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Job demands and health complaints in white and blue collar workers

K.J. Schreuder\textsuperscript{a}, C.A.M. Roelen\textsuperscript{b,c,∗}, P.C. Koopmans\textsuperscript{b} and J.W. Groothoff\textsuperscript{c}

\textsuperscript{a}ArboNed Corporate Accounts, Zwolle, The Netherlands
\textsuperscript{b}ArboNed, Groningen, The Netherlands
\textsuperscript{c}Department of Social Medicine, University Medical Center, University of Groningen, Groningen, The Netherlands

Abstract. Background: General health in the working population is thought to depend on working conditions.
Objective: This survey studied job demands and health complaints in working white and blue collar employees. We expect physical and psychological job demands to be differentially distributed among white and blue collar workers. Do they report health complaints consistent with their working conditions?
Method: Cross-sectional study of 323 white and 383 blue collar workers. They completed the Basic Occupational Health Questionnaire, a valid and reliable self-report questionnaire about health, work and working conditions. The results were analysed using Chi-square and logistic regression analysis, controlling for educational level as a proxy of socioeconomic status.
Results: The questionnaires of 280 white and 251 blue collar workers were suitable for analysis. White collar workers reported higher psychological job demands, and blue collar workers reported higher physical demands. In both occupational groups, low back pain, fatigue and upper respiratory complaints were most common. The rates of low back pain and pain in the lower extremity were higher in blue collar workers, as were regular headaches, pain in the cardiac region and feeling sleepy. However, these relationships substantially weakened when the educational level was adjusted for.
Conclusions: Despite the differential distribution of job demands, white and blue collar workers reported similar health complaints. Health in the working population depended predominantly on socioeconomic status. Interventions to improve general health of employees should be directed at their socioeconomic position instead of working conditions.

Keywords: Physical job demands, psychological job demands, occupation, blue collar, white collar, general health

1. Introduction

Working environments have changed during the last decades. Physical workload has diminished whereas psychosocial working conditions have become increasingly important. Working conditions are thought to contribute to health and well-being among employees. A substantial part of the association between occupation and perceived health in the working population is reported to be the result of a differential distribution of working conditions [28]. Employees working in bad conditions mentioned poor health two to three times more often than those in the upper occupational classes [19]. Physical workload and job control showed stronger associations with general health, whereas job demands were more strongly associated with mental health. Socioeconomic position has essentially different effects on the associations between working conditions and health outcomes. Vathera et al. [31] found socioeconomic health gradients to be significantly reduced by adjustment for workplace characteristics. They suggested that interventions at organisational level may be an effective way to reduce health inequalities in the working population.

Working conditions have been associated with specific health complaints. Physical workload was identified as a risk factor for musculoskeletal complaints [17]. Krause et al. [16] found a one-month prevalence of severe bodily pain in 47% of 941 hotel room cleaners.
Workers in the highest exposure quartiles for physical workload were more likely to report severe pain than workers in the lowest quartile. For musculoskeletal disorders an occupational class gradient was found, which was largely explained by physical demands at work [1]. Psychological job demands have been associated with coronary heart disease [18], psychological distress [2], psychosomatic complaints [7], and mental health disorders [30] with employees working in lower qualified jobs being more at risk [21].

As work is changing from industrial work to service work, the health risks of working conditions today are different than that of a couple of decades ago. Therefore, it is important to investigate the health risks on the occupational level. Ihlebaek and Eriksen [12] studied subjective health complaints in 662 individuals from five occupational groups: blue-collar, school/education, health service, white-collar and service. They found no differences in the prevalence rates of self-rated health complaints between the occupational groups. If health complaints are not conditional on occupation, then the question arises whether job demands or working conditions influence employee’s health. However, Ihlebaek and Eriksen [12] did not relate health complaints to job demands. The present survey studied job demands and health complaints reported by working white and blue collar employees. We expect white collar workers to report higher psychological job demands, and blue collars to report more physical demands. Do they report different types of complaints consistent with their different job demands? The answer to this question will add to the body of knowledge on the relationship between working conditions and worker’s health.

