Author's response to reviews

Title: The Brazilian Portuguese version of the Maastricht Upper Extremity Questionnaire (MUEQ): translation, cross-cultural adaptation, reliability and confirmatory factor analysis

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To Editors of BMC Musculoskeletal Disorders
Prof. Daichi Hayashi, Boston University School of Medicine
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Prof. Jasvinder Singh, University of Alabama
Prof. J. Bart Staal, Radboud University Medical Centre
Prof. Anita Wluka, Monash University

(Editor in chief of BMC Musculoskeletal Disorders)

It is a great pleasure to submit this original paper titled “THE BRAZILIAN PORTUGUESE VERSION OF THE MAASTRICH UPPEX EXTREMITY QUESTIONNAIRE (MUEQ): TRANSLATION, CROSS-CULTURAL ADAPTATION, RELIABILITY AND CONFIRMATORY FACTOR ANALYSIS” to the appreciation of the editorial board of the BMC Musculoskeletal Disorders.

This paper will make available the Portuguese-version of the MUEQ. The BMC Musculoskeletal Disorders was chosen because the original MUEQ and some version were published previously at this journal and due to a great number of papers about epidemiology of musculoskeletal disorders that has been published at BMC Musculoskeletal Disorders. We have made a great effort to answer to each question raised by reviewers, to make the statistical revision requested, methods and translation review as recommended by Associate editor. All the points raised by reviewers were answered in point-to-point response document. The number of initial submission was 1782304449112979.

In this way, we believe on the significant contributions of this paper to actual knowledge about this topic.
Best regards,
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Reviewer’s report
Reviewer: Alice Kongsted

Reviewer’s report:
The study presents a translation of the Maastricht Upper Extremity Questionnaire from English and Dutch to Brazilian Portuguese and a test of its reproducibility, internal consistency, and a factor analysis. The authors have done a very comprehensive job with involving a large group of persons in the translation of the questionnaire and including a large sample for the test of validity. A previously proposed method was followed carefully. Since this is not my field of expertise I cannot tell whether that method is still considered the optimal approach. The translated version was observed to be relatively well understood by the test population and to have high reproducibility. From the present version of the paper it is not clear to me how to interpret the results regarding internal consistency and factors.

In addition to exploring the properties of the questionnaire the manuscript presents the prevalence of CANS in a sample of computer workers. Especially for this part, it is a limitation that the respond rate was quite low which may bias the results.

Major Compulsory Revisions

Background
It is stated that “This increase in computer use due to industrialization causes a considerable increase in the prevalence of CANS among computer office workers” but the referred studies don’t seem to address an increase in the prevalence of CANS. Please, make sure that the correct references supporting this central point are provided.

It seems to me that some highly relevant studies were not considered in the background and I think some of this work questions the evidence for stating that “one of the major causes are the awkward postures at work (non-neutral posture of the wrist, arm and neck, head and trunk rotations, and asymmetrical postures) as well as bad working habits (sitting in the same position for long hours, lifting shoulders during repetitive tasks) in addition to environment and work station..."
design”.

Please revisit this paragraph to make sure that the statement is adequately supported and consider including these background papers: Andersen JH. Risk factors for neck and upper extremity disorders among computers users and the effect of interventions: an overview of systematic reviews. PLoS One 2011 May


Answer: Thank you so much for suggestions. We have included the papers and revised the introduction according to the points raised. (Background pages: 3 and 4)

Method

Study population

Employees aged 18-50 were included according to the inclusion criteria, but the exclusion criteria say that persons aged 60 years or older were excluded. Please make sure to correct this.

As a general principle I would suggest that you don’t list the same factors as in and exclusion criteria. E.g. if an inclusion criteria is age 18-50 there is no need for also having an exclusion criteria related to age, and if inclusion requires being in a position for at least one year I would not considered being in the position for a shorter period an exclusion criteria (because they were never included).

