The contribution of musculoskeletal disorders and physical workload to socioeconomic inequalities in health

Akseli Aittomäki, Eero Lahelma, Ossi Rahkonen, Päivi Leino-Arjas, Pekka Martikainen

Objectives: The objective of the study was to examine whether the association of physical workload with musculoskeletal disorders might explain occupational social class inequalities in self-rated health. Methods: Participants of the study were 40–60 years old employees of the City of Helsinki. The data (n = 3740) were derived from several sources, including mail survey designed by the researchers and health check-ups carried out by occupational health care. Prevalence data and logistic regression were used in the analyses. Results: An occupational class gradient was found for musculoskeletal disorders. The gradient in musculoskeletal disorders was largely explained by physical demands at work in both genders. The contribution of physical demands to occupational class gradient in self-rated health was considerable in women, but smaller in men. The contribution of musculoskeletal disorder to the occupational class gradient in self-rated health was weak for both genders. Conclusion: Physical workload is likely to considerably contribute to inequalities in health. Mediation of this effect through musculoskeletal disorder to generic health, however, could not be demonstrated. Different mechanisms are likely to cause inequalities in different health outcomes.

Keywords: health status, musculoskeletal disorders, occupational social class, physical workload

There is considerable evidence on socioeconomic inequalities in total mortality and most causes of death,1,2 as well as overall health status as measured with self-rated health, limiting long-standing illness and different measures of functioning.3 There is considerable evidence on socioeconomic inequalities in cardiovascular diseases,5,6 lung cancer, and some forms of gastrointestinal cancer,7,8 and alcohol related causes of death.9 Many studies have found socioeconomic inequalities in back disorders, although results are more consistent for their onset than on severity.10–14 Research on socioeconomic variation in total musculoskeletal morbidity is scarce, but there are steep socioeconomic gradients for work disability in musculoskeletal disorders.15–23 The association of musculoskeletal disorders and physical workload has been the subject of a large number of studies.18–20 Most evidence has accumulated on physical work factors as determinants of musculoskeletal disorders of the upper extremity and the low back.18,21,22 Some studies also indicate associations between physically demanding work tasks and disorders of the lower extremity.22–25

A potential mediating mechanism between occupational class, musculoskeletal disorder, and health is as follows: occupation determines physical workload, and mechanical load exerted on connective tissues increases the risk of injury and disease. As musculoskeletal disorders are common, this might be expected to contribute to the socioeconomic variation in generic health outcomes as well. Even so, research on physically demanding work as a determinant of socioeconomic inequalities in health has been uncommon. There is, however, some previous evidence of marked effects of physical work conditions on inequalities in general health status26,27 and functioning.28

In this study we attempt to find out whether the relationship of physical workload and musculoskeletal disorders contributes to the socioeconomic inequalities found for more generic health outcomes.

Objectives

The specific objectives of the study were to test (i) whether occupational class inequalities in musculoskeletal disorder are similar to inequalities measured by self-rated health, (ii) whether inequalities both in self-rated health and musculoskeletal disorders can be explained by physical demands at work, and (iii) to what degree the association of occupational class with self-rated health can be explained by the association of workload and musculoskeletal disorders.

Methods

Data sources

This study is part of a project on employee health and wellbeing called the Helsinki Health Study. The study protocol of the Helsinki Health Study has been approved by the ethical committees at the Department of Public Health, University of Helsinki, and at the City of Helsinki health authorities. Participation was voluntary, and linkage of the mail survey data with data from occupational health care and registers was based on written informed consent.

Participants of the study were employees of the City of Helsinki aged 40, 45, 50, 55 and 60 years. There were three data sources: (i) base-line mail survey of Helsinki Health Study, (ii) a questionnaire filled in together with the participant and an occupational health nurse during age group based health check-up, and (iii) personnel register data. Mail survey questionnaires were sent by the researchers to 13 678 employees during the years 2000, 2001, and 2002. Altogether 8970 employees responded to the mail survey questionnaire resulting...
in a response rate of 67%. Each year the same age groups were invited to age group based health check-up by the occupational health care of the City of Helsinki as part of the routine services of the occupational health care. During the years 2000, 2001, and 2002 a total of 13 923 employees were invited to the health check-up. A total of 8458 employees attended and 5943 gave their consent to conveying data from the health check-up for the study, resulting in a final participation rate of 43% for the health check-up data.

