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: Eivind Berge

Reviewer’s report:

I have a number of minor comments and a few more major comments.

1. The sample size and size of each of the intervention groups must be given in the abstract.

2. There are too many abbreviations.

3. There are too many grammatical errors, for example missing spaces between words, or missing punctuation marks. The text must be carefully checked. For example: Page 3: «According Saunders…» should be «According to Saunders…». Page 4, line 100: «…post-stroke impairments There are few studies…» There is a punctuation mark missing here. Page 4, line 106: «…Rajaratnam et al. (2013)found positive…». There is a space too little between «(2013)» and «found».

4. Figure 1: The description of the three interventions should include the information that interventions will be given for 15 weeks, for example: «Allocated to intervention in the real multimodal group (RMG) for 15 weeks».

5. Figure 1: There is no need to include «Analysis» in this figure. The types of analyses are already described in the text.

6. Figure 1: The timing of follow-up is only 1 month after the end of the interventions. I think that this is too short, and that 3 months or 1 year more should be used.

7. The heading «Recruitment procedures, setting and participants» is unhelpful and can be omitted.

8. Inclusion criteria: «Chronic stroke» must be defined. When after the stroke will be patients be eligible?

9. Line 218: «Informed Consent Term». Do you mean Informed Consent Form?

10. Lines 230-232: The following sentences should be moved to the chapter «Eligibility screening»: «To characterize the individuals, the Mini Mental State Examination (MEEM), Fugl-Meyer, and Orpington Prognostic Scale will be applied. The individuals
will also be characterized by the demographic variables of gender, age, type of stroke, injury time, affected brain hemisphere, and schooling.

11. Line 233 onwards: The paragraph beginning with «The primary outcome will be the domain "Activities of daily living" from the Stroke Impact Scale (SIS)….» should come under a new heading: «Outcome measures and outcome assessment». In other words, this heading should be added.

12. Lines 233 onwards: The timing of the outcome assessment should be given, which is one months after the completion of the 15-week intervention.

13. Table 1: The heading «Outcomes» is misleading and should be removed. The following words in the far left column are also misleading and should be removed: «Eligibility screen», «Primary outcomes» and «Secondary outcomes». The timing of «Post test» should be given, for example: «Post test, 15 weeks». The timing of final follow should also be given, for example: «Final follow-up, 19 weeks».

14. Line 260: «Individuals assigned to the VMG will carry out individualized multimodal training sessions in a virtual environment.» I think that most readers will have difficulty with understanding how this training can improve physical fitness. This should be explained, for example by explaining better the "Stability and Balance Learning Environment (STABLE)" system. This can perhaps be done by showing a picture or providing an URL to this system.

15. The intervention in the VMG must be illustrated, and there must be references to the components of this intervention, so that this intervention can be understood by readers and replicated by other researchers.

16. Line 263: What is «1m²force platform»?

17. Lines 271-275: "In order to guarantee the multimodal character of the virtual intervention and to make it similar to the real intervention, the games were classified according to the perceptual-motor demands of Virtual Reality systems protocol developed by Cairoli et al. (2017). The use of this classification protocol ensured the games placed similar demands on the individuals. For example, the demand for strength and cardiovascular resistance could be consistent across the selected games." Again, it is difficult to understand how these games can be made «similar to the real intervention» and that they can place «similar demands on the individuals» as the "real" intervention.

18. Line 321: «The Brazilian version of SIS 3.0 has satisfactory internal consistency, test-retest reliability, convergent validity, and discriminant validity in stroke patients». This claim needs a reference.

19. Line 327: «According Lin et al., 2010, the values are strength (MDC 24.0 and CID 9.2), ADL/IADL (MDC 17.3 and CID 5.9), mobility (MDC 15.1 and CID 4.5), and hand function (MDC 25.9 and CID 17.8).» This sentence should read: «According to Lin et al
(<<reference number>>) the MDC and CID for strength are 24.0 and 9.2, for ADL/IADL
17.3 and 5.9………».

20. Line 335: «MoCA has a good correlation with other short cognitive tests and shows high
sensitivity and specificity in the prediction of post-stroke cognitive deterioration.» This
claim also needs a reference.

21. Line 402: I don't understand this sentence: «…and an analysis of evaluation measures in
the context of social participation.» Please rephrase.

22. Line 408: «The outcome measures are innovative because, according to ICF, activity and
participation are the target aspects for effectiveness results». First, this sentence is
unclear. What does «target aspects of effectiveness results» mean? Second, ADL is the
primary outcome measure. What is so innovative about that?

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