Final Project

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Introduction

Cognitive impairment is a growing concern in the United States, as the number of people with Alzheimer's disease or related dementias continues to grow (El-Hayek et al., 2019). Since there is no known cure for dementia, understanding the social conditions that may influence risk of dementia or other cognitive impairment is important for health policy. A large body of work across academic disciplines has focused on what earlier life events are associated with cognitive functioning in later life. Researchers find that education, other measures of socioeconomic status, and lifestyle factors are associated with better cognitive health in later life (Baldivia et al., 2008; Jefferson et al., 2011; Liu et al., 2021; Song et al., 2022). I ask the following: What is the association between mid-life occupation and cognitive health in later life? This question is the precursor to my dissertation prospectus, which will outline research questions pertaining to occupational complexity, prestige, and cognitive decline.

Data and Methods

I use the Health and Retirement Study (HRS), a biennial, nationally representative, longitudinal survey of older adults and their spouses. This American survey contains detailed economic, demographic, and health variables. I use the RAND HRS dataset, which harmonizes variables across waves. All household heads are 50 years old or older, some spouses may be under age 50 at the time of interview. Since the HRS over-samples Hispanic people, Black people, and residents of Florida, it provides weighting variables to make it representative of the community-based US population (Sonnega et al., 2014). HRS also provides weights for individuals living in nursing homes. My dependent variable that measures cognitive impairment is a binary variable – having cognitive impairment or not (derived from the total cognition summary score variable – scores of less than 12 out of 27 are considered that of cognitively impaired individuals). This measure of cognitive impairment is widely used in the literature (Crimmins et al., 2016). My independent variable of interest is occupation code for the job with the longest reported tenure (1980 Census occupation codes). I condense existing categories due to small cell size, arriving at these categories: farming/forestry/fishing, mechanics/repair, construction, precision production, managerial and professional specialty, operators: machine, transport, handlers, professional specialty/technical support, sales, service, and other/armed forces/unknown. I also include age (continuous), self-rated health (binary measure of poor/fair health or better health), whether the respondent smokes (binary), employment status (working, retired, or disabled/not in the labor force for other reasons) as well as educational attainment, race, gender, parent's educational attainment in my analysis. I restrict my sample to those ages 50 and up. I keep observations from the year 2000 and onward due to variable availability reasons. I also remove those who are neither White, Black, or Hispanic due to small cell sizes at older ages. I remove observations with missing cognitive impairment measures (around 7% of my sample) (Yahirun et al., 2020) I used Stata to keep variables of interest. I created and modified variables in R before returning to Stata for my analysis.

Since I am interested in modeling risk of cognitive impairment and its association with occupation, I decided to conduct survival analysis and use a discrete time, proportional hazards model. I use the 'stcox' command in Stata as it handles longitudinal data (Cleves, 2008). I test the appropriateness of discrete time hazard modeling by testing the proportionality of hazard with my covariates. I modify time-dependent covariates in the model with additional specifications to test this assumption. I conclude that none of the time-dependent variables are not significant under this additional specification, thus collectively supporting the assumption of proportional hazard.

Results

Table 1 reports hazard ratios for the discrete time hazard models by occupation. When hazard ratios are greater than 1, the rate of relapse to cognitive impairment increases (risk is higher). When hazard ratios are less than 1, the rate of relapse to cognitive impairment decreases (risk is lower). Those with farming/forestry/fishing, mechanics/repair, construction, and precision production jobs, as well as operators, and those in the service industry had higher risks of cognitive impairment compared to those with administrative/clerical support jobs. However, those with professional speciality operation/technical support jobs have lower risk of cognitive impairment compared to people with administrative/clerical support positions.

Table 1. Hazard Ratios for onset of cognitive impairment: HRS, 2000-2018

Variables	Hazard Ratio
Occupation (ref: administrative/clerical support)	
Farming/forestry/fishing, mechanics/repair, construction, precision production	1.197**
	(0.062)
Managerial and professional specialty	0.920
	(0.059)
Operators: machine, transport, handlers	1.288***
	(0.092)
Other/armed forces/unknown	1.154*
	(0.067)
Professional specialty/technical support	0.852*
	(0.052)
Sales	0.994
	(0.071)
Service	1.301***
	(0.080)

Covariates omitted from table for brevity. Standard errors in parentheses.

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

As for the other variables in the model, the risk of cognitive impairment increases with continuous age, unsurprisingly. Those with some college education or a college degree have a lower risk of cognitive impairment compared to those with a high school diploma, whereas those with less than a high school diploma have a greater risk of cognitive impairment. Women have a lower risk of cognitive impairment compared to men. Those with fair/poor health or those who ever smoke have a greater risk of cognitive impairment compared to individuals with better health and individuals who have never smoked. Those who are retired or disabled/out of the labor force for other reasons have a greater risk of cognitive impairment. Black and Hispanic individuals have a greater risk of cognitive impairment compared to

White individuals. Hazard ratios for these covariates appear in the appendix. To further compare these occupational categories, not just by reference category, I conduct pairwise comparisons. From the pairwise comparisons, we see that those in managerial and professional speciality occupations have a lower risk of cognitive impairment compared to those in farming/forestry/fishing, mechanics/repair, construction, precision production. Compared to people in sales, those in farming/forestry/fishing, mechanics/repair, construction, precision production have higher risk of cognitive impairment. Compared to people in managerial and professional speciality occupations, those in service have higher risk of cognitive impairment. Those in professional speciality, technical support occupations and sales have lower risk of cognitive impairment compared to operators. But those in sales have higher risk of cognitive impairment compared to those in professional speciality, technical support occupations and lower risk of cognitive impairment compared to those in service. In general, we see that occupational categories with higher levels of prestige and less physically intensive work experience lower risks of cognitive impairment. Full pairwise comparison results are displayed in the appendix.

Conclusion

Note that these results do not suggest causality between occupation and cognitive impairment. I have not conducted robustness analysis with alternative categorizations of occupation. While my results display such limitations, I believe that this is a worthwhile line of research. These results will contribute to my prospectus plan and ultimately deepen our understanding of cognitive health in later life.

References

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