Author’s response to reviews

Title: Health, work and demographic factors associated with a lower risk of work disability and unemployment in employees with lower back, neck and shoulder pain

Authors:

Lisa Mather (lisa.mather@ki.se)
Annina Ropponen (annina.ropponen@ki.se)
Ellenor Mittendorfer-Rutz (ellenor.mittendorfer-rutz@ki.se)
Jurgita Narusyte (jurgita.narusyte@ki.se)
Pia Svedberg (pia.svedberg@ki.se)

Version: 1 Date: 23 Oct 2019

Author’s response to reviews:

Dear Editor,

Please find enclosed a revision of our manuscript “Health, work and demographic factors associated with a lower risk of work disability and unemployment in employees with lower back, neck and shoulder pain” by Lisa Mather, Annina Ropponen, Jurgita Narusyte, Ellenor Mittendorfer-Rutz and Pia Svedberg. We thank you for the opportunity to revise this manuscript, and are grateful for the constructive reviewer comments. Below are responses to all of the comments point by point, the changes in the manuscript are highlighted in yellow.

Sincerely,

Lisa Mather, on behalf of the research group
Reviewer reports:

Markus Josef Ernst (Reviewer 1): Dear authors

thanks for submitting to BMC MSD.

this is a well written study about a survey looking at risk factors for unemployment and sick leave and possible interactions with familial factors.

Response: Thank you for this positive feedback.

As I am not an expert on familial factors myself, I asked myself whether these factors are predominantly genetic factors or social ones (same or similar up-bringing,- growing).
Response: The familial factors are those that are shared by the twins in a pair, and these include both genetic and environmental factors. Monozygotic twins share 100% of their genetic material and dizygotic twins share approximately 50%. Both types of twins share environment while growing up (if raised together). In this study we used a matched case-control (co-twin control) analysis to control for all factors shared between the twin pairs, unfortunately we did not have sufficient power to analyze monozygotic and dizygotic twins separately, which would have given a clue of if it was predominately genetics or shared environment that was behind the familial confounding. The following has been added to the strengths and limitation section on page 14: “…, this low power also meant we could not analyze monozygotic and dizygotic twins separately, which would have given an indication of if it was genetic or shared environmental factors that was responsible for the familial confounding”.

The methodological reasoning for using a twin study necessitates, from my point of view, some more elaboration in all parts of the manuscript. It seems to be the main point in your research and the focus should more on this.

Response: Thank you for pointing this out. In the manuscript we have now elaborated more on the value of using a twin sample and also added more explicit explanations of our findings regarding the role of familial confounding, as also exemplified above and we added a couple of sentences regarding the method used in the introduction, page 5. Text reads: “With a co-twin control design (matched case-control analysis) an exposure is evaluated after controlling for genetic predisposition and environment while growing up for the outcome. By taking familial factors into account more accurate estimates of risk factors for work disability may be provided, which supplement the epidemiological findings of unrelated subjects.”

In the intro there is some information (page 5) when you refer to the Danish study with quite a large variance of "separate pain sites" has been referred back to genetic factors. Further studies have been cited (references 18-20), to which you should come back in your discussion.

Response: The following sentences has been added to the discussion on page 12: “Familial factors were found to play a role in some of the associations, they explained the association between education and work disability, while adjusting for familial factors made the association between LBP and unemployment stronger. This is in line with previous research that has found both back pain and work disability heritable (17-20). These findings also indicate that the heritability of back pain and work disability is shared with other factors”.
Little has been discussed about the familial factor, though some interactions or effect modifications have been found, especially the effect of LBP on unemployment (Table 3), with a very much larger effect of LBP on the outcome by taking the familial factor into account!!

I would recommend discussing the familial factor more in-depths.

Response: The co-twin analysis contains a small sub-sample of the whole cohort; the twin pairs that were discordant of the outcome, in this case 140 pairs for work disability and 93 pairs for unemployment. The fact that the power is much lower in the co-twin analysis as seen by the difference in confidence intervals in this analysis means we have to be cautious when interpreting these results. This is also mentioned in the strengths and limitations on page 14. However, we agree that the possible effect modification of familial x LBP on unemployment deserves more emphasis and have added the following to the discussion on page 10: “However, in the co-twin analysis for unemployment, there was a decrease in the HR for LBP, indicating a possible interaction between familial factors and LBP on unemployment”.

Minor remarks:

Material and Methods

page 5, please add the year "2004" after "at baseline"

Response: “in 2004-2006” has been added after “at baseline” on page 5.

please write monozygotic and dizygotic instead of using abbreviations which are probably familiar to adepts in that field only.