Answer: The correction was considered. (Methods: page 5 - first paragraph and page 6 - second paragraph)

The MUEQ instrument

I suggest presenting also the English version of the MUEQ in the appendix since it is a little hard to follow the description of this complex tool if not being familiar with the questionnaire. Please refer to the Appendix in the text.

Answer: The both instruments (English and Portuguese versions) were included in the appendix in this new submission as suggested (Pages 32 and 37, respectively). In the text the instruments were cited on page 6 – paragraphs 4 and 5.

Please describe in this paragraph how the tool is scored including the possible range of scores that can be obtained.

Answer: The correction was considered. (Page 7, second paragraph)

Cross-cultural adaptation of the MUEQ to Brazilian Portuguese: It is not clear to
me what was meant by “the final version of the tool and the translation process design were submitted for approval”. I think Figure 1 illustrates the process nicely but I find the description in the method section hard to follow. You may want to consider shorten this paragraph so you mainly provide information in the text that is not available from Figure 1.

Some of details that I find confusing are the term researcher observer/reporter and why only the English version was back-and-forth translated while it seems that the Dutch was only translated one way (I guess this may be due to not being able to include another Dutch speaking person but this does not appear from the manuscript).

Answer: The corrections were considered. (Page 8, first and second paragraph)

Test of the Pre-Final Version

I am not sure what was meant by “in case the percentage of questions was higher than 20% the questionnaire would be reformulated”. Does this refer to questions from the test persons? 20% of what?

Answer: This paragraph was revised and the index of incomprehension was detailed reported (Page 8, last paragraph).

Internal consistency

I found the argument for including 386 volunteers for this part difficult to follow. Could it be simplified by just stating that based on a previous suggestion of using 5-7 times the number of items you chose to include 6 times the number of items (6 x 59) resulting in a required sample of 354 and then explain why you ended out having actually 386 responders?

Answer: This paragraph was revised (Page 10, second paragraph).

Statistical analysis

Since methods for validation of questionnaires is not within my field of expertise I have not accessed the description of the statistics.

Results

Sample characteristics

It may be a little confusing that a section appears with sample characteristics after having already read about one sample. You could consider denoting the two samples Sample I and Sample II throughout the manuscript so it is clear that you have one “pilot sample” (n=55) and one “validation sample” (n=386).

Answer: This recommendation was followed. (Methods, pages 5 and 9)

Can you tell anything about the representativeness of the sample (n=386) as compared to all employees who got the questionnaire (n=627)?

Answer: A discussion about the representativeness of the sample size was included. (Discussion, Page 14, last paragraph)
“The percentage of volunteers who worked in the same position was higher (44%) among those who had been in the same position from 1 to 5 years” I am not sure what this sentence means. What is the difference between “worked in the same position” and “had been in the same position” and what is this percentage higher than? Sorry if I ask really stupid questions but I cannot make sense of this paragraph.

Answer: Excuse-us, it was a mistake. By the other hand, the prevalence study was removed from this paper as recommend by one of the reviewers.

Internal Consistency and Factor Analysis of the MUEQ-Br items

Should the first sentence state “… and the Item-Total Correlations of each domain ranged from 0.2 to 0.8”? I am not sure how to read this and I did not find in Table 4 the value of 0.8

Answer: Such aspects were better described on the new version of the paper. The text was completely reformulated (Page 13, first paragraph).

Discussion

It is described that none of the items with low loadings were excluded “as they represented important aspects of the measured construct.” As far as I understand a low loading indicates that the item is not consistent with the construct. Why did you consider these items with low loadings to represent important aspects of the construct? Isn’t that contradictory to your finding?

Answer: In this new version of the paper, only one question demonstrated a low factor loading (I can adjust my chair height) on the domain work station (0.30). During the confirmatory factor analysis the model was submitted to regression analysis (with Maximum Likelihood estimation) and the weight of each factor on each domain was calculated as significant or not for the model. Despite of the low factor loading of the question about “chair adjustments”, this item was significant in the domain work station. In addition to an ergonomic chair (chair able to support individual adjustments) is an important aspect of work station and could not be ignored on the analysis of work station. The size of factor loadings is dependent on sample size considered on the study. Larger sample sizes (n>300), as we have considered in this study, support models with lower factor loading variables. (Stevens, J. (2002). Applied Multivariate Statistics for the Social Sciences (4th Edition). Mahwah, NJ: Lawrence Erlbaum Associates).