For this study it was necessary to combine the mail survey questionnaire data with the health check-up data to have adequate measures on both health outcomes: data covering all musculoskeletal morbidity was available from the health check-up only, whereas data on self-rated health was available in the mail survey only.

Not all mail survey respondents had participated in the health check-up, and vice versa. Both data sources as well as the respondents’ consent to combining them were available for 3815 participants. Data from the personnel register of the City were available for all employees. Further 75 participants were omitted from the analyses because of missing information on health outcomes or physical demands, yielding a final study sample of 3740 participants. The number of participants and the distributions of occupational class by gender are shown in table 1.

As the loss of participants due to non-matching participation in mail surveys and health check-up and due to lack of consent for linking these was considerable, possible bias was checked against data from the personnel register of the City of Helsinki. Some influences on participation in all data sources with consent for linkage were found. Those in lower occupational classes were somewhat less likely to participate than those in higher classes. Long sickness absence spells somewhat reduced the participation in mail survey, but increased participation through health check-up. Those with long sickness absence spells were more likely to be in the combined data used for this study. The selection according to sickness absence was, however, weaker for those in low occupational class than those in high occupational class, i.e. participants with long sickness absence spells were overrepresented in high occupational class when compared with low occupational class. Age was associated with participation in men, with older men more likely to participate than their younger counterparts, but not in women.

Measurement of health

General health status was measured by single-item self-rated health from Short Form 36 health inventory available in the mail survey.25 The item was ‘How good would you generally say your health is’ with response categories: excellent, very good, good, mediocre, and bad. Less than good health was regarded as signifying poor self-rated health.

Table 1 Number of participants and distribution of occupational class by gender

<table>
<thead>
<tr>
<th>Occupational class</th>
<th>Women (%)</th>
<th>Men (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers and professionals</td>
<td>29</td>
<td>45</td>
</tr>
<tr>
<td>Semi-professionals</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Routine non-manuals</td>
<td>41</td>
<td>8</td>
</tr>
<tr>
<td>Manual workers</td>
<td>10</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Total (N)</td>
<td>3058</td>
<td>678</td>
</tr>
</tbody>
</table>

Data on musculoskeletal disorders were derived from health check-up by the occupational health care. During the health check-up the participants filled out a questionnaire on work ability and work conditions under the instruction of an occupational health nurse. This additional questionnaire included a six item list of musculoskeletal disorders: disorder of the neck and upper back, disorder of the low back, sciatica syndrome, disorder of the limbs, rheumatoid arthritis, and other musculoskeletal disorder. The participants were asked to report whether they currently experienced these disorders and whether the disorders had been diagnosed by a physician.

Reporting a disorder diagnosed by physician in any of the items was regarded as having a musculoskeletal disorder. The analyses were also repeated with musculoskeletal disorder cases being limited to those reporting a diagnosed disorder at least in two out of six items.

Measurement of physical workload

Data on physically demanding work were derived from the health check-up. The additional questionnaire used in the health check-up included a four item list on physically demanding work tasks: strenuous muscular work, repetitive movements, difficult working postures, and carrying and lifting. The participants were asked to state how often they had to engage in such tasks in their job, with response categories never, seldom, moderately, often, and very often. In the analyses physical demands were measured with the number of demanding tasks present often or very often, the measure thus having a range of 0–4 with a mean of 0.68 for men and 1.27 for women. Mean number of physical demands by occupational class and gender is shown in table 2. The Cronbach alpha coefficient for the physical demand items was 0.73.

Analyses were repeated with physical demands applied as four distinct variables instead of one continuous variable. Results for differences by occupational class were similar, and only analyses using the continuous sum variable are reported. Furthermore analyses were also repeated adjusting for years in current occupation, but results were again similar.

