Longest Held Occupation and Health Problems that Limit Paid Work: Evidence from the Health and Retirement Study

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The findings and conclusions in this study are those of the authors and do not necessarily represent the views of NIOSH
Introduction

- Some of the effects of these factors on health may be recognized long after worker exposure or not at all

- An improved understanding of the long-term effects of occupation on health would better guide in targeted prevention strategies
Objectives

• The main objective of this study was to examine the impact of longest held occupation on health for workers aged 50 and older

  – Health was measured by the “hazard rate of impairment” or how fast an individual would become “impaired”

  – Impairment was defined as a health problem that limited the kind or amount of paid work one could do

• We also examined if there was a difference in biomechanical risk factors across occupations
Method

• We used survival analysis rather than a binary outcome model because we wanted to know how fast impairment occurred

• We used a fully parametric proportional hazards model instead of a Cox proportional hazards model to add covariates

• The *hazard rate of impairment* was the dependent variable. It was computed from a survival curve and it measured how fast an individual would become impaired

• Here is a simple example on how the hazard rate of impairment was computed
**Method (cont.)**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Entry year</th>
<th># Impaired</th>
<th>Hazard rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1992</td>
<td>1993</td>
<td>1994</td>
</tr>
<tr>
<td>X</td>
<td>1000</td>
<td>40</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40/1000=0.04</td>
</tr>
<tr>
<td>Y</td>
<td>500</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5/500=0.01</td>
</tr>
</tbody>
</table>

Hazard ratio of X to Y: 0.04/0.01=4, 0.09/0.02=4.5

- The hazard rate of impairment in occupation X was 4% in 93 and 9% in 94
- The hazard ratio of impairment in occupation X was 4 times higher than in occupation Y in 93 and increased to 4.5 in 94
- Our case was more complex than this example because
  – we measured the hazard rate of impairment at different age level
  – we controlled for covariates
  – The entry year was different for different cohorts
Data and measurement of variables

- We used the Health and Retirement Study (HRS), a panel study that surveys a representative sample of older Americans.

- HRS data collection started in 1992 and has re-interviewed the original sample every two years since then.

- New cohorts have been added in different years (e.g. Children of Depression in 1998, Early Baby Boomer in 2004).

- We used data from all five HRS cohorts for 1992-2008 on 12,490 respondents, representing 48.9 million Americans 50 and older.
Data and measurement of variables (cont.)

- Impairment was measured from the question “Do you have any impairment or health problem that limits the kind or amount of paid work you can do?”

- The dependent variable was the hazard rate of impairment, which was computed from a survival curve.

- The main explanatory variable was the longest held occupation.

- We considered eight broad categories of occupation: managerial, professional, sales, clerical, service, agricultural, mechanical, and operator.

- Covariates included: sex, race, BMI, smoking, income, education, health insurance, region.
Results
Descriptive results

The survival rate

- Around age 87 almost all respondents were impaired (unable to do paid work)
The hazard function shows the hazard rate of impairment increased as age increased.
Descriptive results (cont.)

Nelson-Aalen cumulative hazard estimates for three occupations

- There was significant variation in the hazard rate across occupations.
- At all age levels the hazard rate of impairment for workers with longest held occupation in service and mechanical occupations was higher than for workers in managerial occupation.
Descriptive results (cont.)

Average impairment rate by longest held occupation (1992-2008)

- The overall average impairment rate was 2.3% per 100 workers/year
- There was significant variation across occupations
### Parametric model results

<table>
<thead>
<tr>
<th>Impact of occupation on the hazard of impairment</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>HR</td>
<td>95% CI</td>
</tr>
<tr>
<td>8 control variables</td>
<td>Not shown for brevity</td>
<td></td>
</tr>
<tr>
<td>Longest held occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managerial (Ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>1.12</td>
<td>0.93 - 1.35</td>
</tr>
<tr>
<td>Sales</td>
<td>1.08</td>
<td>0.86 - 1.34</td>
</tr>
<tr>
<td>Clerical</td>
<td>1.07</td>
<td>0.88 - 1.30</td>
</tr>
<tr>
<td>Farming</td>
<td>1.30</td>
<td>0.84 - 2.01</td>
</tr>
<tr>
<td>Operator</td>
<td>1.33**</td>
<td>1.03 - 1.71</td>
</tr>
<tr>
<td>Mechanical</td>
<td>1.48***</td>
<td>1.22 - 1.80</td>
</tr>
<tr>
<td>Service</td>
<td>1.65***</td>
<td>1.32 - 2.07</td>
</tr>
</tbody>
</table>