In the discussion you mention The Quick Exposure Check and the Job Factors Questionnaire. Are these measuring potential risk factors? If so these should probably be mentioned in the background.

Please discuss the potential implications of the low response rate in the validation sample. Both in relation to the results regarding validation of the questionnaire and also relating to the high prevalence of CANS you observed.

Answer: It was inserted the Quick Exposure Check and the Job Factors Questionnaire on the background and the aspects of low response rate were
discussed (Background, page 4, paragraph 2).

I find the discussion about sex differences somehow speculative and unnecessarily comprehensive. If you find it important to discuss this in details think the well-established differences in pain sensitivity between men and women ought to be included.

Answer: Such aspects were excluded from discussion.

Minor Essential Revisions

Background: In the paragraph beginning with “The MUEQ is a tool that …” I believe a word is missing in the sentence after the semicolon.

Answer: It was corrected. (Background, Page 4)

Key words: You could consider including the Medline Mesh terms “Occupational Health” and “Upper extremity”

Answer: This recommendation was followed. (Key words, page 2)

Internal Consistency and Factor Analysis of the MUEQ-Br items: “The Cronbach’s alpha value is the item was deleted was above 0.70…” Please have a look at this sentence I think something is missing.

Answer: This text was rewritten and was revised. (Page 13, first paragraph)

Discussion: Typing error in “while in the Arabic version it was from 0.48 to 0.941,2”

Answer: It was corrected. (Page 15, third paragraph)

Reviewer 2

Major Compulsory Revision

1 - The developers of the MUEQ state that the purpose of the questionnaire is to ‘address the occurrence, nature and possible work-related physical and psychological risk factors’ [1]. To address the physical and psychological risk factors, the developers have included potential risk items from 6 domains, however, the instrument have never been tested for its predictive validity (i.e. its ability to classify individuals according to the future course of their disease). I am aware that the MUEQ is a combination of items from several published questionnaires, however, this does not validate that the MUEQ actually possess predictive validity as it is a new instrument [2]. This study does not include a predictive validity analysis and the conclusion that the MUEQ is ‘…a valid tool for the assessment of risk factors related to pain in the upper extremity…’ is not supported by the analyses carried out. Whether the collected data can accommodate such analyses is unclear?

Answer: We agree with the reviewer with respect to the analysis of predictive validity. In this way, we have excluded from all the text the expression
“assessment of risk factors”. Once, we could not report that MUEQ could assess such aspects.

2 - The original MUEQ has not been designed according to a conceptual model and it is unclear whether it is based on a reflective or formative model [1]. Thus, it is difficult to assess if the conceptual structure and choice of items for each domain is valid. In this situation it is paramount that the validation process of a newly translated and cross-culturally adapted MUEQ include 1) an evaluation of the type of model the MUEQ uses (i.e. reflective or formative) as the assessment of psychometric properties differ, and 2) a methodology which properly tests the factorial structure. The factor analysis used in the present paper is a first-order EFA which, in my opinion, is the wrong analyses for testing the factor structure of a questionnaire with 7 dimensions and 14 sub-dimensions. Second, I disagree with the interpretation of the reported results. Three of the 7 EFA results have an explained variance of < 50%. Preferably, the explained variance should be > 60% as the model otherwise is missing too much of the variance. The appropriate analysis can be either 1) a second-order EFA (not an EFA on each predefined domain as done in this and the original article), or 2) a CFA testing the original second-order factor structure outlined by Eltayeb et al. [1]. Please refer to any textbook of EFA and CFA [2, 3].