Measurement of socioeconomic status

Occupational class was used to indicate socioeconomic status. Classification was based on the occupational title derived from the personnel register, and included four classes: managers and professionals, semi-professionals, routine non-manuals, and manual workers. The classification followed similar theoretical principles of occupational class as presented by Erikson and Goldthorpe.30

Controlling for confounders

Analyses were adjusted for age. Analyses for associations of physical demands with health outcomes were repeated adjusting in addition to age for psychosocial job demands and

Table 2 Mean number of physical demands by occupational class and gender

<table>
<thead>
<tr>
<th>Physical demands by occupational class</th>
<th>Women</th>
<th></th>
<th>Men</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>95% CI</td>
<td>Mean</td>
<td>95% CI</td>
</tr>
<tr>
<td>Managers and professionals</td>
<td>0.48</td>
<td>0.43–0.53</td>
<td>0.33</td>
<td>0.26–0.40</td>
</tr>
<tr>
<td>Semi-professionals</td>
<td>1.07</td>
<td>0.97–1.18</td>
<td>0.55</td>
<td>0.41–0.69</td>
</tr>
<tr>
<td>Routine non-manuals</td>
<td>1.75</td>
<td>1.67–1.83</td>
<td>0.78</td>
<td>0.48–1.08</td>
</tr>
<tr>
<td>Manual workers</td>
<td>1.92</td>
<td>1.78–2.09</td>
<td>1.37</td>
<td>1.23–1.52</td>
</tr>
</tbody>
</table>
job decision latitude\textsuperscript{31} and physical environment risks (noise, vibration, insufficient lighting, solvents, and other chemicals, high or low temperatures, dry air, dust, dampness, mould-damaged premises). Results are referred to, but data are not shown.

**Analyses**

Occupational class differences in self-rated health and musculoskeletal disorders are first reported as crude prevalences by gender.

To empirically test for the first research question, logistic regression models of both musculoskeletal disorders and self-rated health as a function of occupational class were fitted stratified by gender. To test for the second research question, models of both outcomes were adjusted for physical demands. To test for the third research question, models of self-rated health as a function of occupational class were also adjusted for musculoskeletal disorder, as well as

Table 3: Prevalence of less than good self-rated health and musculoskeletal disorder by occupational class and gender

<table>
<thead>
<tr>
<th></th>
<th>Women (%)</th>
<th>95% CI (%)</th>
<th>Men (%)</th>
<th>95% CI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than good self-rated health by occupational class</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managers and professionals</td>
<td>17</td>
<td>14–19</td>
<td>19</td>
<td>15–24</td>
</tr>
<tr>
<td>Semi-professionals</td>
<td>19</td>
<td>16–22</td>
<td>30</td>
<td>23–38</td>
</tr>
<tr>
<td>Routine non-manuals</td>
<td>25</td>
<td>23–28</td>
<td>26</td>
<td>14–38</td>
</tr>
<tr>
<td>Manual workers</td>
<td>33</td>
<td>28–38</td>
<td>40</td>
<td>33–47</td>
</tr>
<tr>
<td>Musculoskeletal disorder by occupational class</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managers and professionals</td>
<td>30</td>
<td>27–33</td>
<td>28</td>
<td>23–33</td>
</tr>
<tr>
<td>Routine non-manuals</td>
<td>37</td>
<td>35–40</td>
<td>35</td>
<td>22–48</td>
</tr>
<tr>
<td>Manual workers</td>
<td>40</td>
<td>34–45</td>
<td>34</td>
<td>27–41</td>
</tr>
</tbody>
</table>

**Results**

**Research question 1**

Both self-rated health and musculoskeletal disorders showed marked occupational class differences in both genders as illustrated by prevalences (table 3) and age-adjusted regression models (tables 4 and 5).

There was a consistent occupational class gradient in musculoskeletal disorder in women. In men a tendency of those in lower occupational class having more musculoskeletal disorder than those in higher class was observed, although the gradient was not fully consistent, and did not reach statistical significance at 95% level. There was a clear occupational class gradient in self-rated health in both genders. The differences were larger for self-rated health than for musculoskeletal disorder.

