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

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Author’s response to reviews:

Dear Editor,

Please find enclosed a revision of our manuscript (Reference number: BMSD-D-19-00700R1) “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 again, 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:

Julie Agel (Reviewer 2): Thank you for your responses I still find the use and non-use of twins to be confusing. Please add something in your introduction to clarify that your database is based on twins but they are not the primary focus.

Are you considering familial factors to equal twins - perhaps equate them clearly; familial factors as represented by twins - and then why you have some in your database

Response: Thank you for this comment. In twin studies it is common to use an analysis of the whole sample first, i.e. twins are then regarded as any individual and then compare the results of that analysis to the results of a matched analysis of the complete discordant twin pairs to assess the influence of familial factors (i.e. results after controlling for genetics and environment shared by the twins in a pair). This approach is described well in for example:


We have clarified what we mean by familial factors in the introduction on page 5, and also added the references Carlin et al. and Kujala et al. The section now reads:
“Studying twins that share 50-100% of their genetic material and 100% rearing environment (when raised together) provides a possibility to adjust for those unmeasured factors, which are hereafter referred to as familial factors. With a co-twin control design (matched case-control analysis) an exposure is evaluated after controlling for genetic predisposition and environment, while growing up. This is then compared to results of an analysis of the whole sample, where the twins are treated as individuals to assess the influence of familial factors, as is a common approach in twin studies (21, 22). 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.”

We have also added the following in the methods section that describes the co-twin approach “Conditional Cox regression analyses were also performed on the discordant twin pairs, where one twin had the outcome and the other did not. This analysis control for factors shared by the twins in a pair i.e. approximately 50% of genetics for dizygotic twins and 100% of genetics for monozygotic twins, as well as shared environment for both types of twins, i.e. familial factors. This analysis is then compared to the analyses of the whole sample to assess the influence of familial factors on the associations. If the HRs in the co-twin model are lower than that of the whole sample, we can suspect that familial factors are of importance in the associations (21, 22)”.

Line 24 - Does this adequately address that twins may not work at the same job and thus not have the same risk for low back pain - do you know how different the twins were in the socio-economic and work status

Response: When using co-twin analyses, it is the pairs that differ in both exposure and outcome that are informative, and those pairs that are the same are non-informative in the analysis, this is described in the above mentioned references Carlin et al. and Kujala et al. and this is the reason we report the number of pairs that are discordant for the outcome in the manuscript. For the work environment variables there were 266-276 individuals in the analysis, which means the analysis contained 133-138 discordant twin pairs that also differed in the exposure. For the education analysis there were 254 individuals, i.e. 127 pairs. In the analysis of unemployment, the corresponding numbers were 166-184 individuals (83-92 pairs) for work environment and 160 (80 pairs) for education. This means that most pairs that were discordant for the outcomes also were discordant for the exposures and contributed to the analyses.

In the analysis of the whole sample we treated the twins as individuals and adjusted for the fact that the twins are not statistically independent by adjusting the standard error.
Table 1 - I continue to have trouble following your sample - you indicate that this is 5,556 twins but based on earlier responses not everyone has their twin in this sample so it is subjects -- all of whom happen to be twins but not that their twins are included in this data

Response: The sample consists of 5,556 twin individuals, not twin pairs. This has been clarified in Table 1 and Figure 1. The whole sample of twins is first analyzed as individuals, similar to traditional epidemiological models, then those twin who belong to complete pairs and who are exposure/outcome discordant are analyzed in order to control for familial factors. This is a standard procedure using data from a twin cohort. The following sentence has been added to the methods section describing the sample to clarify “Twin individuals were included in the study even if their co-twin did not respond or meet inclusion criteria, since they can still contribute to analyses of the whole sample”.

Perhaps expand Figure 1 to include how many twins are actually in your dataset versus just one

Response: “….whereof 635 complete twin pairs” has been added to the study sample in Figure 1.

I will defer to the Editor but I would consider re-organizing your manuscript to make the fact that you are a twin with that twin present in the study a variable handled like the other variables. I think that because your data came from a Twin focused database you are emphasizing this and it is confusing, at least to me, but in reality you are just using this extra variable in an interesting fashion.

Response: We acknowledge the concerns raised by the reviewer and have taking this into consideration. However, we would like to keep the structure of the manuscript as is since this is how this kind of study is usually presented. The aim of the study was also to take advantage of the unique possibility to adjust for familial confounding by using complete twin pairs who are exposure/outcome discordant. Hence we feel that we need to argue and explain how this is possible already in the introduction. We have now clarified the reasoning in the introduction and other parts of the manuscript in the first and second revision in order to address the concerns raised as we comprehend that the methods and sample used may not be familiar to all readers. Please find related changes on page 5,7,9-10. We also added two references (Carlin et al; Kujala et al) where the method and interpretation of findings are explained in more detail.
I believe job control is not common terminology in the US ENglish population so perhaps consider different terminology especially in the conclusion.

Response: The scale used to measure work environment is called the “Demand–Control–Support Questionnaire (DCSQ)” and the term “job control” refers to this scale, which is commonly used in studies assessing work environment. Hence, we think it is most appropriate in order to be consistent with the literature in the area to keep the term “job control” which is standard when using the DCSQ.