Reviewer's report

Title: Development of a complex intervention to improve participation of nursing home residents with joint contractures: a mixed-method study

Version: 0 Date: 06 Dec 2017

Reviewer: Kathryn Hyer

Reviewer's report:

Development of a complex intervention to improve participation and quality of life of nursing home residents with joint contractures: A mixed-method study

This manuscript described the process of developing a multifaceted intervention to improve social participation and quality of life for nursing home residents with joint contractures. This is a mixed-methods design, using qualitative and quantitative results from both the potential staff who would implement the intervention and nursing home residents improves the development of the intervention and contributes to the strength of the manuscript.

The strength of this paper lies in the authors' presentation of the process of developing a complex intervention for nursing home residents with joint contractures using the Medical Research Council (MRC) framework. The MRC framework development includes: 1) Identifying evidence and theory; and 2) Modelling process. The development of an initial intervention protocol using qualitative and quantitative results makes the study a mixed-method design and is a strength.

The manuscript is very detailed about the preparation of the intervention, both creating the intervention, and involving potential nursing home residents and staff. The manuscript lays the foundation for the PECAN intervention to be implemented in nursing homes. Because of the development process used to create the intervention the perspectives of both nursing home staff and residents have been incorporated into the development of the intervention. This should
strengthen the intervention's ability to increase the participation of nursing home residents and achieve the stated outcomes of improved participation and increased quality of life for residents with contractures.

1. An important weakness is the PECAN intervention is discussed but it not clear if it implemented. The results section discusses implementation but the conclusions section (lines 383-386) state that PECAN "is ready for a pilot study investigating its impact and feasibility." It is important that the results section differentiate the theoretical implementation of PECAN based on the development work from the actual PECAN implementation. It the intervention has occurred these sections need to be reconciled.

2. The background describes the wide range of contractures and suggests that part of the audience for the intervention is "others at risk of developing joint contractures." This is never discussed again. This is an important part of the potential benefit of the intervention and how all residents' participation is measured should probably be discussed. Later in the paper 18% of the residents interviewed had no disability- do they have contractures or are they at risk?

3. The resident outcome is increased social participation but activity is used interchangeably in the introduction and in different sections. Is social participation equivalent to participation in any activity?

4. Participation is not equivalent to resident quality of life. More on the precise measurement of quality of life for residents with joint contracture should be provided.

5. It appears from Table 1 that 6 residents with contractures (18%) of total population, have no disability. How does this reconcile with the intervention? Why are these included if there is no disability? Is this part of the theory of planned behavior intervention?

6. The authors should identify how "cognitive ability to participate in and follow a group discussion (Line 130)" was formally assessed.

7. Graphic modeling needs to be better described initially and in the results. It is operationally defined on Line 108 but is discussed in the introduction. Using consistent language and
perhaps providing a graphic using the resident interview data would make this important data more understandable.

8. How did the intervention account for the personality of residents and their proclivity to participate in the group discussion versus cognitive difficulties?

9. The authors should justify why no audio was recorded during the interviews (Line 134).

10. The systematic review of the literature is part of the intervention development. Yet it is difficult to read parts of the review. Perhaps an appendix that synthesizes a figure to display the articles that were included and excluded as a result of the systematic review process and how it helped develop the intervention.

11. Including the Mean and Standard Deviation as column headers may be more beneficial for the reader (Table 1).

**Are the methods appropriate and well described?**

If not, please specify what is required in your comments to the authors.

Yes

**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.

Not relevant to this manuscript

**Quality of written English**

Please indicate the quality of language in the manuscript:

Acceptable
Declaration of competing interests

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

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?
2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?
3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?
4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?
5. Do you have any other financial competing interests?
6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare I have no conflict of interest

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal