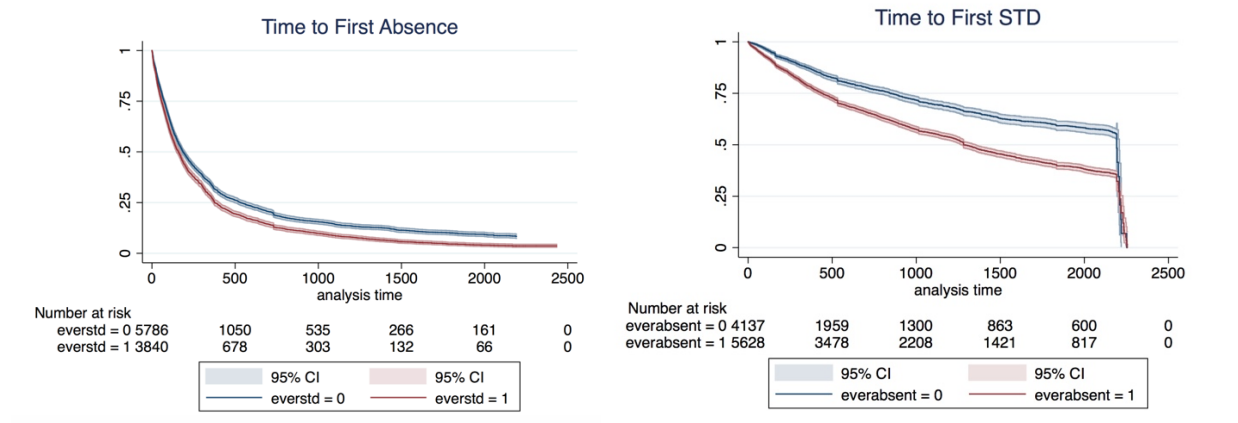
Notes: Data from AMC from 2003-2008 for 7 plants.

Workers with a short-term disability event have higher absenteeism across a number of metrics. First, we define those ever absent as having at least one absenteeism spell of at least two days, in order to distinguish absenteeism possibly related to health from workers who may take an occasional one day off. We also calculate the maximum number of days absent for any one absenteeism episode, as well as track the total number of absent days. We calculate these metrics yearly as well as cumulatively over the entire analytical time period.

3. Results

Figure 1 shows the relationship between absenteeism and eventual short term disability using a time-to-event framework, Kaplan-Meier curves. The panel on the left describes the time to the first absenteeism event (using the above-mentioned definition of at least two consecutive days) for those with and without an STD event. Consistent with the data described in Table 1 above, workers that have an STD event have a greater share of absent days and have those days sooner in the analytical time period. The panel on the right flips the analysis: it explores the hazard of an STD event for workers with or without an absence of two or more consecutive days in the time period. Workers with at least one substantive absence are much more likely to experience at least one STD event.

Figure 1: Time to STD for Group of Ever Absent and Time to First Absence for Group of Ever STD



Next, we use a Cox proportional hazards model to explore role of absenteeism in the time to short-term disability from the start of a health diagnosis for the six chronic diseases in question. We limit our sample to those who have a new diagnosis in the time period so as not to capture absenteeism patterns linked to previous health problems. We also include a “wash out” period to exclude all workers with a short-term disability event one year prior to the start of our time period in 2003. Table 2 shows these results. The first column of results pools all workers with any new diagnosis of the six chronic diseases; subsequent columns display results for workers with the onset of a specific disease for the diseases in which there were enough new diagnosis for the models to be sufficiently powered. We observe that in nearly all cases, the indicator of having at least one absence of two or more consecutive days prior to STD and after diagnosis is highly predictive of subsequent employer-sponsored disability event. When all diseases are pooled (and thus statistical power is larger) we also observe that the maximum duration of an absent spell in the year prior to diagnosis is predictive of subsequent disability.

We do not observe any effects for the number of absenteeism spells prior to disability or the total number of days absent. Finally, having insurance with income coverage in the case of disability is highly predictive of subsequent disability, likely because of added worker protections. We do not observe this effect in the disease-specific models, but we may not be sufficiently powered to do so.

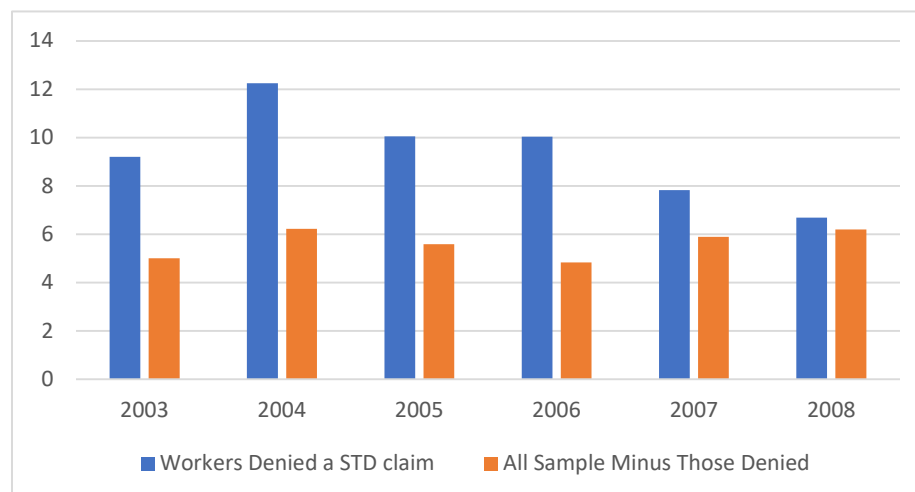
Table 2: Results of Statistical Model for Absenteeism on Time to Short-Term Disability From Time of Health Diagnosis, 2003-2008.

	<u>All Diseases</u>	<u>Arthritis</u>	<u>Hypertension</u>	<u>Diabetes</u>	<u>Depression</u>
Ever Absent (2+ days)	1.2968***	1.294124**	1.66256***	1.293173	1.860042*
Maximum Duration of Absence	1.0262**	1.006139	1.019322	1.057965	1.004858
Number of Absenteeism Spells	1.001778	9960279	0.9984481	0.989883**	1.005162
Number of Days Absent	0.992	1.012439	1.000288	1.007755	1.020067
Insurance Coverage	1.638***	2.512886	1.332528	1.030025	0.3164903
Number of Person-Year Observations	13,655	4,891	8,174	2,409	939
Number of Unique Workers	1,593	710	818	275	121

*Note: Data from AMC 2003-2008 for all workers in payroll data for 7 plants. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Controls include sex, ethnicity/race, age at onset, tenure at baseline, and plant fixed effects.*

Finally, we make a first attempt to understand whether absenteeism may be used as a substitute for disability. We have data available for denials of disability claims for one year of the data, in 2004. In Figure 2, we plot the mean number of absent days from 2003-2008 for the 1,037 workers that have a denied STD claim in 2004 and compare to the rest of the sample. Indeed, denied workers miss more days of work, and absenteeism increases around the time of a denial of a claim. Notably, the number of days absent peaks in the year of denial of claim and then gradually declines to be nearly on-par with the remaining workers by 2008. and suggests that workers may increase their absenteeism when disability is not an available option. Subsequent work will explore using these denials in a multivariate framework.

Figure 2: Mean Number of Days Missed for Workers Denied a STD Claim Compared to All Workers



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