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The Relationship between Long Working Hours and Diabetesfor Older Workers

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Abstract:*This study bridges a gap in the literature by examining the relationship between long working hours and the risk of having diabetes among older workers in the United States. We have applied the Cox regression method, a frequently used approach in survival analysis, to panel data from the Health and Retirement Survey (HRS). We have not found a statistically significant relationship between working hours and the possibility of diabetes. This study's findings may raise questions about the need for initiatives in the European Union and other countries that regulate the length of work schedules.*
Keywords*: diabetes; working hours; the United States*

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I. Introduction

According to Center for Disease Control and Prevention, in 2005–2008, the estimated percentage of adults with diabetes (diagnosed and undiagnosed) was 3.7% among those aged 20–44 years, 13.7% among those aged 45–64 years, and 26.9% among those aged 65 years or older in the US. It means that older workers are more likely to have diabetes. Therefore, we need more studies which focus on older workers.

The long working hours may cause several work-related illnesses. Researchers try to investigate the relationship between working hours and ill health. For instance, obesity (Mercan, 2014), arm/hand discomfort(Bergqvist, Wolgast, Nilsson, & Voss, 1995), blood concentration of glycosylated hemoglobin (HbA1c)(Cesana et al., 1985), and impact of the job on workers' physical and mental health(Ettner, 2001). In addition, there are some literature review and meta-analysis studies in this literature(Cosgrove, Sargeant, Caleyachetty, & Griffin, 2012; Kang et al., 2012; Virtanen et al., 2018). However, a few studies have the large sample size or nationally representative samples e.g. (Dembe, Erickson, Delbos, & Banks, 2005). In this study, they used the National Longitudinal Survey of Youth (NLSY) dataset. NLSY is a nationally representative dataset for the US and they find that working more than 60 hours per week significantly increase the probability of injury.

In addition, there might be a relationship between long work hours and diabetes. A previous study finds that air traffic controllers who have a demanding job are more likely to have diabetes(Cobb & Rose, 1973).It was also reported that job strain is associated with increased levels of glycosylated hemoglobin among non-diabetic populations(Netterstrøm, Kristensen, Damsgaard, Olsen, & Sjøl, 1991).

For diabetes, there are few longitudinal studies(Kawakami, Araki, Takatsuka, Shimizu, & Ishibashi, 1999).First study depends on workers in a factory in Japan. They followed 2194 Japanese male workers for eight years. They find that long overtime is associated with a higher risk of non-insulin dependent diabetes mellitus. Furthermore, another study finds that longer overtime is a negative risk factor for having diabetes in Japanese male office workers(Nakanishi et al., 2001).

Although there is a term, karoshi, in Japanese for death from overwork, according to OECD, in 2018 on average Americans worked more than Japanese, 1786hours and 1680 hours respectively. Even though this fact, there are few studies for the US. A previous study finds that female nurses who worked more than 40 hours from 15 states had an elevated risk of diabetes(Kroenke et al., 2006). In addition, there is one study reviews both published and unpublished studies that focus on the relationship between the working hours and the risk of incident type 2 diabetes from all around the world(Kivimäki et al., 2015).

II. Methodology

This study depends on the data from Health and Retirement Survey (HRS), which is conducted by University of Michigan. We use RAND version of HRS in this article. HRS has more than 26,000 Americans who are older than 50. HRS has many information about respondents like sociodemographic characteristics or detailed work histories. HRS started at 1992 and is conducted every two years since then.HRS also provides sampling weights for each response to reflect the national distribution of Americans in this age range. In this study, we used those weight values.

During 1992 and 2016, there is a total of 178,084 person-years for the analysis and Table 1 shows the summary statistics from our sample. Among those cohort members, 80 percent is white, and 60 percent of the sample is married. In addition, the average of number of school year is 12.2years. In HRS, the question about diabetes states that has a doctor ever told you that you have diabetes. About 20 percent of the cohort has told yes to this question. The reporting of diabetes question is used as the dependent variable. We use several different control variables in our Cox model that has an important advantage that it does not make potentially untenable distributional assumptions about the hazard rate.

III. Results

In this paper, the Cox proportional regression analyses were performed using Stata SE (version 15) statistical software. For our analysis, the main independent variable is a dummy variable which equals to one if the person worked more than 50 hours per week. Other independent variables are age, male, white, household total income, being married, number of cohabitants in the household, number of children, base self-reported health, self-reported health, change in health status, obesity, base body mass index, hospitalization, number of diseases, health limits for working, alcohol consumption, cigarette consumption, stress, physical effort, tenure, unemployed, and school years. This analysis found that, after adjusting for those factors, working more than 50 hours per week in a job has 6 percent (for 95 percent CI:0.86-1.03) lower thediabetes hazard rate compare to jobs without that exposure. Table 2 shows the estimates from our analysis.

Even though the coefficient of working hours isnot statistically significant at usual levels, long work hours reduce the diabetes hazard rate compare to jobs without long hours. In addition, we apply our Cox regression by gender. Our results are similar for both male workers and female workers, when we divide our sample according to genders.

IV. Conclusion

This study is the first attempt to investigate the relationship between long work hour and possibility of having diabetes among old adults in the United States. We found that old workers who worked more than 49 hours per week were more likely to reduce the probability than those who worked less than 50 hours per week. It is important to understand the risk of diabetes in the old workforce because of the policy implications, for example, a discussion about a policy to restrict the number of work hours per week. This analysis of 12 biennial surveys from Health and Retirement Study data suggest that old workers' work hours are not associated with high probability of having diabetes.

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Table 1: The Summary Statistics

Explanatory Variables at Baseline	All Sample	
	Mean	Sdt. Dev.
Long working hours (50+)	0.05	0.223
Having Diabetes	0.20	0.403
Age	68.92	10.44
White	0.80	0.398
Household total income	29837.07	289272.4
Married	0.60	0.48
Number of cohabitants	2.18	1.169
Number of children	3.22	2.177
Based_self-reported health	1.96	0.953
Self-reported health	2.92	1.133
Change in health status	0.27	0.444
Obesity	0.28	0.446
Based_body mass index	24.59	4.780
Hospitalization	0.27	0.448
Number of diseases	2.04	1.480
Health limits work	0.30	0.462
Alcohol consumption	0.47	0.499
Cigarette consumption	0.13	0.346
Stress	0.15	0.361
Physical effort	0.09	0.297
Tenure	4.04	9.142
Unemployed	0.01	0.130
Education level	12.19	3.314
N	178.084	

Table 2: The Results of the Cox Regression Analysis

	All Sample	
Explanatory Variables at Baseline	HRR	SE
Long working hours (50+)[a]	0.94	0.045
Age	1.00***	0.001
White	0.76***	0.018
Household total real income	1.00	0.000
Married	1.12***	0.023
Number of children	1.01***	0.005
Base_self-reported health	1.01	0.011
Self-reported health	1.17***	0.025
Obese	0.53***	0.037
Base_body mass index	1.03***	0.002
Hospitalization	0.88***	0.011
Number of diseases	1.58***	0.011
Health limits work	0.85***	0.012
Alcohol consumption	0.84***	0.015
Cigarette consumption	0.80***	0.022

Stress	0.93**	0.023
Physical effort	0.93**	0.033
Tenure	1.00	0.015
Unemployed	1.05	0.039
Education level dummy variables	✓	
Industry dummy variables	✓	
N	174,235	

Abbreviations: COEF=Coefficient; SE=Standard Error.
Note: [a]It equals to 1, the individual worked more than 49 hours in a week. *p<.10,**p<.05,***p< .01.

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