Author's response to reviews

Title: Can work ability explain the social gradient in sickness absence: a cross-sectional study of a general working population in Sweden

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Author's response to reviews: see over
Dear Editor:

Please consider the revised manuscript entitled ‘Can work ability explain the social gradient in sickness absence: a cross-sectional study of a general working population in Sweden’ for publication in the BMC Public Health. Please note that the paper is an original and has not been published previously and is not being considered for publication by any other journal.

We are grateful for the reviewer’s comments and have now revised the manuscript accordingly. Since all three reviewers are very knowledgeable in this field, and consequently, had very valuable comments the quality of the paper has certainly increased with this process. Below we have included a point-by-point description of the changes made, and finally all our answers to the specific questions of the three reviewers are provided (our answers are marked in yellow).

Thank you for your consideration of our revised manuscript. We look forward to your reply.

Best regards,

Jesper Löve

Changes made point-by-point:

- Additional analyses has been conducted and included in the manuscript. In these additional analyses all individuals not answering that they were currently on sick-leave were deleted in order to reach a more homogenous sample.
- Information about the self-reported cause for being sick-listed has been included in the manuscript.
- That the delay between inclusion and the time of the questionnaire allowed respondents to go back to work has been discussed and brought up as a limitation in the discussion section.
- Since work ability could not explain the total association in men we have now extended the discussion about the validity and reliability of the work ability measures.
- We have now included an important study by Virtanen (2011) in the introduction section (also in the discussion) showing that socioeconomic differences in sickness absence may be diagnose-specific.
- We have now provided more information about the validity of the work ability index in the method section.
- A paragraph in the introduction section has been shortened (suggested by Prof. Virtanen).
- We have added "Employed" to the column title "Participants" in table 1. In the same table we have also deleted an asterix that should not have been there.
- The information about the sampling procedure has now been extended.
- The conclusion in the abstract has now been revised.
- The information about the demographic variables and categorization has now been extended.
- A missing reference about the validity and reliability of the work ability index has now been inserted in the discussion section (about page 18).
- Chi-square values have been included for all comparisons in table 2.
- “Low work ability” has now been deleted in table 2.
A discussion of whether the work ability items measure the same phenomena in both the population sample and in the sick-listed sample is now included in the discussion section.

In line with the suggestion by Prof. Christensen we have now included some paragraphs (as limitations in the discussion section) that more advanced methodology may be needed to provide more accurate answers to this research question. Here we have also included the suggested and highly relevant reference by Lange and Hansen (2011).

Below are our answers to the reviewer’s specific queries.

Reviewer: Marianna Virtanen

Reviewer's report:
Review of the Manuscript "Can work ability explain the social gradient in sickness absence: a cross-sectional study of a general working population in Sweden" submitted to BMC Public Health
The study aimed to examine whether self-reported work ability explained social gradient in sickness absence. My comments regarding the manuscript:

Major Compulsory Revisions
1. Sickness absence involves two main requirements: 1) a person must be diagnosed as having a disease and 2) his work ability must be essentially reduced due to this disease. Therefore it was quite a surprising finding in your study that 75/78% of sick-listed people had high work ability according to their own opinion. Why were they then sick-listed? We certainly agree with the reviewer on the two requirements and that it is therefore surprising that a high proportion of the sick-listed still report high work ability. Here we must also emphasize that it is not self-reported sick-leave but medically certified sick-leave >14 days. As suggested by the reviewer (below) one possible explanation could have been that, due to the delay between sampling and the time for the questionnaire, some of the sick-listed have returned to work and consequently have retained their work ability. However, to examine this possibility we have now performed the same analysis after excluding the ones not answering that they are “currently on sick-leave.” Although the proportion reporting high work ability decreased to some extent there is still a higher proportion reporting high work ability (both in physical and in mental work ability). The decreased proportion of high mental work ability was largest in women but still, a majority had high mental work ability (47 % vs. 53%, p<.0001). These analyses is now also included in the manuscript (as an additional analysis, figures not shown).

Do you have any diagnosis data on those sick-leaves? In my opinion, the socioeconomic gradient in sickness absence should have been almost totally explained by work ability since reduced work ability is an inherent concept of sickness absence.
Unfortunately, we do not have any information on specific diagnosis. Please see discussion under reviewer point 2.

2. You had people who had sickness absence of >14 days before the survey was sent. There might me a large proportion of people who had infectious diseases, who were operated etc. This is an important comment. Unfortunately, we do not have the medical sickness certificate which would of course be very valuable here. However, in the questionnaire we had one question where the respondent answered the medical cause for them currently being on sick-leave. When examining this in the sample where non sick-listed participants had been excluded, the great majority were sick-listed due to Common mental disorders and/or musculoskeletal disorders and only very few (3.6 %) reported infectious disease as a cause for being sick-listed. A paragraph with this information has now been inserted in the description of the samples (i.e. result section). This proportion is also in level with statistics from the Swedish Social Insurance Agency (Försäkringskassan).