Response: Abbreviations has been replaced by the full names throughout the manuscript.

statistical analysis: please state how you have checked interdependence of independent variables as this might be critical, especially familial factors and education might be related with each other!
Response: Familial factors (unmeasured genetic and shared environment) were adjusted for by an additional case-control analysis and hence was not added to the analysis as a variable, so in this case interdependence is not an issue. When it comes to the other variables we calculated a correlation table and found only weak correlations (0.02-0.32) between the independent variables, so we made the decision they could be added into the same models in step 3 of the analysis. Moreover, no problem with collinearity was reported in the analyses.

Results:

Demographics: page 10, line 19-20ff: I would recommend changing the sentence about the effect of education on sick leave, as the effect in the twin-analysis is not significant, although it might be tempting to indicate some interaction education x familial factor on the other hand I would recommend to put more emphasis on the possible effect modification of familial x LBP on unemployment, as stated above.

Response: The sentences on page 10 were changed to: “Those with a higher education had a lower risk of sick leave/disability pension compared to those with secondary education in the analysis of the whole sample. However, this association seem to be influenced by familial factors as the HRs were above one and non-significant in the co-twin analysis (Table 2). This result indicates that the association was explained by genetics and shared environment”.

Since familial factors were not added as a variable, we were unfortunately not able to assess interactions with familial factors.

Best regards

Julie Agel (Reviewer 2): Please explain why the data collected in 2013 is just being presented now in 2019.
Response: The data is nation-wide register data from the Social Insurance Agency. To obtain this data we must go through a rigorous process of applications and there is a lot of data cleaning involved once data is delivered. Hence, getting updates of the register data is a time consuming process and we have to work with the data that is available to us at the time. For future manuscripts we hope to have a longer follow-up with more recent years of data to present.

Please clarify your sample - line 1 page 6 says 25,496 - lines 50 say 635 x 2 = 1270 - abstract says 5,556 and Figure 1 does not clear this up for me

Response: 25,496 was the number of individuals that responded to the STAGE questionnaire. Out of these respondents 5,556 met the inclusion criteria and were included in the analysis. In this sample of 5,556 individuals, there were 635 complete twin pairs.

Please clarify what control means in the section on job demands.

Response: The following section has been added on page 8: “Demands measure psychological demands at work with questions such as: “Does your job require too great a work effort?” , control measures decision latitude with questions such as: “Do you have the possibility to decide for yourself how to carry out your work?” and support measures social support at work with questions such as: “There is good collegiality at work”.

What is the time period that the survey covers - if it was administered over 2 years which seems a long time to keep a survey open - I am confused as to why recall bias is not a concern (line 42 page 13) when the questions appear to ask for recall over 6 months

Response: The survey started with a pilot in the end of 2004, then the main part of the responses was collected in 2005 (once for each individual), with some responses coming in the early part of 2006. We agree there may be an issue with recall bias and have added a sentence in the strengths and weaknesses section: “Since the questions enquired about pain for the last 6 months, there is a risk of recall bias” (page 14).

Can you please provide the actual questions asked to create your categories of NSP and LBP.

Response: The actual questions are as follows:
“Have you during the past 6 months had pain, ache, discomfort somewhere in your body?”

The follow-up questions following marking the neck-shoulders or lower back on a drawing were:

3 questions on pain intensity

How strong do you assess your pain or pain from the neck/lower back/shoulder is at the moment?

How intense has your worst neck/lower back/shoulder pain been over the past 6 months?

How intense has your neck/lower back/shoulder pain been on average over the past 6 months?

3 questions on pain-related disability

How much have your neck/lower back/shoulder problems interfered with your everyday activities?

How much have your neck/lower back/shoulder problems changed your opportunities to take part in social and family activities?

How much have your neck/lower back/shoulder problems changed your ability to work (including housework)?

All questions were answered with a number between 0 and 10. A more detailed description is also provided in the article by Nyman and colleagues as referred in the manuscript, reference 17.

Please clarify the differences between your responders and non-responders - in particular the sex category.

Response: Women were somewhat overrepresented among the respondents to STAGE, as is also common in responses to other surveys conducted in Sweden. Moreover, since back pain is more common among women we ended up with 60% women in the study population while there was approximately an equal proportion of men and women in the base population.
Please clarify if the point of your work is to focus on twins and their impact on pain or if that is just a convenient sample and you are interested in the global population.

Response: In this particular study, we are interested in producing results that would be of interest for the global population. Since the Swedish Twin Register is population based the sample should be generalizable to the general population. However, using the twin sample gives us the unique opportunity to adjust for the familial factors that are shared between the twins. The fact that the sample contains twins was used as a way of dealing with confounding, rather than being the main point of the study.