2. Methods

2.1. Study population and design

Dutch occupational law obliges companies to perform health surveillance among their personnel every four years. Health surveillance included a questionnaire, a series of biometrical measurements, and physical examination. For this study, we used the results of the questionnaires of health checks performed by our regional occupational health department in the period 2002 to 2004. We wanted to study a population as homogeneous as possible in terms of gender, occupational status, and organizational characteristics. Therefore, we collected the results of employees working in a few large companies with comparable absence levels. The company absence level was calculated as:

\[
\{\text{Total number of days absent on company level corrected for part-time return to work}\}/\{\text{Total number of workers in the company } \times 365 \text{ calendar days}\} \times 100\%
\]

White collar employees were recruited from an accounts office (n = 168; absence level 4.8%) and an insurance company (n = 155; absence level 5.2%). According to the ILO classification of occupations (ISCO-88) they were professionals (accountants, insurance agents and inspectors) and clerks doing administrative computer work and sale by telephone. Blue collar workers were machine operators and skilled workers (maintenance technicians) recruited from a cheese production industry (n = 249; absence level 5.5%) and a company producing diapers (n = 134; absence level 5.4%). Their tasks included receiving commodities, supporting the automated production lines, remedying malfunctions, wrapping products, and shipping them. We decided to study male employees because only 3 blue collar workers of the cheese-producing company were women and we wanted to exclude gender differences.

The questionnaire used in the occupational health surveillance was the Basic Occupational Health Questionnaire. This valid and reliable [34] self-report questionnaire consists of 116 questions about health complaints and diseases, recent medical treatment, job demands, working conditions, and interpersonal workplace relationships. According to Dutch law, ethical approval was not required for this cross-sectional questionnaire survey. All workers were informed that their results would be analysed and reported on group level, after which they gave informed consent.

2.2. Measurement of job demands and health complaints

Job demands were divided into physical and psychological demands. Physical job demands were measured with a subscale of the Basic Occupational Health Questionnaire containing 8 items: physical workload, prolonged sitting, prolonged standing, heavy lifting, regular bending, regular twisting, regular high reaching, and repetitive movements. Each item was scored absent (0) or present (1), and a total score on physical job demands was calculated by summing the items. The score ranged from 0 (i.e. no physical demands) to 8 (i.e. high physical demands) and the subscale had a Cronbach’s \( \alpha = 0.60 \). Psychological job demands were measured
Table 1

Specific job demands of white and blue collar workers compared

<table>
<thead>
<tr>
<th>Job demand</th>
<th>White collar</th>
<th>Blue collar</th>
<th>Pearson $\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical workload</td>
<td>11</td>
<td>61</td>
<td>46.7***</td>
</tr>
<tr>
<td>Prolonged sitting</td>
<td>50</td>
<td>21</td>
<td>11.4**</td>
</tr>
<tr>
<td>Prolonged standing</td>
<td>6</td>
<td>73</td>
<td>75.6***</td>
</tr>
<tr>
<td>Heavy lifting or dragging</td>
<td>10</td>
<td>72</td>
<td>63.7***</td>
</tr>
<tr>
<td>Regular bending</td>
<td>5</td>
<td>70</td>
<td>74.1***</td>
</tr>
<tr>
<td>Regular high reaching</td>
<td>13</td>
<td>53</td>
<td>32.8***</td>
</tr>
<tr>
<td>Repetitive movements</td>
<td>24</td>
<td>60</td>
<td>23.2***</td>
</tr>
<tr>
<td>Mental workload</td>
<td>90</td>
<td>29</td>
<td>32.5**</td>
</tr>
<tr>
<td>Work too difficult</td>
<td>2</td>
<td>3</td>
<td>0.3</td>
</tr>
<tr>
<td>Prolonged concentration</td>
<td>190</td>
<td>162</td>
<td>0.8</td>
</tr>
<tr>
<td>Overtime work</td>
<td>22</td>
<td>7</td>
<td>6.6*</td>
</tr>
<tr>
<td>Time pressure</td>
<td>177</td>
<td>109</td>
<td>21.3***</td>
</tr>
<tr>
<td>Work piling up</td>
<td>48</td>
<td>68</td>
<td>35.9***</td>
</tr>
</tbody>
</table>

Frequency distribution of the specific job demands in number of cases and %; the frequencies in white ($n = 280$) and blue ($n = 251$) collar workers were compared using Chi-square tests of which the Pearson $\chi^2$ coefficients and their significance are presented; $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

with a subscale of 6 items (mental workload, work difficulty, prolonged concentration, overtime work, working under time pressure, and work piling up), with a score range of 0 (i.e. no psychological demands) to 6 (i.e. high psychological demands), and a Cronbach's $\alpha = 0.64$.

The Basic Occupational Health Questionnaire also inquired the one-month prevalence of 22 specific health complaints.

