Author's response to reviews

Title: Muscle activity and head kinematics in unconstrained movements in subjects with chronic neck pain; cervical motor dysfunction or low exertion motor output?

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Author's response to reviews: see over
Dear editor,

First we would like to thank the editor for giving us the opportunity to revise the manuscript. We would also like to thank the reviewers for the evaluation and suggestions for improvements which have been helpful for focusing the manuscript. Substantial changes have been made to the manuscript including a review of the linguistics. We believe the quality of the paper has improved of these reasons.

All changes made to the manuscript are highlighted using **bold** font style.
Reply to the reviewers

Reviewer 1

Reviewer's report
Title: Muscle activity and head kinematics in subjects with chronic neck pain; cervical motor dysfunction or simply low exertion motor output?
Version: 1 Date: 4 April 2013
Reviewer: Niamh Moloney

Reviewer's report:
General Comments
1. This is an interesting paper which provides deeper insights into the mechanisms of motor control alterations in whiplash associated disorder. Given the current focus on assessment and treatment of specific motor control (deep neck flexors and extensors) in clinical practice and research circles, the research presented in this paper is important and clinically relevant.

2. The manuscript would benefit from being shorter and more concise, particularly the methods, results and discussion sections.
Reply: We have tried to make the MS more concise with emphasis on the methods, results and discussion sections, and parts of the methods section (on EMG) have been moved to the supplementary files. However, due the large number of independent variables and several test condition (three speed tests, four movement directions and tests of additional head load), the findings have already been presented somewhat in summary form, and this part is thus only moderately shortened.

3. Replace the word ‘subjects’ to people when referring to a population generally and participants when referring to specific study participants. This needs to be corrected throughout the manuscript.
Reply: Corrected.

Major Compulsory Revisions
Methods:
1. Provide an overview of the methods employed and briefly explain why they are being used. This would be most useful after the section on participants.
Reply: We have inserted a paragraph titled “overview of the study” as suggested by the reviewer.

2. Head movements: explain how you calculated the individual neutral head position.
Reply: We have rewritten the sentences regarding the descriptions of neutral head position.

3. Shorten sections on kinematics and EMG is possible (particularly EMG).
Reply: Significant parts of the method section on EMG have been moved to the supplementary material.

Statistics

1. Re-phrase the first sentence.
Reply: The sentence is now re-phrased.

2. How did you assess for normal distribution of the data?
Reply: The data was inspected using graphical displays, particularly searching for outliers.

3. Delete sentence about tendencies, particularly considering the small sample size in your study.
Reply: Sentence deleted.

4. Place any information regarding statistical analyses in this section i.e. last paragraph on results of EMG about re-analyses should be described in statistics.
Reply: The first sentence of the last paragraph of the EMG section was only a re-rephrasing of what was already written in the statistics concerning these analyses (GLM with velocity and displacement as covariates) and not a presentation of new analyses. We realize this paragraph was poorly written and we have therefore re-phrased it.

5. Insert information on sample size calculation/ power of the study.
Reply: Due to the large number of different measures and the uncertainty on the variability of these, it was unfortunately difficult to estimate sufficient sample sizes. However, we have found a number of significant differences both for EMG and kinematics between the WAD and control group, suggesting adequate test power at least for many of the comparisons.

Results

1. Were data normally distributed?
Reply: We judged the data as approximately normally distributed after log-transformations.

2. Was normalisation possible after log-transformation of all data?
Reply: All normalizations were completed before log-transformation.

3. Were there any data for which non-parametric statistics would have been more appropriate? This seems likely given the nature of the data and the small sample size.
Reply: For untransformed data, this would certainly have been the case; however, log-transformations were quite efficient in removing outliers. Many of the simpler comparisons might have been conducted using non-parametric methods, however, for some of the more complex ones (e.g. with several observations for each participant) this was not the case. Given the effectiveness of the transformations, we thus decided to use parametric statistics throughout the paper.

2. P-values need to be inserted throughout.
Reply: We have inserted the missing p-values. To keep the text reader-friendly we have given most values are given in summary form (p-values <0.0....).
Minor Compulsory Revisions

General:
1. Watch spacing with measurements e.g. 6 cm should be 6cm.
   Reply: Using the SI system (Le Système international d'unités) required by the journal, the value of a quantity is written as a number followed by a space followed by the unit symbol. We have therefore not changed the presentation of values and symbols of units, with the exception of previous erroneous presentations.

