Reviewer’s report

Title: A combination of multimodal physical exercises in real and virtual environments for individuals after chronic stroke: study protocol for a randomized controlled trial

Version: 0 Date: 21 Feb 2019

Reviewer: Erik Edward Prestgaard

Reviewer’s report:

Summary

The current manuscript by da Araujo Mazzini et al describes the background and methodology of a "prospective, randomized, single blind trial of a 15-week exercise program to investigate the effects of the combination of physical exercise in real and virtual environments for chronic post-stroke individuals." An anticipated number of 36 participants are to be randomized to 3 groups (virtual reality group, conventional rehab group or combined group) with ADL (activities of daily living) scores as the main outcome. Final follow-up is scheduled 1 month post-intervention.

The manuscript is generally well-written, provides a detailed rationale and may provide new insights in a fast-growing stroke rehabilitation research field. However, addressing the issues listed below could potentially improve the scientific value of the manuscript.

Major comment

A comprehensive 2017 Cochrane review by Laver et al (not referenced in the manuscript) concluded that: "We found evidence that the use of virtual reality and interactive video gaming was not more beneficial than conventional therapy approaches in improving upper limb function. Virtual reality may be beneficial in improving upper limb function and activities of daily living function when used as an adjunct to usual care (to increase overall therapy time). There was insufficient evidence to reach conclusions about the effect of virtual reality and interactive video gaming on gait speed, balance, participation, or quality of life. This review found that time since onset of stroke, severity of impairment, and the type of device (commercial or customised) were not strong influencers of outcome. There was a trend suggesting that higher dose (more than 15 hours of total intervention) was preferable as were customised virtual reality programs; however, these findings were not statistically significant."

Among other things, Laver et al specifically recommended that future trials evaluate

1) patients at least 3 months after intervention ended,

2) "the impact of virtual reality on the person's motivation to participate in rehabilitation, engagement in therapy, and level of enjoyment". And that
3) future research trials should report data on the number of participants screened against eligibility criteria, as they provide useful information regarding the proportion of stroke survivors for whom virtual reality intervention may be appropriate.

Please cite this review (for example, on page 4) and address these 3 major issues.

Minor issues

-Abstract: Please state explicitly which is the primary/main outcome measure.

-Page 3: what is "ecological validity"?

-Page 5. Authors state that they want to investigate if effects last "…longer than one month". Adding later follow-up visits for major outcome-measurement would greatly improve this study.

-Page 7: What does "chronic phase of stroke" mean specifically?

-Page 10: "…a system of RV developed..." Did you mean VR?

-Page 14: "...Physical exercises are an important intervention strategy for individuals following a stroke, since promote improvement on gait functional capacity…” Is a word missing here? The sentence does not currently make sense.

-Page 14: "Physical exercises increases…". This is not grammatically correct.

-Page 14, final sentence: "The outcome measures are innovative because, according to ICF, activity and participation are the target aspects for effectiveness results." I am not sure what this means, please rephrase.

General comments

-Have you considered discussing the cost/benefits of VR rehabilitation?

-A large number of (uncommon) abbreviations may unnecessarily frustrate the reader. Consider reducing the use of abbreviations.

Level of interest

Please indicate how interesting you found the manuscript:

An article of importance in its field

Quality of written English

Please indicate the quality of language in the manuscript:
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All images and figures within the manuscript should be genuine i.e. without evidence of manipulation. No specific feature within an image may be enhanced, obscured, moved, removed, or introduced. If you have concerns about the veracity of the figures you should choose the first option below.

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Is it essential that this manuscript is seen by an expert statistician? If so, please give your reasons in your report.

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Were you mentored through this peer review?

Yes: Eivind Berge, University of Oslo