3. Statistics

Data were analyzed using SPSS for Windows, version 14. The rates of specific (physical and psychological) job demands, and the prevalence rates of health complaints in white and blue collar workers were compared using Chi-square tests.

Multiple logistic regression analysed the differences in the prevalence of health complaints, with occupation as the outcome variable being blue collar or non-blue collar (i.e. white collar), controlling for the educational level measured on a six-point Likert-type scale with 1 = none or primary education, 6 = university.

Statistical significance was concluded for $p < 0.05$.

4. Results

Of the 706 workers, 111 (36 white collar and 75 blue collar) did not participate in the health surveillance. From our occupational health registration system we computed that they had a mean age of $45.2 \pm 10.8$ years. Of the 595 participants, 64 questionnaires had to be excluded because they were not complete. The questionnaires of 531 (280 white and 251 blue collar) workers were suitable for analysis. White collar workers had a mean age of $42.7 \pm 10.0$ years and blue collars were $43.2 \pm 9.6$ years of age. The educational level was $4.0 \pm 0.9$ (range 2 to 6) in white collar workers and $3.1 \pm 0.8$ (range 1 to 5) in blue collars.

Blue collar workers reported $1.6 \pm 1.9$ physical job demands, while white collars reported $0.4 \pm 0.9$ physical demands. Table 1 shows that prolonged sitting was most prevalent among white collar workers. The other physical job demands were more often reported by blue collar workers.

The mean score on psychological job demands was $2.1 \pm 1.4$ in white collar workers and $1.4 \pm 1.2$ in blue collars. Prolonged concentration was common in white as well as blue collar workers. White collar workers mentioned high mental workload, overtime work and working under time pressure more frequently. Blue collars complained more often about work piling up (Table 1).

Working white collar employees reported $2.5 \pm 2.6$ health complaints and blue collars mentioned $3.5 \pm 3.8$ complaints. Figure 1 shows the prevalence rates of health complaints in white and blue collar workers. Low back pain was most prevalent in both occupational groups: 25% of working white collars and 37% of the blue collars mentioned it.

Fatigue and stuffy nose/sneezing were also often reported in both occupational groups. The prevalence of
pain in the upper and lower extremity, neck pain and feeling sleepy/drowsy was high in blue collar workers. Pain in the upper extremity, neck pain and irritated eyes were frequently mentioned by white collars.

Table 2 compares the subjective health complaints in both occupational groups. None of the investigated complaints was more prevalent in white collar workers. Blue collars felt sleepy/drowsy more often, reported more headaches, and complained of pain in the cardiac region more frequently. The rates of hearing problems, pain in the lower extremity and low back pain were also significantly higher in blue collar workers.

These relationships, however, substantially weakened when the educational level was adjusted for (Table 3). Only the prevalence rates of feeling sleepy/drowsy ($p = 0.02$) and low back pain ($p = 0.02$) remained higher in blue collar workers.

5. Discussion

Job demands were differentially distributed: white collar workers mentioned higher psychological job demands, whereas blue collars reported higher physical demands. Blue collar workers reported more health complaints than white collar workers, confirming that unskilled blue collars tend to show higher morbidity than skilled white collars [24,35]. Despite the differential distribution of job demands low back pain, upper respiratory complaints, and fatigue were most common in both white and blue collar workers. Vaez et al. [31] examined differences in self-rated health among young working people according to educational level and occupation. They found no education-based differences, and few differences based on occupation. Among males, manual workers reported higher scores with regard to pain and physical function than did non-manual workers. The observed differences, however, appeared non-significant and they concluded that perceived health status was not conditional on occupation. Our results add that the type of complaints is not dependent on occupation either.

5.1. Physical job demands and health complaints

Blue collar workers experienced higher physical demands than white collars did. White collar workers re-
Table 2
Specific health complaints in white and blue collar workers compared