2. There are several grammatical and typographical errors throughout the manuscript which need correction.
   Reply: We have tried to improve the written language by means of help of a linguistics consultant.

Abstract
1. Explain rmsEMG.
   Reply: We have now written the abbreviation rms to “root mean square”.

2. Conclusion is very unclear. ‘Unconstrained head movements in subjects with WAD are completed with reduced velocity etc does not make sense, perhaps due to incorrect use of the word ‘completed’.
   Reply: We have now rephrased the conclusion and split the sentence into two.

Background
1. Sentences 3 and 4 of 1st paragraph need referencing.
   Reply: We have now altered parts of this section. Previous sentence 3 is now removed. Sentence 2 is slightly altered but with no references, because the specific examples of reduced motor output is referred to in the next two sentences.

2. Second paragraph and start of 3rd paragraph- excessive use of furthermore, additionally, in addition.
   Reply: We have tried to improve the written language.

3. Re-phrase last sentence ‘comparisons were completed’; do you mean comparisons were conducted?
   Reply: Yes. This sentence has been changed as suggested.

Methods
1. First and fourth sentences could be combined and shortened. Suggestion: We examined... suffering from long term WAD (>6 months), classified as grade 2 on the Quebec Task Force classification and which started within 72 hours of the motor vehicle accident.
   Reply: We have re-phrased this sentence according to the suggestion from the reviewer.
2. Why were height, weight, BMI and grip strength measured? Explain.

Reply: Grip strength was taken as a measure of overall muscle strength while BMI is an indicator of body composition. Anthropometrics and strength may affect movement kinematics and EMG amplitude and were therefore measured for examining possible systematic differences between groups. We have inserted a sentence concerning this in the new section “overview of the study”. We have also altered the first sentence in the “descriptive data – grip strength” for clarification.

3. Self-reported questionnaires: pain rating usually starts at 0 not 1.

Reply: Yes, regrettably the study was started erroneously using a 1-10 rating scale, thus we have used a 10 point scale in the present study.

4. Self-reported questionnaires: Re-phrase last sentence.

Reply: We have re-phrased the sentence.

5. It is stated that all tests were supervised by two examiners. Do you mean that all tests were conducted by two examiners at the same time? Why was this necessary?

Reply: Yes, all tests were examined by two researchers because the position- and EMG data were sampled on two different computers. We have now removed this sentence.

6. GLM is commonly referred to as ANOVA. Use ANOVA and ANCOVA as appropriate.

Reply: We have now changed to ANOVA for the comparisons where this was appropriate. However, some cases with random factors are not standard ANCOVA, and are normally handled within the GLM framework. Thus we have kept GLM as description for the “non-ANOVA” cases.

7. Re-phrase second last sentence.

Reply: Sentence deleted.

8. EMG:
   a. 1st sentence: ‘sampled from 3 pairs of muscles’ but only 2 listed.

Reply: This is a typo which is now corrected. Originally we also measured the activity of the trapezius muscle but due to very low activity in all movement directions and speed tests these data were not reported. This was described in the final sentence of this section but is now moved to the supplementary file.

   b. Change ‘in the following, the SCM will be referred to” to ‘from now on / henceforth etc’.

Reply: The sentence has been re-phrased according to the reviewer’s suggestion.

Results

1. Re-phrase the sentence ‘the control group scored about the same as the Norwegian normative values’. If they were compared, provide details of results and results of this comparison.

Reply: The generic mental and physical component summary (MCS and PCS) measures of the SF-36 questionnaire are norm based scales and calculated in the present study using
the Norwegian normative data of Loge, J.H. and S. Kaasa (Scand J Soc Med, 1998. 26(4):250-8). The normative data are defined as t scores of 50 ± 10 (mean ± SD). Thus scoring above or less than 50 indicate increased/reduced mental and physical functioning relative to the normal values. The statement does thus not point to a separate comparison, but to the fact that the Norwegian values are 50 and the values for the control group very similar (within 1/2 SD). We have now tried to clarify this in the methods.

2. Kinematics: ‘All variables for head and neck kinematics showed differences’- were these differences statistically different?
Reply: Giving the large number of variables, we chose to present the detailed results in figures and tables and to present the main findings in the text given as summaries. The specific sentence is an introductory sentence giving an overall view of the data. More details concerning this are given in the following sentences. We acknowledge that this may not appear clearly and we have therefore rewritten parts of this section.

