Reviewer's report

Title: Registry-based data of psychosocial working conditions and occupational groups as predictors of disability pension due to musculoskeletal diagnoses: a prospective cohort study of 24 544 Swedish twins

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Reviewer: Ingrid Sivesind Mehlum

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This manuscript investigates the associations between occupational groups defined by sector, and psychosocial working conditions with disability pension due to musculoskeletal diagnoses, accounting for familial factors in the associations.

Major comments

The data material is impressive, however, it is not very clear what this study adds, compared to previous studies; what makes this study important and worth publication? The introduction is not very convincing as to this matter; the aim does not seem particularly focused and the authors do not seem to have any model or hypotheses as to how the included variables are related.

Psychosocial variables are included, with values assigned to each individual based on a job-exposure matrix for 8 very broad occupational groups. The reason for including the occupational groups in the study is not very clear, and the results will probably not be of much help as to decide where preventive measures would be needed.

Minor comments

Introduction

I find the introduction a bit confusing. In the first paragraph, the authors write: “The few studies examining psychosocial working conditions have detected associations between low job control, high job strain and DP due to MSD”, referring to 2 papers about low job control and 4 about high job strain. However, a couple of sentences further down, the authors write: “As far as we are aware, one study has investigated the association between job strain and DP due to MSD, with another examining low job control”. There seems to be an obvious contradiction here.

In the next paragraph, there is a similar contradiction. First: “Studies of socioeconomic class based on occupation have indicated clear associations between occupational social classes and DP”. And in the next sentence: “studies based on socioeconomic position, or with a more detailed classification of occupations in population-based samples have not apparently been conducted”. And again, further down: “some studies do seem to indicate that there are
differences in the risk for DP due to MSD between occupational groups”. And even further down, in the fourth paragraph: “despite the relatively abundant research on occupational groups, workrelated factors and risk of DP due to MSD…” Are there, or are there not other studies about these things?

Several terms are used: occupations, occupational groups, occupational social class, and socioeconomic class, however, it is not quite clear which of these are supposed to be the same and which are not.

Third paragraph: “Individual-related environmental effects, which are mainly exposures or circumstances encountered in adulthood, such as education, occupation, or psychosocial working conditions…” I believe individual-related environmental effects in childhood would also be important. Do the sum of these factors actually add up to 100%, or is it just assumed that they do?

Fourth paragraph:
“…despite the relatively abundant research on occupational groups, workrelated factors and risk of DP due to MSD, most previous studies have used selfreported data”. At least one of the listed references (18) is based on registry data only. And also, be more specific about what self-reported data you are referring to.

Methods
Study population: “Data were available for 10 246 complete same-sex twin pairs with known zygosity (4154 monozygotic [MZ], 6071 dizygotic [DZ])…” The numbers 4154 and 6071 add up to 10 225. Were 21 twin pairs of unknown zygosity?

Occupational groups: It is very difficult to understand that there are 8 occupational groups; use the semi-colons consequently between the groups.

Psychosocial working conditions: How these were assigned using the JEM needs to be described in more detail. The referred JEM (26) was created for 320 different occupational categories. Were they all used and the occupations collapsed into 8 groups afterwards?

Covariates: Why were children living at home added as a covariate? Is it a potential confounder of the relationship between occupational groups and DP, or between psychosocial work environment and DP? Or a potential mediator (in which case it might not be correct to adjust for it, see Hernán MA et al., Am J Epidemiol 2002)? What would this model look like?

Statistical analyses: “…to investigate the potential effect of occupational groups on psychosocial working conditions and the effect of psychosocial working conditions on sector defined occupational groups, we ran the analyses by including occupational groups as an additional covariate for psychosocial working conditions and vice versa”.

I do not think this is correct. What you seem to have done, is investigating the potential effect of occupational groups on DP, adjusted for psychosocial working conditions (and vice versa). Then there is the question of a model again. I could
think of a model with psychosocial work environment as a mediator between occupation and DP (this may not be correct). What are you actually doing when you do these adjustments, according to your model?

The analyses that were conducted using twin pairs discordant for DP are not quite clear to me. Were you using some kind of fixed effects regression analyses? It would be helpful if the name of your Stata command for these analyses was included.

Results

The authors write different versions of “…were significant predictors for future DP”, “predicted DP”, “remained associated with risk of DP”, without writing what the effect was. Did the variables increase or decrease the risk of DP. Did the effect get stronger or weaker?

Last paragraph: The authors write: “There was no major influence of these additional adjustments…”

What adjustments? Between the first columns of Table 2 (age- and sex-adjusted) and Table 3 (Model 1), referring to the previous sentence, or between Model 1 and Model 2 in Table 3, referring to the last part of the sentence (which, by the way, is difficult to understand and needs to be rewritten)?

Table 1: When was marital status, and children at home measured?

Table 2: Were all the discordant twins in the same occupational groups?
- Why not use “active job” (the best type) as the referent category?
- The age- and sex-adjusted results were also clustered on pair identity; this should be added.

Table 3: What do the symbols * and † mean?

Discussion

First paragraph: The term “several confounding factors” is mentioned a couple of times. Are they really confounding, or just “possibly confounding”? In the last paragraph of the results section, the authors write: “There was no major influence of these additional adjustments…” If this means after adjustment for the covariates, they are probably not very strong confounders, if at all.

Second paragraph: “Currently, there are few studies which would have investigated the associations between psychosocial working conditions…” The sentence seems incomplete and is difficult to understand – the associations between psychosocial working conditions and what?

“The direct effect between job demands, job control…”. The term “direct effect” is commonly used in contrast to “indirect effect”, which is an effect mediated through other variables. What is meant here (in this list of many work-related variables) – direct effects between all the variables?

“…suggesting that interventions in adults would be potentially beneficial”. 
According to the previous sentence, this should be workplace interventions, not any interventions in adults.

“Our results support the finding of mediating effect of psychosocial working conditions”.

How? This should be explained. There were only small changes in the effects of occupational groups between Model 1 (not adjusted for psychosocial working conditions) and Model 2 (adjusted).

“…but in our data, these conditions seemed to have a relatively strong and independent (i.e. they were not dependent on confounding factors and family background) predictive role for DP due to MSD”. They could very well have an independent effect, not confounded by family and background factors, and still be a mediator between occupational group and DP. What confounding factors are you referring to here?

“This may reflect the fact that the pathway to DP might not be the same for all DP diagnoses”. How?

Third paragraph:
“Hence, this suggests that an even larger sample size with more precisely determined occupational groups would be needed to clarify these associations and the possible influencing factors”.

I cannot see why a larger sample size would help?

Fourth paragraph:
“The results from many other studies of work-related factors such as socioeconomic status…”

Is socioeconomic status a work-related factor?

“…these previous studies have had access only to self-reported data of work-related factors…”

Self-reported data is probably better than data based on a JEM, and especially when broad occupational groups are being used.

Last paragraph:
“…these kinds of studies are only available in countries with high coverage of national registries and permission to link data between registries. Therefore, we may state that these results may be applicable to other Nordic countries…”

It might very well be correct that the results of this study is applicable to other Nordic countries but less so to other countries, but not because of the national registries.

“The comparison of MZ and DZ discordant twins revealed the trivial role of family background and genetic factors with regard to most occupational groups and psychosocial working conditions such as job strain.”

Be more precise: What this actually revealed was the trivial role of family
background and genetic factors with regard to THE EFFECT OF most occupational groups and psychosocial working conditions ON DP.

**Level of interest:** An article of limited interest

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

'I declare that I have no competing interests.