**Research question 2**

Adjusting for physical demands attenuated the association of occupational class with musculoskeletal disorder markedly in both genders (table 4). In women the association of occupational class with musculoskeletal disorders almost completely disappeared when adjusting for physical demands.

Adjusting for physical demands resulted in a marked attenuation of the association of occupational class with self-rated health in women, but only in a small attenuation in men (table 5).

**Research question 3**

Adjusting for musculoskeletal disorders resulted in a small attenuation of the association of occupational class with self-rated health in women. No clear changes in men were observed.
The occupational class gradient in musculoskeletal disorders was largely explained by physical demands at work in both genders. Physical demands explained a considerable portion of the occupational class gradient in self-rated health in women. A small contribution of the occupational class gradient in self-rated health was observed, although the gradient was not fully consistent for men, and it was less steep than that for self-rated health. The objective of the study was to test for an explanatory model of socioeconomic variation in health. It was hypothesised that occupation determines the extent of physical workload, and physical workload contributes to musculoskeletal disorders. These disorders in turn would then contribute to socioeconomic inequalities found in general health outcomes, for example self-rated health.

We studied 40–60 year old employees of the City of Helsinki. The multiple data sources included mail survey questionnaire, self-reported data on work and health from age group based health check-up by occupational health care, and data from the personnel register of the City of Helsinki.

### Main findings
An occupational class gradient in musculoskeletal disorders was observed, although the gradient was not fully consistent for men, and it was less steep than that for self-rated health. The gradient in musculoskeletal disorders was largely explained by physical demands at work in both genders. Physical demands at work explained a considerable portion of the occupational class gradient in self-rated health in women. A small contrast

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**Table 5** The association of occupational class with less than good self-rated health, adjusted for age and physical demands and musculoskeletal disorder

<table>
<thead>
<tr>
<th>Self-rated health as a function of occupational class</th>
<th>Women</th>
<th></th>
<th></th>
<th>Men</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td>%C&lt;sup&gt;a&lt;/sup&gt;</td>
<td>OR</td>
<td>95% CI</td>
<td>%C&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Adjusted for age only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managers and professionals</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Semi-professionals</td>
<td>1.40</td>
<td>1.07–1.85</td>
<td>1.87</td>
<td>1.18–2.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routine non-manuals</td>
<td>1.79</td>
<td>1.43–2.24</td>
<td>1.69</td>
<td>0.85–3.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual workers</td>
<td>2.58</td>
<td>1.91–3.50</td>
<td>2.98</td>
<td>1.94–4.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted for age and physical demands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managers and professionals</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Semi-professionals</td>
<td>1.21</td>
<td>0.91–1.61</td>
<td>–43</td>
<td>1.81</td>
<td>1.14–2.88</td>
<td>–5</td>
</tr>
<tr>
<td>Routine non-manuals</td>
<td>1.34</td>
<td>1.05–1.71</td>
<td>–50</td>
<td>1.56</td>
<td>0.78–3.14</td>
<td>–15</td>
</tr>
<tr>
<td>Manual workers</td>
<td>1.88</td>
<td>1.36–2.60</td>
<td>–33</td>
<td>2.53</td>
<td>1.58–4.06</td>
<td>–15</td>
</tr>
<tr>
<td>Adjusted for age and musculoskeletal disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managers and professionals</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Semi-professionals</td>
<td>1.35</td>
<td>1.02–1.80</td>
<td>–10</td>
<td>1.88</td>
<td>1.17–3.02</td>
<td>+1</td>
</tr>
<tr>
<td>Routine non-manuals</td>
<td>1.66</td>
<td>1.31–2.09</td>
<td>–13</td>
<td>1.50</td>
<td>0.74–3.05</td>
<td>–22</td>
</tr>
<tr>
<td>Manual workers</td>
<td>2.34</td>
<td>1.71–3.20</td>
<td>–11</td>
<td>2.98</td>
<td>1.92–4.62</td>
<td>0</td>
</tr>
<tr>
<td>Adjusted for age, physical demands, and musculoskeletal disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managers and professionals</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Semi-professionals</td>
<td>1.21</td>
<td>0.91–1.62</td>
<td>–44</td>
<td>1.84</td>
<td>1.14–2.96</td>
<td>–3</td>
</tr>
<tr>
<td>Routine non-manuals</td>
<td>1.31</td>
<td>1.02–1.68</td>
<td>–54</td>
<td>1.42</td>
<td>0.70–2.92</td>
<td>−32</td>
</tr>
<tr>
<td>Manual workers</td>
<td>1.81</td>
<td>1.30–2.52</td>
<td>–38</td>
<td>2.65</td>
<td>1.63–4.30</td>
<td>–11</td>
</tr>
</tbody>
</table>