In your table 2 it seems that from the sick-listed women and men, 46% and 44%, respectively, were still sick-listed at the time of the survey. Those who were no longer sick-listed did not consider their work ability as poor, because they received the survey after they had recovered. One way to address this problem is to restrict the analysis to individuals who were still on sick leave (as an additional analysis). Thank you for this highly relevant suggestion. These analyses have now been conducted and included in the manuscript as additional analysis (see above).

You should also include this issue as a limitation in your Discussion and if you still have a finding that work ability did not significantly explain the socioeconomic gradient, you should try to explain why it did not happen. Is there something wrong with the Work Ability Index? Are people in Sweden on sick leave for other reasons than reduced work ability? etc. Unfortunately we do not have the answer for this question, although it comes up as a highly relevant question. Although work ability index (WAI) has been shown to work in both populations based samples and more narrow samples of sick-listed it is still possible that the sensitivity of the WAI could be questioned in some settings. The use of incident cases of sick-leave gave us the opportunity to capture individuals that just recently had become sick-listed. Yet, it is possible that these individuals may think of their ordinary or normal work ability rather than their work ability in their newly attained position as sick-listed when filling in the questionnaire, particularly if they have conditions with short duration. If so, more misclassifications may of course occur why the reliability of the WAI may also be unsatisfactory in this setting (i.e. they may score higher on the WAI than they should regarding their health state). Although we have not found any previous studies looking at these specific issues in WAI similar discussion may be relevant in general self-rated health. That is, although self-rated health has characteristically been viewed as the sum of a person’s medical health status [1], individuals may also regard several other aspects when doing their estimation [2]. Moreover, since we used new sick-listed cases it is possible that there could be a bias where the
respondents refer to their “normal” work ability when filling out the questionnaire. However, we have not found any previous empirical support for such an assumption. Finally, it is also possible and even probable that these issues of reliability and validity become even more important since the present study only use two of the items included in the WAI. This discussion has now been included in the discussion section.

3. It might be worth including some information on socioeconomic differences in diagnosis-specific mental and physical sickness absence, see e.g., Virtanen M et al. Occup Environ Med 2011; Andersen LL et al. Occup Environ Med, 2011. Thank you very much for contributing with these relevant and interesting articles. Virtanen et al is now included in the introduction section.

You can assess whether the differences are more pronounced in physical than mental sickness absence which helps you to understand why mental work ability did not have any major contribution to the association in your study. This is an important comment and an important question to raise. Unfortunately, we did not have any information on the diagnosis leading to sick leave. In the self-reported question of cause for sick-leave the respondents were unfortunately allowed to tick several boxes of the reason for being sick-listed, which most of them did. If a person ticked both depression and neck pain – how should we categorize this? In sum, we are planning to look into this question but think that it demands more space and a paper in its own. However, the issue is now brought up as a limitation in the discussion section.

Minor Essential Revisions
4. You use the term "incident cases" which is not appropriate in your study. Incidence refers to first onset of a disease and in your analysis you do not have information on earlier morbidity, I guess. I would recommend you to use the term "prevalent cases" instead. We used the term incident cases since this group consists of individuals who became sick-listed in a new sick-leave spell. None of them had any earlier sick-leave spell the year under study. Of course a very strict definition of incident case would be to include only the first morbidity, or in this case, the first sick-leave spell, ever for an individual. However, that is a too strict definition and in line with most epidemiologic research we use incident case for those cases who occur during the study period. See also Hensing et al 1998 and Hensing, 2004.

5. It would be important to provide more validity information on Work Ability Index in addition to a correlation with the total scale. This have now been included in the method section.

6. Your Introduction covers well the existing literature. You might shorten the paragraph starting with "To find an explanation...". Thank you for this comment. The paragraph has now been shortened down.

7. Table 1: add "Employed" to the column title "Participants". There is an asterix which is not referred. The comment is now revised

Level of interest: An article whose findings are important to those with closely
related research interests

Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:
I declare that I have no competing interests.

Reviewer: Ossi Rahkonen

Reviewer’s report:

• Major Compulsory Revisions
  - I had some difficulties following the sample procedure, the authors could at least give some figures of the response rate in the data section (I found 52% in the end of discussions). Were those people being on sickness absence before the responding the questionnaire (6.6%) omitted from the analyses. Was sick leave also asked in the questionnaire? Was it analysed? Thank you for this valuable comment. The information of the sampling procedure has now been extended. And yes, we had a question about “currently being on sick leave”. Related to the comments of Prof. Virtanen (another reviewer) we have conducted additional analyses where we excluded all individuals that had returned to work between the sampling and questionnaire. Information of these analyses is now inserted in the manuscript and although now specific figures are shown the results of the main analyses are mirrored in light of these additional analyses.

• Minor Essential Revisions
  - the conclusion of the abstract mainly repeats the results. Conclusion needs to highlight public health and/or research issues. The conclusion in the abstract has been revised accordingly.

  - data; randomized working population data, women n=1501, men n=1214; are women employed more than men in Sweden? The reason for this is that drop-out was higher among men. Since the method section is now extended information about this will hopefully appear more satisfactory.

  - variables, also other variables (income, education etc) needs to be described, categorizations etc. Thank you for noticing this. A description of the variables is now included in the method section.