3. Delete references to tendencies.
Reply: Have been deleted.

4. Association between kinematics and self-reported data: re-phrase last sentence
   Suggestion: We did not find any....
Reply: We have changed this sentence assuming the reviewer meant the first sentence.

5. EMG: delete ‘as expected’ from second paragraph.
Reply: Done!

Discussion
1. The small sample size should be acknowledged as a limitation and care should be taken making strong statements such as ‘these findings indicate that long term WAD neither leads to altered activation strategies nor resultant movement patterns etc’ in such a small study.
Reply: We agree. We have therefore inserted a paragraph concerning this in the discussion. We have also modified the conclusions in the abstract and after the discussion.

2. It would be good to discuss the clinical implications of these findings.
Reply: We have now inserted a sentence of a possible clinical implication of this study.

Conclusion:
1. Second sentence contains a double negative and therefore is not clear. Again, it would be appropriate to mention the clinical relevance of this study at this point.
Reply: We have rewritten this section.

Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Needs some language corrections before being published
Statistical review: Yes, and I have assessed the statistics in my report.
Declaration of competing interests: I declare no competing interests.

Reviewer 2

Reviewer's report
Title: Muscle activity and head kinematics in subjects with chronic neck pain; cervical motor dysfunction or simply low exertion motor output?
Version: 1 Date: 19 April 2013
Reviewer: Tina Juhl Juul

Reviewer's report:
This is an interesting article, which investigates whether changes in movement irregularity found in patients with Whiplash Associated Disorders are associated with changes in movement displacement and velocity. Even through, the objective is highly relevant there are methodological challenges that need to be addressed before this article can be considered for publication. Please see specific comments below.

Major Compulsory Revisions

Overall:
The article needs to undergo a linguistic proofreading. For the majority of this article the written English affects the transparency as well as the reader-friendliness to such a degree that it hampers a clear structure.

Reply: We have now consulted a linguistic expert concerning the manuscript and the written language has hopefully improved.

Background:
The background presents unfocused with a lack of a clear red line. Therefore, please consider a major reworking.

Reply: We have tried to improve the structure of the background section.

The article addressed an extremely important aspect in its field – both from a scientific and a clinical viewpoint. Unfortunately, the clinical perspective is confined to addressing clinical assessment tests.

Reply: The main purpose of this study was to examine movement performance in subjects with and without neck pain after WAD and to explore some possible mechanisms of the difference and not to assess clinical issues. We have however inserted a sentence about a possible clinical implication in the conclusion.

Throughout the background statements such as “Subjects suffering from long term musculoskeletal neck pain after motor vehicle accidents (Whiplash associated disorders-WAD) may have pronounced disability that affect daily living”, “One of the most prominent
clinical manifestations in subjects with long term WAD is cervical motor dysfunction, signified by altered neck muscle activation and motor output” (first paragraph) and “Such irregular movement patterns have been suggested to be a consequence of motor control disturbance in subjects with persistent WAD” (second paragraph) are provided. However, with no references presented. Following good reference practice state the reference for each specific statement. Therefore, please make sure that every time a statement is given, which is based upon the existing literature, please make sure it is followed by a reference(s).
Reply: We have now added references to all statements concerning empirical data.

“Subjects suffering from long term musculoskeletal neck pain after motor vehicle accidents (Whiplash associated disorders- WAD) may have pronounced disability that affect daily living” (first paragraph). Please clarify the term disability and daily living, since they are unspecific terms.
Reply: This is an introductory statement which we believe is general and self-explanatory, but we have added a reference to the statement.

Below you will find an example. I have tried to rephrase some of the sentences as well as put in brackets where a reference is missing.

Summary reply: Large parts of the background have been rewritten which hopefully has improved the quality of the written language.

“In this study we compared head kinematics and muscle activation in relatively unconstrained neck movements at three different speeds in participants with— and without long lasting WAD. In addition comparisons were completed when taking both movement velocity and displacement into consideration.” (Third paragraph).
In my opinion the purpose is not clearly stated. You state what you did, but not what was the purpose of this study. Please rewrite.
Reply: In the “Instructions for authors” published on the BMC musculoskeletal Disorders web-page, it is stated that the background section “........should end with a brief statement of what is being reported in the article”. We believe that is what we have done and have therefore decided to leave it unaltered.

Level of interest: The article is important in its field.
Quality of written English: Unacceptable.
Level of interest: An article of importance in its field
Quality of written English: Not suitable for publication unless extensively edited
Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:
Declaration of competing interests:
‘I declare that I have no competing interests’.