Author’s response to reviews

Title: Behavioral and neural adaptations in response to five weeks of balance training in older adults: A randomized controlled trial

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Author’s response to reviews:

Dear Dr. Yuan, dear reviewers

Thank you very much for the review and the much appreciated comments on our manuscript. We have revised the manuscript accordingly. Below is the point-by-point response to the reviewers’ comments. The reviewers’ comments are copied, followed by the author’s responses (R).

We hope that we could respond satisfactorily to your concerns and thank you for reconsidering our manuscript. We appreciate your time and look forward to your response.

Sincerely,
Jan Ruffieux

Point-by-point response to the reviewers’ comments

Reviewer #1

In this manuscript, the authors carried out a five-week long balance training on aged adults. Postural stability, spinal reflex excitability and cortical excitability were assessed before and after training. For the postural stability measures, they found a training effect for the number of
errors conducted during one-legged standing, but not for the sway parameters. In addition, no significant neural adaptations were found.

1. In Table 1, for one-legged static balance task, is the sway value significantly different between training and control groups before training?

R: No, there is no significant difference between the two groups at the pretest; p = 0.53 using a Mann-Whitney-U-test (because data are not normally distributed).

2. In Table 1, the error number for both static balance task and dynamic balance task went up after training in the control group. Are they statistically significant? Any possible explanation?

R: No, the differences are not statistically significant; p = 0.25 for the static and 0.24 for the dynamic balance task using Wilcoxon-tests (because data are not normally distributed).

While the difference in the static task is rather small, we agree that for the dynamic task, it looks considerable. However, as stated above, it is not significant and it is mainly due to 2 subjects who showed a relatively large increase in the number of errors while the others showed relatively small changes, in both directions (see Additional file for raw data). Accordingly, also the standard error is much larger than for all other measurement points. However, we have no explanation for the increase in these 2 subjects.

3. Where was the trial carried out and how the sample size was determined?

R: The measurements were carried out in the laboratory of the Movement and Sport Sciences at the University of Fribourg. We have now stated this in the methods section.

The required sample size was calculated using G*Power software (3.1; Faul et al., 2007) for a 2x2 mixed-design ANOVA with the following presumptions: effect size f = 0.25; α = 0.05; power (1 - β) = 0.75.

4. The method used to generate the random allocation sequence was not described.

R: Because of the rather small group sizes we used a block randomization procedure in order to assure similar group sizes. We have now stated this in the manuscript. The allocation sequence was generated using a self-written MATLAB script.
Reviewer #2

The present study by Ruffieux et al. investigated the effect of age on the behavioral and neural adaptations in response to balance training. The results are of some values; however, some major questions should be clarified.

1. In Abstract: the result description is quite simple, while the other parts are tedious. Please reorganize them.

   R: The results are now presented in more detail in the abstract. In return, we have shortened the methods part a little bit.

2. In Results:

   a. The authors should include a clear and succinct title for each figure legend to describe the results or the major findings of the figure, not just using a phrase;

      R: We have changed the title of Figure 1 accordingly. Figure 2 has been removed, please see comment below.

   b. in Fig 1, why the errors show an obvious increase between the pre and post values in the control group, see Fig 1b?

      R: Please see response to comment 2 of reviewer #1 above.

   c. Suggest to include the number of the participants in each panel, such as "Control group (n=12)", not "N = 28 for (a) and (c);"

      R: The suggested changes have been made.

   d. The figures are repetitive explanations of the tables, which needs to be re-designed;

      R: To avoid this redundancy, we have removed the data that are presented in Figure 1 (number of errors) from Table 1. Furthermore, we have removed Figure 2, the data of which are presented in Table 2.
e. Please include statistical results of TMS-related changes (or no changes) on the behavioral performances in old adults.

R: We are not sure whether we understand the reviewer correctly. We have now integrated statistics for the conditioned H-reflex in the results section (no significant effects).

If the reviewer is talking about correlations between changes in the early facilitation of the conditioned H-reflex and behavioral parameters: We have calculated the correlations but they are all clearly not significant. Furthermore, we believe that it is not relevant to calculate correlations between changes in two parameters if one of both showed no changes. We have therefore decided not to include these results.

3. In Discussions: Please delete the subtitles.

R: The subtitles have been deleted.