  - table 2 and table 3; being lower non-manual women show low sickness absence; do the authors have any information what are the largest female occupations in this SEP group? This is certainly a relevant question but unfortunately we do not have any information of occupation.
This is correct. The ORs were estimated as women in relation to men (1.0) for each SEP group separately.

- discussion about page 18; that those two items of WA index used are reliable and valid needs a reference. Thank you. This is now revised.

- response rate is low, was it even lower for men? Could the authors estimate whether the response rate has any effect on the results. Yes, it was lower for men and also among individuals having the lowest incomes. Since we do not know the level of work ability among the ones not answering any estimation will be anecdotal. However, one could assume that the proportion having low WA was higher among the ones not answering the questionnaire. Although this was probably the case in all SES-groups the number of individuals having low WA and not answering was probably higher in the lower SES-groups due to the higher drop-out rate. If this was the case it would lead to an underestimation of the SES-differences in work ability.

Level of interest: An article of importance in its field
Quality of written English: Acceptable
Statistical review: Yes, and I have assessed the statistics in my report.
Declaration of competing interests:

Reviewer: Karl Bang Christensen

Reviewer's report:
Major Compulsory Revisions

1. Previous studies have found low socioeconomic status to predict sickness absence. This study shows incident sickness absence to be associated with low socioeconomic status. Please explain more clearly why this is important. Thank you for this comment. This study is important since previous studies have mainly conducted these analyses on samples covering specific occupations or occupational groups (e.g. municipal workers). By using a population-based sample we show that the gradient observed previously is relevant even in a much broader perspective. This also gives implications for public health since an intervention with a small effect on a broad population makes a significant effect on society. This study also contributes with the use of incident sick-leave cases since this also give that the cases consist of individuals just recently becoming sick-listed. If not doing this the population of sick-listed individuals is much more heterogeneous regarding length of the spells and consequently severity of disease.

2. Go beyond the simple comparison of proportions in Table 2. The readers need a chi-squared tests to tell them if there is an age difference between the two samples in women. The readers do not need to be told that 10% differs significantly from 15%, that 47% do not differ significantly from 49% and that 43%
differ significantly from 36%. Feel free to keep these comparisons, but do provide us with the information we need. **If we understand you correctly you want us to include the chi-square values for each comparison. These are now included in table 2. Thank you for pointing this out.**

3. For the three or four dichotomous variables it is very silly to provide the * saying that there is a significant difference in the proportion with low 'Mental work ability' AND a significant difference in the proportion with high 'Mental work ability'. “Low work ability” have now been deleted in table 2

4. Since self-reported work ability is the product of both individual resources and work demands. Wouldn't one expect incident cases of sick-listed employees to score lower simply because they are sick-listed. In other words: when we consider 'work-ability' in the working population and 'work-ability' in the sick-listed population is it the same thing? Please discuss this. **This is certainly a highly relevant comment but we do think that we actually measure the same thing in these two populations. However, although work ability index (WAI) has been shown to work in both populations based samples and more narrow samples of sick-listed it is still possible that the sensitivity of the WAI could be questioned in some settings. The use of incident cases of sick-leave gave us the opportunity to capture individuals that just recently had become sick-listed. Yet, it is possible that these individuals may think of their ordinary or normal work ability rather than their work ability in their newly attained position as sick-listed, when filling in the questionnaire. This may particularly be the case if they have conditions with short duration. If so, more misclassifications may of course occur why the reliability of the WAI may also be unsatisfactory in this setting (i.e. they may score higher on the WAI than they should regarding their health state). Although we have not found any previous studies looking at these specific issues in WAI a similar discussion may be relevant in general self-rated health. Although self-rated health has characteristically been viewed as the sum of a person's medical health status [1], individuals may also regard several other aspects when doing their estimation [2]. Finally, it is also possible and even probable that these issues of reliability and validity becomes even more important since the present study only use two of the items included in the WAI. This discussion has now been included in the discussion section.**

The statement that "Self-reported physical work ability was a strong explanatory factor implies that the mechanism behind this social gradient is partly due to a social gradient in work ability" could be reconsidered. As you see above we certainly agree with you in that a potential methodological problem with our measurement may bias the levels of work ability in the population-based sample in comparison to the sick-listed sample. However, although there may exist problems of reliability we still think that we measure the same phenomenon in both samples but the "implies" in the suggested sentence is intended to mirror some humbleness towards this statement.

5. Should there be a group with "Current sick-leave=No"
**In correspondence with deleting "low work ability" from table 2 we suggest that "Current sick-leave=No" is also left out of this table.**

6. Cite recent methodological work on this topic (Lange and Hansen,
Epidemiology 2011;22: 575–581) and acknowledge that more complicated methodology may be needed in order to provide answers.

Thank you very much for providing this very interesting work. We also agree that data and models like this may be needed to provide even more accurate answers to the current research questions. We have now brought up that analyses like the ones suggested in Lange and Hansen may be needed in future studies to provide more accurate evidence in this issue (this discussion has been inserted as a limitation in the end of the discussion section).

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**
I declare that I have no competing interests