**Author's response to reviews**

**Title:** The relation between body mass index and musculoskeletal symptoms in the working population.

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**Author's response to reviews:** see over
June 6th, 2013

Dear editor,

In response to the editorial request we provide a point-by-point description of the changes made:

**REVIEWER 1**

We would like to thank the reviewer for the positive words on the improvement of the revised version of the manuscript. A point-by-point reply to the reviewer’s remarks and description of the changes made on the last comment are provided below.

**Major Compulsory Revisions**

1) Presence or absence of exposure to physical load factors was defined based on force and awkward postures only. Using vibrating tools and exposure to repetitive work tasks were ignored.

   The results of Appendix 1 do not support an interaction between physical load and BMI.

   *In the new models we additionally controlled for the use of vibrating tools and exposure to repetitive work tasks. We decided not to include these variables in the combined physical workload variable, as described in the previous response. The main reason for not including repetitive work tasks as a discriminating factor for high or low physical workload is that we can not, based on the question as stated in the NWCS questionnaire, distinguish between repetitive work tasks such as repetitively lifting heavy loads or mouse or keyboard use. When including this variable a very large percentage of the workers would be classified as working under heavy physical conditions, including office workers. The results of Appendix 1 have been added to give insight in the separate effects of BMI and workload, not to demonstrate interaction effects.*

   Exposure to a physical load factor was a risk factor of musculoskeletal symptom independent of overweight/obesity. Both overweight and obesity were associated with musculoskeletal symptom independent of physical load factors with a dose-response relation. The joint effect of physical load factor and overweight/obesity was additive only.

   Such results do not produce a significant interaction after including product term of BMI (3 groups) x physical load (2 groups). With a large sample size, both independent and joint effects could be significant. The authors would specify how the product term of BMI x physical load was included in the model. Was BMI
included as a 3-cateroy variable? Was only joint effect significant?

*The results did produce significant interaction after including the product term of BMI (3 groups) x physical work load (2 groups) (Appendix II). Effect modification can also be present when both independent and joint effects are significant, but differ in the strength of the association. In appendix II we included the complete multivariable model as well as the results of the uni-variable (adjusted) associations.*

The study had a higher power for exploring the association between BMI and musculoskeletal symptom in those with no exposure to physical load factors (N=31,623) than in those with exposure to a physical load factor (N=8,897). The prevalence of overweight/obesity as well as that of musculoskeletal symptoms was not compared in those with or without exposure to physical workload. The differences could be due to low power of study in those with exposure to a physical load factor. Moreover, using vibrating tools and repetitive movements were not defined as exposure to physical load factor or the results were not controlled for using vibrating tools and repetitive movements.

*We have no indication, based on the descriptives on presence of musculoskeletal symptoms in the separate groups (presented in the added table 3a), that the statistically significant differences found, are due to low study power.*

If the authors would like to keep the results of Table 3, it is necessary to modify this table:
1) to add the results of product term of BMI (3 groups) x physical load (2 groups) to this table and control also for using vibrating tools and repetitive movements,

*In accordance to the suggested modifications we added all results and adjustments in table 3.b. and Appendix II*

2) to add the number of normal weight, overweight or obese subjects, and
3) to add the prevalence of musculoskeletal symptom for normal weight, overweight or obese subjects.

*The descriptive data have been added to the manuscript in additional table 3.a*

Minor Essential Revisions

1) Upper case letters of the reference 18 need to be corrected.
2) The last sentence of the Discussion: musculoskeletal symptoms were dependent variables, not independent variables.

*We thank the reviewer for these corrections, it has been adjusted accordingly.*
As a response to the editorial comments the ethics statement has been revised in the manuscript:

“The sample was extensively informed about the study in a letter that accompanied the questionnaire. The burden for respondents was low given the topics covered in the questionnaire. Consequently, and in accordance with ethics regulations in the Netherlands, ethical approval was not required for this study.”

Yours sincerely,

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