**Author’s response to reviews**

**Title:** Neck pain and postural balance among workers with high postural demands - a cross-sectional study

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**Version:** 4  **Date:** 14 June 2011

**Author’s response to reviews:** see over
Dear editor in chief

We have now carefully read the reviewers’ suggestions. We find them relevant and have therefore followed them as can be seen in our response and in the manuscript.

Best wishes,
On behalf of the authors
Marie Birk Jørgensen

Reviewer’s report: Reviewer 1

We thank the reviewer for her re-review of the manuscript and the suggestions. We have followed them and feel that it has improved the paper.

Title: Neck pain and postural balance among workers with high postural demands - a cross-sectional study
Version: 3 Date: 28 February 2011
Reviewer: Julia Treleaven
Reviewer’s report:
There has been considerable improvement to the manuscript but given the responses and new data now available I have a couple of reservations. I am still wondering whether the exclusion criteria were sufficient to take out all other possible causes of disturbed balance and feel that this should be stated both in the methods and the limitations.

Our reply: The exclusion criteria are now more clearly stated in the methods section.

Action: Methods section: “No other exclusion criteria were specifically determined.”

Our reply: We still argument with the inclusion of workers only (not patients) but agree, that this does not guarantee an exclusion of other balance disturbances. Therefore, your point is now applied in the methodological considerations section.

Action: Methodological considerations sections: “…the exclusion criteria may not have been sufficient to take out other possible causes of disturbed balance.”

With respect to the new information of results of the single leg stance failure it would appear that the main finding now is that it is only significant if the cleaners have both neck and back pain. There are no differences in failure rates of those without pain, vs low back pain or neck pain only. This has not been spelt out in the discussion and should be discussed. The only finding really is that neck pain impairs balance with the CEA and rambling.

Our reply: True, the issue of concurrent neck and back pain is now treated in the discussion and the abstract and conclusion reflect our findings.
Action in discussion: “However, a large proportion of those with neck pain had concurrent low back pain. The relatively small groups of cleaners with pain in only one of the two sites did not have elevated failure frequencies. A significant and more than four times increased risk of failure during unilateral stance was seen in the group with concurrent neck and low back pain. Previous findings support that particularly concurrence of pain or generalised spinal pain seem to have a role on postural impairments [11].”

Abstract:
Should reflect the findings relating to confounders of back pain.

Our reply: This is now corrected

Methods
Should be stated that other exclusion criteria were not specifically determined.

Our reply: Done

Discussion and Conclusions need to be adjusted to reflect actual findings relating to neck pain and balance- if just look at neck pain- most of balance tests - no significant differences between those with neck pain and those without neck pain.

Our reply: The discussion on concurrent neck and back pain is elaborated and the conclusion has now been rephrased so they closely reflect the results

Limitations and areas for future research
State that this could be considered – eg any correlations between fail single leg stance and age, days of neck pain, concurrent back pain etc.?? , time to failure etc.

Our reply: Concurrent back pain impact on failure in unilateral stance has as stated earlier been treated. The remaining suggestions for future research have been included in the methodological considerations section.

Action: “In future research registration of the time to failure would improve the data from unilateral balance tasks and a test of correlations with age, intensity, duration or site of pain pain could be interesting.”

Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Acceptable
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Reviewer's report: Reviewer 2

We appreciate this full review of the manuscript and particularly thank the reviewer for the corrections of the references. All references are now carefully checked and
corrected and updated if needed. In addition, we agree with the suggestion of further statistical tests on the findings of the unilateral stance test and this has contributed to an improved interpretation and discussion of the results.

Title: Neck pain and postural balance among workers with high postural demands - a cross-sectional study
Version: 3 Date: 5 April 2011
Reviewer: Mats Djupsjöbacka
Reviewer's report:
The quality of presentation has been substantially improved.
Since I did not review details of the first submission this will be a full review from scratch. I have the following comments on the manuscript:

Major Compulsory Revisions
Page 3, Background, 2nd paragraph, line 2
Reference 12 (Röijezon et al. 2010) is not a study of postural balance.
Please delete.

Our reply: Done

Page 4, 1st paragraph, lines 6-9
Reference 17 (Djupsjöbacka 2008) does not contain any information supporting the statement for which it is used as reference.
Please delete.

Our reply: Done. And replaced with Kiemel et al. 2006. “Slow dynamics of postural sway are in the feedback loop.”

Page 4, 1st paragraph, lines 9-11
The references given (9, 17 and 19) are not original research studies supporting the statement that externally generated perturbations would more consistently challenge proprioception in postural balance.
Please refer to original research that supports the statement.

Our reply: The reference has now been updated to reflect original research in the area and the sentence modified to properly reflect the reference (Dietz et al. 1989, “Significance of proprioceptive mechanisms in the regulation of stance”).