<table>
<thead>
<tr>
<th>Health complaint</th>
<th>White collar ((n = 280))</th>
<th>Blue collar ((n = 251))</th>
<th>Pearson (\chi^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>63</td>
<td>59</td>
<td>0.8</td>
</tr>
<tr>
<td>Sleepy/drowsy during work</td>
<td>32</td>
<td>49</td>
<td>6.7*</td>
</tr>
<tr>
<td>Sleeping problems</td>
<td>24</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Cannot cope</td>
<td>15</td>
<td>16</td>
<td>0.2</td>
</tr>
<tr>
<td>Nervous/aggitated</td>
<td>17</td>
<td>25</td>
<td>2.7</td>
</tr>
<tr>
<td>Regular headaches</td>
<td>18</td>
<td>30</td>
<td>5.0*</td>
</tr>
<tr>
<td>Concentration problems</td>
<td>24</td>
<td>25</td>
<td>0.3</td>
</tr>
<tr>
<td>Memory problems</td>
<td>27</td>
<td>31</td>
<td>1.0</td>
</tr>
<tr>
<td>Pain in gastric region</td>
<td>19</td>
<td>24</td>
<td>1.4</td>
</tr>
<tr>
<td>Pain in cardiac region</td>
<td>15</td>
<td>28</td>
<td>6.0*</td>
</tr>
<tr>
<td>Vision problems</td>
<td>33</td>
<td>39</td>
<td>1.6</td>
</tr>
<tr>
<td>Irritated/itchy eyes</td>
<td>44</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>Hearing problems</td>
<td>19</td>
<td>42</td>
<td>12.9***</td>
</tr>
<tr>
<td>Regular dry throats/kharse</td>
<td>6</td>
<td>11</td>
<td>2.1</td>
</tr>
<tr>
<td>Regular stuffy nose/sneezing</td>
<td>54</td>
<td>63</td>
<td>2.6</td>
</tr>
<tr>
<td>Regular coughing/wheezing</td>
<td>27</td>
<td>37</td>
<td>3.2</td>
</tr>
<tr>
<td>Short of breath</td>
<td>37</td>
<td>44</td>
<td>1.9</td>
</tr>
<tr>
<td>Pain in upper extremity</td>
<td>59</td>
<td>69</td>
<td>2.9</td>
</tr>
<tr>
<td>Pain in lower extremity</td>
<td>22</td>
<td>67</td>
<td>33.7***</td>
</tr>
<tr>
<td>Neck pain</td>
<td>57</td>
<td>54</td>
<td>0.12</td>
</tr>
<tr>
<td>Low (lumbar) back pain</td>
<td>70</td>
<td>93</td>
<td>9.0**</td>
</tr>
<tr>
<td>High (thoracic) back pain</td>
<td>20</td>
<td>23</td>
<td>0.7</td>
</tr>
</tbody>
</table>

The rates of specific health complaints in number of cases and %; the rates among white and blue collar workers were compared using Chi-square tests of which the Pearson \(\chi^2\) coefficients and their significance are presented; *\(p<0.05\), **\(p<0.01\), ***\(p<0.001\).

ported prolonged sitting as physical strain. It is tempting to attribute the prevalence of low back pain to their prolonged sitting. Burdorf et al. [4] reported that sedentary workers frequently adopt non-neutral postures of the trunk. Their results suggested that sustained sedentary work in a forced non-neutral trunk posture was a risk factor for low back pain. Reviewing recent epidemiological literature, Hartvigsen et al. [10] found no support for the popular opinion that sitting-while-at-work is associated with low back pain.

In our study, working blue collar employees reported low back pain more often than did white collar workers, even after adjustment for the educational level. They experienced higher physical workload, heavy lifting/dragging and regular bending. Dose-response relationships have been found between low back pain and the exposure to trunk flexion over 45° and lifting/carrying loads over 10 kg measured in percentage of work time [14]. Trunk flexion over 45° is a risk factor for disabling low back pain [15], confirming that work-related health complaints might be the result of specific physical occupational risk factors.

Pain in the lower extremity was also mentioned more frequently by blue collar workers. Croft et al. [5] recognized hip osteoarthritis as an occupational disease in men whose work involved prolonged standing (OR = 2.7; 95% confidence interval 1.0–7.3) and/or heavy lifting (OR = 2.5; 95% confidence interval 1.1–5.7). Reviewing literature, McCulloch [23] reported that musculoskeletal pain of the lower back and feet and chronic venous insufficiency were health risks associated with working conditions that required prolonged standing. In our study, prolonged standing was mentioned more often by blue collar workers. This might explain the higher prevalence of pain in the lower extremity among them. The cross-sectional design of our study, however, precluded conclusions on causal relations between job demands and health complaints, impeding the discussion on ergonomics.

