Reviewer's report

Title: Effects of aquatic physical intervention on fall risk, working memory and hazard-perception as pedestrians in older people: a pilot trial

Version: 0 Date: 23 Dec 2019

Reviewer: Tobias Braun

Reviewer's report:

The authors performed a study on the Effects of aquatic physical intervention on fall risk, working memory and hazard-perception in older people. In my impression, the study fits well to the scope of BMC Geriatrics.

I have reviewed the paper and would like to make some suggestions on how to improve the quality of the reporting of the study (major revisions).

My major point is the design of the study and the risk of selective reporting. The authors included a total sample of 42 participants, who were separated into 3 different groups. I miss a formal sample size calculation. Moreover, in the trial registration (NCT03510377) the authors reported to aim for a total sample 78 participants. I wonder how this number (n=78) was calculated (e.g. based on an effect size generated from a pilot study or from other existing research), and I miss critical a discussion of the small sample size and the strong deviation from the registered sample size in the discussion section.

With respect to the sample size and the methods used in this study, I think that this is rather a pilot and feasibility trial, and thus, the study should be reported as such. Please refer to the following publications and revise the manuscript according to these recommendations:


* Arain et al. BMC Medical Research Methodology 2010, 10:67: What is a pilot or feasibility study? A review of current practice and editorial policy
For reporting of the study, please also adhere to the following guidelines/recommendations:

CONSORT (for pilot trials), Consensus on Exercise Reporting Template (CERT; Slade et al. 2016) and template for intervention description and replication (TIDieR; Hoffmann et al. 2014).

Some further comments on the manuscript:

Title & Abstract:

1. The Title and the Abstract should indicate the design of the study, e.g. "a randomized controlled pilot and feasibility study"

2. The abstract should include exact figures in the result sections, e.g. mean differences for the primary and secondary outcomes, aspects of feasibility, p-values etc. Please refer to CONSORT recommendations for abstract reporting.

Background:

3. In my impression, the background section is reported too broad and does not really focus on the lack of research for this topic and the aim of the study. I especially miss a robust and clear description of what is already known about the effects of aquatic therapy on mental and physical functioning in older adults. What are advantages and disadvantages, what kind of interventions have already been examined? How large are (potential) effects, what are the risks and harms of this intervention? How about the costs, and for what kind of older people might aquatic therapy be more effective than land-based interventions? You write "Yet, there are few studies examining the effects of Aquatic physical intervention (API) on cognitive abilities (32-35) and functional behaviors". I think there are much more trials which should be considered (please refer to reviews on aquatic therapy for people with Stroke or COPD, e.g. Iatridou et al. 2018, Iliescu et al. 2019, Cochrane review by Mehrholz et al.).

Methods

4. The aim of the study should be reported in the Background section.

5. Please define a primary and other secondary (or other) outcomes.

6. Please report sample characteristics in the Results section (see CONSORT).

7. Please describe the setting and the process of recruitment in more detail.
8. Inclusion and exclusion criteria should be in agreement with the ones reported in the trial register, or deviations should be clearly stated. For example, in the registration, one criterion is "Score above 24 in the Mini Mental State Examination", in the manuscript, you write "above 78 on Modified Mini-Mental State Examination (3MS)".

9. Please describe the process of randomization and allocation in much more detail.

10. I have severe concerns about the robustness and trustworthiness of the randomization procedure, if participants were allowed to change the groups. Did you use intention-to-treat analysis? If not, please consider to do so.

11. You report that "five additional people were recruited for this group." How and where did you recruit these people?

12. The intervention and control procedures should be reported in much more detail, to allow for replication (of the intervention and/or the study) in research and clinical care. Please adhere to CERT and TIDieR Checklists.

13. Why did you perform an "intermediate" follow-up measure after 6 weeks?

Results:

14. The results section should be revised, and most of the data (numbers) reported in the text should be reported in a well-structured table.

15. Please add 95% confidence intervals, especially for mean differences.

16. The figures 2 and 3 seem very small and might be hard to read.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

No

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

No
Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?

If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

**Quality of written English**

Please indicate the quality of language in the manuscript:

Needs some language corrections before being published

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Please complete a declaration of competing interests, considering the following questions:

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