Answer: We would like to thank the reviewer for suggestions. Each MUEQ domain is based in a reflective model, as each question are a reflex of the construct, there is no hierarchical organization among the items to suppose a formative model. In this way, classical test theory was used to assess psychometrics of the questionnaire. On this new version of the paper, the Confirmatory Factor Analysis as recommended was conducted and three different models were tested.

Minor essential revisions

1. The title does not reflect the full purpose of the article. Please consider a more descriptive title.
Answer: The title was reformulated.

2. Sample

The sample was 627 but only 386 were included in the analyses. This is approx. 60% which is a rather low response rate. Why was this? Has it resulted in any bias in the results? Perhaps the feasibility of the questionnaire, which is rather long and cumbersome, is a problem and the authors have not discussed this.

Answer: Such aspects were discussed on the new version of the (Page 14 - last paragraph and Page 15 – first paragraph)

3. Scoring of MUEQ

It is unclear how the MUEQ is scored. Do you calculate an overall summary score of all dimensions? Or do you calculate a sumscore for each dimension or sub-dimension?
Answer: The sumscore of each dimension is considered to characterize the impairment on psychosocial and ergonomics aspects. It was better described on this new version of the paper. (Page 7, second paragraph)

4. The Brazilian version contains 3 extra items, 1 in the ‘Information’ section and 2 in the ‘Complaints’ section. In addition, pictures have been added to question 13. Adding questions and pictures to the MUEQ alters it from the original and I suggest that the authors call it a modified version of the MUEQ.

Answer: Thanks for this valuable suggestion. This aspect will be considered. However, it is important to make some corrections. The Brazilian version has only one modification which was the picture on question 13. However, this question was removed by the final MUEQ-Br version according to Confirmatory Factor Analysis. Moreover, the complaint and information sections are part of the original MUEQ sent by the authors.

5. The translation and cross-cultural adaptation process is performed after the Cosmin Checklist manual. This is a manual for the Cosmin checklist, not a guideline for how to perform the translation and adaptation process. Please use a proper reference for how to do this such as Beaton et al. [4].

Answer: The recommendation was considered. (Page 7, fourth paragraph)

6. The description of the translation and cross-cultural adaptation is long. As this is standard procedure which is documented in many articles, this section can and should be shortened considerably.

Answer: The corrections and recommendations were considered. (Methods, Pages 7 and 8).

7. Page 8, last paragraph.

The authors write: ‘The pre-final version of the questionnaire was first applied to 15 subjects so that in case the percentage of questions was higher than 20% the questionnaire would be reformulated [23] and a new group of volunteers would be recruited,…’

I do not understand this. Please reformulate.

Answer: It was reformulated (Page 8, last paragraph).

8. Reproducibility

How did the authors secure that the patients were stable in the test-retest period? This needs to be described in the method section.

Answer: The description was included (Page 9, third paragraph).

9. Statistical analysis
The authors do not state which type of ICC they use. Please do so as there are many different types of ICC giving very different results.

Answer: The recommendation was considered. (Page 10, third paragraph)

10. Results

There is no mention of the translation process? What did the translators find out? Were there any issues? This should be described in the results section.

Answer: The recommendation was considered. (Results, Page 12).

11. In Table 4 the authors have presented Cronbach’s alpha, item-total correlations and alpha if item deleted. I suggest the authors make a simpler table with only the most important information (i.e. alpha for each 14 dimension) as the rest of the information only is important in the process of item reduction. Mean Cronbach’s alpha and alpha for the total score is not necessary as alpha is inflated when calculated across several dimensions and therefore not valid. I suggest the authors delete these.

Answer: The data obtained from Internal Consistency Analysis (item-total correlations and alpha if item deleted) were maintained since the questionnaire was reduced according to Confirmatory Factor Analysis (table, page 27).

12. Discussion

The interpretation of how to use the Cosmin taxonomy and measurement properties is misunderstand, and I suggest the authors refer to the book ‘Measurements in Medicine’ [2].

Answer: It was modified the use of COSMIN taxonomy through the text.