- Because the characteristics of workers varied across occupations, a fully parametric proportional hazards model was estimated.
- Controlling for covariates, the hazard rates of impairment in the service, mechanical, operator occupations were 65%, 48%, and 33% higher than workers in the reference occupation, respectively.
- Occupation has strong association with impairment.
Ways occupation affects impairment

• To understand potential mechanisms, we examined occupation-related differences in work environment

• The HRS did not collect information on the exposure of workers to chemicals, noise, or other risk factors

• However, it collected information on biomechanical risk factors by asking workers if their job required lots of physical effort, stooping, kneeling or crouching, and lifting heavy loads

• Respondents answered these questions with all/almost all, most, some, and none/almost none of the time

• We want to see if there were systematic differences in biomechanical risk factors across different occupations
Ways occupation affects impairment (cont.)

Responses for jobs required lots of physical effort by occupation

<table>
<thead>
<tr>
<th>Occupation</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some times</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managerial</td>
<td>9</td>
<td>7</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>Clerical</td>
<td>8</td>
<td>7</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Professional</td>
<td>13</td>
<td>11</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Sales</td>
<td>34</td>
<td>27</td>
<td>27</td>
<td>25</td>
</tr>
<tr>
<td>Mechanical</td>
<td>27</td>
<td>27</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Service</td>
<td>39</td>
<td>41</td>
<td>41</td>
<td>35</td>
</tr>
<tr>
<td>Operator</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>35</td>
</tr>
<tr>
<td>Farming</td>
<td>42</td>
<td>42</td>
<td>41</td>
<td>35</td>
</tr>
</tbody>
</table>
Ways occupation affects impairment (cont.)

Responses for jobs required stooping, kneeling, and crouching

<table>
<thead>
<tr>
<th>Occupation</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some times</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clerical</td>
<td>54</td>
<td>5</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Managerial</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Professional</td>
<td>9</td>
<td>14</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Sales</td>
<td>21</td>
<td>23</td>
<td>23</td>
<td>15</td>
</tr>
<tr>
<td>Service</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>15</td>
</tr>
<tr>
<td>Mechanical</td>
<td>17</td>
<td>26</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td>Operator</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Farming</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>15</td>
</tr>
</tbody>
</table>
Ways occupation affects impairment (cont.)

Response to jobs required lifting of heavy loads

Cumulative percent

- All of the time
- Most of the time
- Some times
- Never

Professional: 42%
Managerial: 32%
Clerical: 23%
Sales: 15%
Mechanical: 14%
Service: 12%
Operator: 10%
Farming: 20%

All of the time: 2%
Most of the time: 3%
Some times: 8%
Never: 23%
Ways occupation affects impairment (cont.)

• Results revealed that workers in the managerial, professional, clerical, and sales occupations were exposed to less biomechanical risk factors than workers in the other four occupations.

• These results strengthened the findings of the parametric results.

• Biomechanical risk factors in the operator, mechanical, and service occupations could partially explain the high hazard rates of impairment that workers experience in these occupations.
Summary and conclusions

• Compared with workers in other occupations, workers with the longest tenure in service, operator, and mechanical occupations had elevated hazard rate of impairment.

• Differences in exposure to biomechanical risk factors may be one explanation.

• The implication is that costs for healthcare and disability services might be higher for workers experiencing elevated hazard rates of impairment compared to other workers.

• This might get worse as the population overall continues to age and more older workers continue to work.

• These results can help employers and policy makers to target prevention strategies.
Thank you for your attention