Author's response to reviews

Title: The level of leisure time physical activity is associated with work ability - a cross sectional and prospective study of health care workers

Authors:

Elin Arvidson (elin.arvidson@vgregion.se)
Mats Borjesson (mats.borjesson@telia.com)
Gunnar Ahlborg Jr (gunnar.ahlborg@vgregion.se)
Agneta Lindegård (agneta.lindegard@vgregion.se)
Ingibjörg H Jonsdottir (ingibjorg.jonsdottir@vgregion.se)

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Author's response to reviews: see over
Dear Editor

We hereby submit the revised version of the manuscript “The level of leisure time physical activity is associated with work ability- a cross sectional and prospective study of health care workers”. Below is a list of the points raised by the referees, and our comments to each point. Some parts of the manuscript have, from the basis of these points, been changed (all shown in bold in the revised manuscript). The manuscript has also been copyedited in order to ensure correct English.

Point-by-point response to reviewers:

Referee 1
Thank you for the valuable feedback on our paper. You have drawn attention to a number of important deficiencies and your response will help us to improve the paper.

  • Abstract: the comparison of poor/moderate WAI with PA pattern is not directly clear, please phrase the direction of associations at baseline. Also, for the prospective study which should read that those with more PA are more likely to improve in WAI (start with the determinant in the sentence!)
We agree, that part of the abstract was confusing. The text has now been changed, according to the reviewers’ suggestion (page 1).

  • introduction: the statement that a simple tool to predict WA is strange..this manuscript does not evaluate the predictive power of PA..also, why should PA be predictive tool that is needed when WA can be measured directly. Thus, it is of interest to know the relation between PA and WA, but not from the point of view to have predictive power for WA (I guess that the predictive power in terms as c-statistics will be very low)
You are absolutely right about the predictive power, thank you for scatting light over this. It is a linguistic mistake, and the purpose is not to evaluate predictive power in its true sense. This has now been changed (page 4). Further, we agree there is no need for another tool to measure work ability. But, the association between PA-level and WA is interesting, adding to the importance of PA in corporate wellness and society. Furthermore, if it is possible to foresee the future work ability with a simple question of physical activity it, in our opinion, is also of interest.

  • Discussion: see remarks on predictive power..the PA question is not intended to have diagnostic or prognostic power. Otherwise, if this was the approach then one would expect classical parameters such as spec, sens and area under the curve.
This is an important remark and the mistake has been corrected.
• **Discussion:** when having only two points in time reversed causality cannot be excluded. It would strengthen the paper when also addressing negative change in WAI. Indeed, in previous research it is common to use the negative change in WAI. However, in this paper we wanted to focus only on the positive changes. This decision has also been done in order to limit the extent of the manuscript.

• **Abstract:** the mental and somatic health part in the background is rather odd, since both aspects of health are not addressed at all in this study. We agree, it was confusing and the sentence has now been changed (page 1).

• **Methods:** I doubt whether response RATE is the correct term, since not a RATE. After consulting a statistician we are sure that response rate is the correct term to use in this context.

• **Methods:** As the measure of change is likely to suffer to some extent from regression to the mean it would help to also present determinants of a negative change in WAI. That is a good point. We have tried to reduce the effect of regression to the mean by the inclusion of individuals maintaining excellent work ability, and thereby diminish the potential risk to some extent. To still ensure that work ability was affected by physical activity an analysis was made also with the negative change. The result remained unaffected and, as mentioned above, in order to limit the extent of the manuscript we chose to focus only on the positive change.

• **Results:** why is table 2 not presented as a similar analysis as table 3, also to underpin the values given in the text. Both tables 2 and 3 should also include some information on the prevalence of the determinant and outcome measures. This is a relevant question. We agree that table 2 was confusing. Some of the important data are now in the text, and table 2 and 3 have been changed (page 17 and 18).

• **Discussion:** the second paragraph presents sort of the rationale...hence, I would like to see some remarks on why WA is important for sustained employability with studies that show that a poorer WAI has negative impact on this. This is a relevant remark and we have now supplemented the discussion, and added the references 34 and 35 (page 8).

• **Discussion:** with respect to Pohjonen, it is important to present both decline and improvement in WAI, may be in the text simply also the average value. I would expect that at population level over 2 years there is only a limited change in WAI. Since we do not use WAI as a continuous variable we prefer not to present the average value. We are aware that the consequences could be that we miss some information regarding changes within WAI-category.
• **Methods:** how was the sample constructed of the study population? Random? Convenience?
The participants were randomly selected. This information is now added in the method section (page 4).

• **Methods:** are the answering categories on PA mutually exclusive?
Yes. The instrument are designed in a way that only one category of physical activity apply to each individual. This information has now been added to the method section (page 5).

• **Discussion:** the first two sentences are confusing, please separate the cross-sectional and longitudinal findings clearly and explain the direction of the association (more PA higher WAI)
Yes, we agree. The text has now been changed, hopefully making it clearer (page 8).

**Referee 2:**
Thank You for the valuable feedback on our paper. You have drawn attention to some important deficiencies and Your response will help us to improve the paper.

• *In the prospective analysis it is possible to see the changes in WAI as a continuous variable. In fact, in addition of the changes in the level of WAI category, the changes in the WAI (within category) could be calculated.*
In our opinion, WAI should be treated as a categorical variable. We are aware that the consequences could be that we miss some information regarding changes within WAI category.

• *The authors calculated the prevalence rate (comparing poor/moderate with good/excellent) in different category of physical activity considering sedentary as reference. It is better to calculate RR in each category of WAI considers one category as reference category (for example excellent) and Physical activity as independent variable adjusted for other co-variates.*
After consulting a statistician we stand by our method of analysis. First; in the cross sectional analysis we did not compare the groups poor/moderate and good/excellent. Instead, we calculated the prevalence rate of each level of physical activity for individuals reporting poor/moderate work ability. Second; in the prospective analysis we calculated the prevalence rate of each level of physical activity for individuals with a positive change in work ability from 2004 to 2006. Thus, physical activity is indeed the independent variable.

• *In the prospective analysis the author should use repeated measurement analysis.*
We measured the level of WAI and PA at baseline. At the two year follow up only WAI was measured, as an outcome measure depending on the level of PA at baseline.

• *Table 3 is not informative. The role of the WAI category is not clear.*
We agree. Table 3 has now been changed (page 18).
The author should consider appropriate abbreviation in the paper. For example, using abbreviation in the tables is not usual, or in the first line of the abstract the author has used PA without previously introducing it. That is correct. The abbreviations in the tables have now been adjusted accordingly, as are the first sentence in the abstract (page 1 and 16-18).

Hopefully, you will find the revised manuscript improved and suitable for publication in BMC Public Health.

Best regards

Elin Arvidson (corresponding author: elin.arvidson@vgregion.se) on the behalf of my co-authors