5.2. Psychological job demands and health complaints

White collar workers experienced higher psychological job demands than blue collars did. High psychological workload has been associated with musculoskeletal pain, in particular neck and shoulder complaints [29]. In our study population, about 20% of white collar workers reported pain in the upper extremity and neck. However, the prevalence rates did not differ between white and blue collar workers. De Zwart et al. [36] also noticed that the differences in prevalence rates of neck pain between mentally demanding work and physically demanding work were small.
In spite of higher psychological job demands, white collar workers did not report more psychosomatic complaints. Bourbounnais et al. [2] found a 27.8% prevalence of psychological distress among 2889 white collar workers in the Quebec city area. Strong relations were reported between psychosocial work demands and psychosomatic complaints [7]. In our study blue collar workers felt sleepy/drowsy more often, and reported more headaches and pain in the cardiac region, than did white collar workers. Marchand et al. [21] found non-qualified white collar workers, semi-qualified blue collar workers, and male non-qualified blue collar workers to be more at risk for psychological distress and common mental disorders. Our results confirmed that psychosomatic complaints were more prevalent among blue collar workers. This finding, however, could not be understood from their psychological workload. Probably, factors not related to the workplace such as marital status, family life, lifestyle, nutrition, personality, and ethnicity play a role, as these factors were found to be correlated with health [9]. It is difficult to draw conclusions from the correlations between these variables and health, because of (non-linear) interactions among the variables and new factors continuing to be identified. Social epidemiology has recognized a broad range of psychosocial risk factors for health, most notably social relationships, chronic stress, and psychological dispositions such as anger/hostility, lack of self-efficacy/control, and negative affect/pessimism [11].

5.3. Socioeconomic health inequalities

Socioeconomic differences in morbidity are substantial [20,22], with health problems occurring more frequently among people in lower social classes [6,25]. Rahkonen et al. [26] investigated 8970 employees to determine whether health is related to working conditions. They concluded that both social class and working conditions were related to health after mutual adjustments. Our study showed that the relations between health complaints and occupation were substantially weakened when we controlled for education, which is a proxy of socioeconomic status. Only low back pain and feeling sleepy remained more prevalent among blue collar workers when the educational level was controlled for. These results indicate that general health seems to be particularly determined by socioeconomic position. Researchers should pay attention to possible interactions among health and socioeconomic variables instead of working conditions.

Schrijvers et al. [28] observed higher odds ratio for poor general health in the lower occupational classes
adjusted for confounders. The odds of poor general health were higher among people reporting hazardous physical working conditions, lower job control, lower social support at work, and among those in the highest categories of job demands. They concluded that a substantial part of the association between occupational class and poor health in the working population could be attributed to a differential distribution of working conditions. It was suggested that interventions aimed at improving working conditions might result in a reduction of inequalities in health in the working population. In spite of different working conditions, health complaints of blue and white collar workers in our study population predominantly depended on socioeconomic status.

5.4. Limitations of the study

A point of attention in this study is the possibility of bias by selective non-response. Some may have decided not to participate in health surveillance because they felt healthy. Others, by contrast, may have done so because they were already under regular medical control or treatment. Therefore, both overestimation and underestimation of the rates of health complaints was possible.

Furthermore, the results suffer from the cross-sectional design of this study, limiting conclusions on causality. For example: blue collar workers perceived higher physical job demands and reported low back pain more often. However, we could not conclude that the physical demands caused this complaint. Therefore, our results did not add to the body of knowledge in ergonomics.

Although there is a risk of subjectivity in using self-report questionnaires, such surveys provide detailed information about perceived workload and health. Questionnaire results may be distorted by response styles (e.g. cognitive-affective consistency within the person and social desirability), attribution processes, or personality characteristics. The Basic Occupational Health Questionnaire included standardized factual questions in neutral wording, and studies about its applicability have already been published [3,33]. Nevertheless, it is important to keep in mind that questionnaire responses may be influenced by how someone feels.

The reliabilities of both demand scales were relatively low. This was explicable from the different types of job demands which were not necessarily related. For instance: the worker reporting prolonged sitting, will not mention lengthy standing as a job strain, whereas both were considered physical demands. The low reliabilities did not disturb our results, because factor analysis has shown both scales to be uni-dimensional [27].

Finally, the results of this study are not representative for the total working population. We studied a sample of convenience including male white and blue collar employees working in four regional companies in two northern Dutch provinces. We neither studied female workers, nor employees of small companies or small traders.

We conclude that health inequalities between white and blue collar workers depended predominantly on their socioeconomic position. Changing work demands will have effects on the incidence of specific work-related disease. However, it is not likely to affect self-rated general health. To reduce health inequalities, worksite health promotion programs will be more promising than adjustment of working conditions [8]. Therefore, studies on such programs as a means of achieving better health and increased worker productivity [32] should be stimulated.

References

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