OR, 95% CI and per cent changes in model estimates (%C) from logistic regression models. 

a: Per cent changes in model estimates compared with age-adjusted model.

(Table 5). Mutual adjustment did not clearly add any attenuation to what was achieved by adjusting for physical demands only.

### Adjusting for confounders
Adjusting for psychosocial demands and job decision latitude did not attenuate the occupational class gradient in musculoskeletal disorders. Adjusting for physical environment risks resulted in some attenuation of the gradient. In women the effect of physical environment risks on musculoskeletal disorder was much smaller than the effect of physical demands. In men the effects of physical environment risks and physical demands were of similar magnitude, but the effect of physical demands retained even after adjustment for physical environment risks as mutual adjustment resulted in partly reverse occupational class differences (data not shown).

The effect of adjusting for physical demands on the occupational class gradient in self-rated health did not change markedly when models were adjusted either for psychosocial job demands and job decision latitude or for physical environment risks in addition to age (data not shown).

All analyses were repeated with musculoskeletal disorders limited to respondents with more than one disordered body area. The occupational class gradient in musculoskeletal disorders was steeper, and in women adjusting for physical demands attenuated by two-thirds of the gradient instead of the whole gradient. Results for self-rated health did not change.

### Discussion
The objective of the study was to test for an explanatory model of socioeconomic variation in health. It was hypothesised that occupation determines the extent of physical workload, and physical workload contributes to musculoskeletal disorders. These disorders in turn would then contribute to socioeconomic inequalities found in general health outcomes, for example self-rated health.

We studied 40–60 year old employees of the City of Helsinki. The multiple data sources included mail survey questionnaire, self-reported data on work and health from age group based health check-up by occupational health care, and data from the personnel register of the City of Helsinki.
the effect of physical workload on health is not limited to differential socioeconomic variation in health. Functional, and subjective models of health being related to work has not supported the distinctions between the medical, model as is the case for self-rated health. However, previous different definitions of health, musculoskeletal disorders disorder than self-rated health. Due to smaller occupational class differences in musculoskeletal disorders, to the comprehensive measure. However, tasks with health outcomes, because in work with little physical is likely to reduce the observed association of physical work requires were found despite the fact that musculoskeletal disorder had a strong association with self-rated health as such (data not shown). The contribution of musculoskeletal disorder to the gradient in self-rated health in women was much smaller than that of physical demands. Thus it seems unlikely that the effect of physical demands on the occupational class gradient in self-rated health are mostly mediated through musculoskeletal disorder. This part of the hypothesised pathway was not supported by the results.

Previous studies have indicated self-rated health to be a comprehensive measure for ill-health covering various conditions. Therefore the socioeconomic variation could be expected to pass on from the components, including musculoskeletal disorders, to the comprehensive measure. However, in our study, while the socioeconomic gradients in the two health outcomes had partly similar determinants, the gradients were largely independent of each other. This may partly be due to smaller occupational class differences in musculoskeletal disorder than self-rated health.