Page 9, Statistics
The use of ACNCOVA with LBP as covariate may not be appropriate if the groups differed substantially with respect to LBP. I recently became aware of the problem using ANCOVA to deal with substantial group differences on potential covariates/confounders. In short, it may substantially bias the results. For details see:
If you wish to keep the ANCOVA approach please present data to support that
the LBP variable did not differ substantially between groups. Otherwise you should use another approach for testing if LBP contributed to the group differences.

Our reply: We totally agree with you and thank you for pointing this out. Our reference to the statistical method unfortunately was not correct. The model used is the General Linear Model with stepwise entry of covariates. (In SPSS syntax this is referred to as “UNIANOVA” and was during a proof reading turned into the misleading sentence of ANOVA). This is now corrected in the statistics section. Still the data are presented in the same table and the same models of corrections have been applied.

Page 10, Unilateral stance test, lines 3-7
Did the group with concurrent neck and low back pain differ significantly from the other groups? Please add this information.

Our reply: We have now conducted an analysis to reveal the impact on concurrent neck and low back pain. The results of the statistics test have now been given to illustrate this point. An interestingly large elevated failure frequency is seen in the group with concurrent pain, whereas the groups with pain at only one site did not differ from those without pain. The results are given in table 3 and have been given consideration in the discussion.

Page 11, Discussion 2nd paragraph.
‘The Romberg test with eyes closed uncovered an impaired proprioception...’ Here you implicitly draw the conclusion that there was a significant effect from the factor eyes open/closed on group differences. You cannot draw such a conclusion from the fact that group was significant in the eyes closed and not in the eyes open model. One possibility for addressing this question is to enter eyes open/closed as a within subject factor in a repeated measures ANOVA and assess if the interaction Open/closed eyes * Group is significant. Please address this issue with appropriate analyses or rephrase the text.

Our reply: We agree that the phrasing can be misinterpreted and have now rephrased the sentence in the discussion and deleted it in the conclusion. We do not find our study appropriate for an actual comparison between open/closed eyes scenarios, since the open eyes test was performed only once, and mainly served as familiarization to the test situation.

Action: “Former findings indicate that people with neck pain rely on visual input to compensate for impaired proprioception”

Page 12, 1st paragraph.
‘The difference in rambling represents the central component of postural balance [11].’ Reference 11 is not an original study supporting this statement. Please use original research as references.

Our reply: Ref 11 replaced with original study: Kiemel et al. 2006. “Slow dynamics of postural sway are in the feedback loop.”
Page 15. Conclusions
See my point above regarding effect of eyes open/closed on group differences.

Our reply: The sentence has been rephrased.

Minor Essential Revisions
Page 5, Participants
I assume that 194 (234-40) subject were included. Please state explicitly how many subject were included.

Our reply: Done

Page 5, Procedure, lines 1-2
‘Exclusion from the physical tests was determined...’
Does this mean exclusion from the whole study or only from the physical tests? Please clarify.

Our reply: The exclusion criteria were only from the physical tests. This is now specifically pointed out.

Action: “…(only the physical tests, not the trial as a whole)”

Page 5-6
This headings on these pages (Measurements, Procedure, Unilateral stance, ...) are not structured in a coherent way. For example, under the heading ‘Measurements’ only the questionnaire is described while the different measurements of postural control have their own headings. Please adjust so that the headings follow a coherent structure.

Our reply: Done

Page 6, end of first paragraph
‘If the participant moved his/her arms or feet from the starting position and lost balance, a new trial was commenced.’
So if a participant moved his/her arms or feet from the starting position but did not lose balance no new trial was commenced. Was this really the case? Please clarify.

Our reply: This has now been clarified.

Action: “If the participant moved his/her arms or feet from the starting position and/or lost balance, a new trial was commenced”

Page 9, Statistics, line 2
Does ‘COP values’ refer to all outcome variables calculated from the COP data? Please clarify.
Our reply: The sentence has been rephrased.

Page 10-11, Results
According to the methods section CEA stands for the 95% confidence ellipse area of either the COP, rambling or trembling trajectories. On several occasions in the results you only mention CEA without specifying what it represents. Please harmonize the naming of the outcome variables between the methods and results sections. This also applies to table 2.

Our reply: The definition on page 8, line 4 was stated wrong, and is now corrected.

Action: “…COP 95 % confidence Ellipse Area, here abbreviated as CEA”

Page 17.
Reference 11 is incomplete. It should read:
Roijezon U: Sensorimotor function in chronic neck pain: objective assessments and a novel method for neck coordination exercise. Umeå University medical dissertations, ISSN 0346-6612; 1273; 2009.

Our reply: Thank you, this has been corrected.

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