Author’s response to reviews

Title: Test–retest reliability of tip, key, and palmar pinch force sense in healthy adults

Authors:

Lin Li (20160055@ruc.edu.cn)

Yanxia Li (lmm333_0@163.com)

Changhong Wu (17145575@qq.com)

Xinyan Zhang (xinyanzhang_ruc@163.com)

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Author’s response to reviews:

Dear Dafne Solera,

Thank you for considering the revised version of our manuscript, "Test–retest reliability of tip, key, and palmar pinch force sense in healthy adults," (BMSD-D-19-00686R1) that was submitted to BMC Musculoskeletal Disorders. We thank the editor and reviewers for pointing out revisions that were important and necessary for our manuscript. We have thoughtfully taken into account these comments.

Charlotte Beaudart (Reviewer 1):

1/ Did the authors ensure that participants did not encountered any health/clinical/functional modifications between the test and the retest interval? Moreover, authors are invited to report the mean time observed between test and retest.

R: The participants self-reported that they did not develop any health-related/clinical/functional modifications between the test and the retest. In addition, the participants were instructed to avoid participation in physical activity immediately before the test session and between the test and the retest to prevent fatigue from influencing the testing.

Each subject performed 9 trials on two occasions (session 1 and session 2), which took place at approximately the same time of day 1 week apart, with the same experienced tester in the same laboratory to evaluate the reliability and measurement precision of the pinch force sense.

2/ At the end of the introduction, authors used the terminology "normal subjects". Please change it.

R: The phrasing “normal subjects” was accordingly revised to “healthy adults”.

3/ The reviewer is a little sceptical about the reference 18 which seems to indicate that only 15-20 subjects are sufficient for estimating the reliability of quantitative variables. I am aware of other guidelines that recommend a minimum of 50 subjects. Authors should discuss it in more details in the discussion section since their restricted sample size is the major weakness of their manuscript.

R: The sample size in our article was based on the recommendations of Fleiss, who indicated that 15 to 20 subjects are sufficient for estimating the reliability of a quantitative variable [1]. Previous studies have investigated the test-retest reliability of the force sense test in the ankles (14 subjects) [2], knees (30 subjects) [3], hips (20 subjects) [4], shoulders (31 subjects) [5], and hand grips (21 subjects) [6]. Our study (21 subjects) has roughly the same number of subjects as these similar studies.
Comments about the small sample size were added to the discussion section: "However, our study does have some limitations. For example, the small sample size is insufficient to represent the population...".

4/ Methods of the warm-up activities is not enough developed and is confusing. Please give extra details about this warm-up activity to differentiate it from the MVIC. At this point, I have the feeling that the MVIC test is the warm-up test.
R: MVIC test: .... The warm-up activities consisted of three repetitions of achieving a submaximal pinch grip force, as measured by the dynamometer....
Force reproduction task: .... The subjects performed a standardized warm-up that consisted of three repetitions of the test procedure for familiarization with the apparatus and estimation process and to promote relaxation....

5/ Did the authors checked for normal distribution of their variables prior running statistics? The mean values in table 1, 2 and 3 are accompanied with a very high standard difference. I suspect that these variables are not following a normal distribution.
R: The following sentence has been added to the data analysis section: "Prior to the analysis, the data were tested for normal distributions using the Kolmogorov–Smirnov test." The Kolmogorov–Smirnov test showed normal distributions for all the data.

6/ It is not clear why both SD and 95% CI are reported for mean values in table 1, 2 and 3.
R: The 95% CI for the mean values in tables 1, 2 and 3 have been deleted.

7/ In discussion, the interpretation of SEM values is not enough developed.
R: I interpreted the SEM values in a clearer way in the discussion: "To assess the measurement error magnitude, absolute reliability or agreement was considered. SEM facilitates the quantification of absolute reliability and can be reported in the actual units of measurement. The SEMs at 30% and 50% MVIC were lower than that at 10% MVIC.... The SEM values and Bland–Altman plot revealed that the agreement and reproducibility of the 30% and 50% MVIC conditions were superior to those observed at 10% MVIC."

8/ Figure 2 is not clear.
R: A step-by-step protocol for the force reproduction task has been added in Figure 2.
Ruud W. Selles (Reviewer 2):
Force sense is not a very well-used concept although previously reported. It would help if in the introduction the authors would precisely define what it is and describe how it is measured, for example summarizing the protocols in the studies mentioned in line 49-50.
R: The precise definitions and common measurement techniques of force sense were added to the introduction: " Proprioception is critical for accurate movement. It enables communication from the periphery to the central nervous system (CNS), which is required for the body to acquire joint position awareness and maintain a desired postural orientation and overall position in space. There are three types of conscious proprioceptive senses: kinesthesia, joint position sense, and force sense [7, 8]. All of them, especially force sense, play a role in good neuromuscular control. Force sense is defined as the ability to detect and interpret forces applied to or generated within a joint [9]. Force sense is measured by the performance accuracy of individuals during force reproduction tasks, which are defined as tasks in which individuals are instructed to produce target forces and reproduce these forces [10]."
Line 30: "quantification of manual function is the evaluation of a subject's maximum gripping and/or pinching strength." I think "function" is too broad a concept. Maximum strength is a measure of muscle function, while manual function could encompass other things such as, for example, what kind of grips someone can make.
Line 35: "It may be that the pinch force sense is more important than maximal pinch strength in the performance of daily manual activities such as holding a knife, fork, or spoon, using chopsticks, clipping ails, holding a pencil, opening food packages, and turning a key in a lock [5-8]." From looking at the abstracts of these 4 papers, I do not understand how all four (if any) really support the statement that force sense is more important than maximum strength. Which findings support this? This statement needs to be further clarified or omitted.

It is not clear which the 95% CI refers to. Readers may mistake this for the 95% LOA. The phrasing “95% CI” was accordingly revised to “95% Confidence interval (CI)”. The Table legends need some further detailing of what could be seen in the Tables, including a specification of the abbreviations. Throughout tables and text, it is important to add measurement units. In addition, Tables and text report more decimals than the actual measurement accuracy would allow for. Reducing this will also increase the readability.

The Tables are very difficult to read in the current format although this may potentially be solved in typesetting the manuscript and be removing decimals.

Some of the text in the results could be placed in another table or maybe omitted. Presently the text is difficult to read with some many outcomes reported in detail.

Discussion

First sentence: I do not understand this very general statement. Please specify.

Overall, I think for this relatively small and focused research question, the length of the discussion could be strongly reduced by just summarizing the findings, relating them to other literature and discussion the limitations.

We hope that these revisions have made our manuscript acceptable for publication in BMC Musculoskeletal Disorders.

I look forward to hearing from you soon.
Sincerely yours,

Yanxia Li
College of Physical Education, Langfang Teachers University, No. 100 Aimin West Road, 065000, Langfang, Hebei, China. Email: lmm333_0@163.com.

References