It can be argued that the studied health outcomes followed different definitions of health, musculoskeletal disorders following a disease model rather than a subjective sickness model as is the case for self-rated health. However, previous work has not supported the distinctions between the medical, functional, and subjective models of health being related to differential socioeconomic variation in health. The contribution of physical demands to the occupational class gradients in both health outcomes was larger for women than men. This suggests a higher vulnerability of women to physical demands at work. However, a weak association in men may also be due to the inaccuracy of measurement of physical workload.

Results from this study further suggest that physical workload may contribute to the socioeconomic variation in health independent of musculoskeletal disorders. Psychosocial job demands, job decision latitude, and physical environment risks did not explain this association. Confounding from health behaviours is theoretically possible, but previous studies have not found consistent associations between work conditions and health behaviours. Therefore our results suggest that the effect of physical workload on health is not limited to musculoskeletal disorders.

Methodological considerations

In this study musculoskeletal disorders were measured as any self-reported musculoskeletal disorder diagnosed by a physician. A large part of this morbidity is likely to be non-specific back or shoulder pain. The duration of the disorder was unknown, and consequently, this classification contains musculoskeletal disorders of potentially a wide variety of severity. This was reflected in a fairly high prevalence of these disorders, which may explain the less steep gradient for musculoskeletal disorders than that for poor self-rated health. It is possible that this broad classification of disorders may hide inequalities in specific diseases, but as these are much less common, their total effect at the population level is unlikely to be large.

Measurement of physical demands at work was based on self-reports. Earlier research has suggested that misclassification is likely to reduce the observed association of physical work tasks with health outcomes, because in work with little physical workload, self-assessed workloads are liable to be overestimated, and in work with high physical loads, liable to be underestimated. The result of such bias would be to reduce the variation of physical workload, and is likely to reduce the contribution of physical workload to occupational class gradients in health outcomes. Therefore this bias is unlikely to explain the observed contributions. Furthermore, in a cross-sectional study design, reverse-causation cannot be ruled out. Part of the contribution of physical workload to health outcomes could be due to a tendency of those with worse health to report more workload. Earlier studies have examined possible influences of morbidity on self-assessed physical workload, but results are conflicting.

The studied population, i.e. municipal employees from the City of Helsinki, was female dominated. Weaker results for physical workload as a determinant of health outcomes in men than women may also be related to the possibility that the data do not fully represent the male dominated occupations with high physical workload. We have discussed this issue earlier in more detail.

Loss of participants accumulated in the construction of the final data set from several data sources. Owing to the disparate participation in mail surveys and health check-up and lack of consent to link these data a considerably smaller study population than the original sample was available for analyses. However, the possible bias could be assessed by using the personnel register of the City of Helsinki. In the data analysed in this study those in low occupational class were slightly underrepresented, and those with long sickness absence spells were somewhat overrepresented. Sickness absence, however, influenced data availability more in those in high occupational class, and the occupational class inequalities in long sickness absence spells were somewhat narrower for the participants than non-participants. The effect of the possible bias is likely to underestimate occupational class inequalities in the studied health outcomes, and therefore the bias is unlikely to invalidate the main findings of the study.

Conclusions

Physical workload has been underresearched as an explanation for socioeconomic differences in health, presumably because of difficulties to measure physical workload in large population samples. Our study suggests that physical workload is a central determinant of socioeconomic differences in musculoskeletal disorders and also contributes to differences in self-rated health. Physical workload may also contribute in important ways to other socioeconomic differences in health.

The relative importance of different determinants and their mediating mechanisms is likely to vary between health outcomes. Ill-health can be caused by many different conditions, and likewise, the influence of socioeconomic status on different domains of health may be caused by different mechanisms.

Acknowledgements

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Conflicts of interest: There are no conflicts of interest.
Key points

- Considerable contributions of physical workload to socioeconomic inequalities in health were found.
- The contribution was particularly strong for occupational class differences in musculoskeletal disorder, but mediation through musculoskeletal disorder to general health status could not be verified.
- There may be other mechanisms for the effect of physical workload on inequalities in health than the effect of mechanical exposure and risk of injury on musculoskeletal morbidity.
- Changes in physical workload are likely to affect inequalities in health, particularly inequalities in musculoskeletal disorder.

References


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