Reviewer’s report

Title: Effective behavioral intervention strategies using mobile health applications for chronic disease management: a systematic review

Version: 0 Date: 28 Jul 2017

Reviewer: Carolina Wannheden

Reviewer’s report:

General comments:

The study titled "Effective intervention strategies using mobile health applications in behavioral research for chronic disease managements: a systematic review" aimed to perform a systematic review to examine RCT-evaluated mHealth intervention strategies and their effectiveness in adult chronic care management, excluding diabetes care. It is a highly relevant topic for chronic care management as more knowledge is needed to gain understanding about the potential of mHealth interventions. The reported findings in this review are interesting and valuable. However, the presentation and discussion of results could benefit from some more elaboration. The authors could contribute more by describing and comparing the intervention strategies in the reported studies in more detail, as well as the type of behavior changes they aimed to facilitate. This is important in order to understand commonalities and differences between the evaluated mHealth interventions. Also, the key findings from the review should be emphasized and discussed thoroughly in relation to findings from previous scientific work, including systematic reviews, e.g. in diabetes care. Can the authors conclude what distinguishes effective from non-effective mHealth intervention strategies? When reviewing the manuscript, authors should use the PRISMA checklist for systematic reviews to ensure that all relevant items for reporting systematic reviews are included and reported accurately. The methods section could be more thoroughly described by following the checklist.

Specific comments are provided below (references are made to the page and line numbers in the format PAGE.LINENUMBER):

Title:

The phrase "in behavioral research" sounds a bit odd as it appears in the title. Maybe "Effective behavioral intervention strategies" would be easier to understand. Also, the phrase "effective intervention strategies" is somewhat misleading as the used intervention strategies are quite briefly reported with little detail and discussion.

Abstract, background:

Is it fair to say that mHealth has continuously been used as an "effective method" if the study's aim is to examine effectiveness of mHealth interventions? What is meant by "effectiveness of health outcomes”? Effectiveness in terms of health outcomes?
Introduction:

5.14: Are all cited references (13-16) systematic reviews?

Methods:

5.55: Indicate how the search terms were combined (using AND, OR operators)

6.35: Reference 16 does not seem to be a systematic review.

6.52-7.22 Assessment of risk of bias: The authors refer to the Cochrane risk assessment tool. Consider using the 'Risk of bias summary' figure suggested by Cochrane for better visibility. Further, the authors should report how the information from the risk of bias assessment is to be used in their data synthesis.

7.17: "For each risk of bias item, the studies were classified as "unclear," "yes," or "no," corresponding with "unclear," "low," or "high" risk of bias respectively." This is somewhat confusing. It may be easier to interpret if the authors stick to the terms and representation format suggested by the Cochrane handbook.

7.40: Articles were excluded for different reasons, including "(c) no outcomes of interest". A clarification of outcomes of interest would be beneficial.

Results:

8.4: "and a few studies showed no statistically significant mHealth intervention effects". Could "a few" be replaced by "two" for more clarity?

8.21: How should "feasibility of smart-phone based self-management interventions" be understood? It would help if the authors defined how feasibility is to be determined in this context.

9.4: "HRQOL" > "HRQoL"

10.14: "and also used telemonitoring" > "and two studies used telemonitoring" (not the same studies as in the previous phrase)

10.16: "about half of the studies" -"half of the studies"

10.19: "Most common components of mHealth interventions included …": It would be helpful if some statistics were reported regarding the common components.

10.28/29: add references to the reported patient groups (as done in page.line 10.36)

Risk of bias assessment:
Studies were assessed as having high risk of bias due to allocation concealment, blinding of participants and personnel, blinding of outcome assessors, and incomplete outcome data and 15 studies were assessed as having a low risk of bias. This is confusing. First, allocation concealment and blinding would expectedly lead to a reduced risk of bias. Second, there seems to be something wrong in the second part of the sentence: "15 studies were assessed as having a low risk of bias", but only 12 studies were reviewed. This section needs rephrasing. According to the Cochrane handbook, the risk of bias assessment "should summarize the general risk of bias in results of the included studies, its variability across studies and any important flaws in individual studies." (http://handbook-5-1.cochrane.org/index.htm#chapter_8/8_assessing_risk_of_bias_in_included_studies.htm)

Discussion:

For example, being alerted by … rendering this mHealth intervention ineffective"; This sentence is confusing.

"65% of the people in the US owned one of the mobile devices in 2013"; not clear what the authors mean by "one of the mobile devices".

"Thus, we intended to choose studies with robust design and long-term follow-ups." What is considered long-term follow-up in this context?

Conclusion:

The authors conclude that mHealth interventions have led to improved health outcomes, but no conclusions are drawn about new knowledge regarding (potentially) effective mHealth intervention strategies.

The last sentence in the conclusions section is difficult to understand. There may be several other (contextual) factors than country development level that influence the effectiveness of mHealth interventions, which would benefit from further research. Therefore, the recommendation to study mHealth in developing countries may be too limited. Further, could the authors mention some conclusions regarding mHealth intervention strategies?

Table 1:

Use abbreviations consistently, e.g. IG, CG

Report the number of patients in the intervention group, control group consistently (compare e.g. row 1, 2, 3, 4).

Be consistent with capital letters: e.g., n vs. N, fibromyalgia vs. Fibromyalgia

Spell out abbreviations.
2009, Kearny et al.: "hand-food" > "hand-foot"

2013 Kristjánsdóttir et al.: "Catastrophizing [Pain catastrophizing scale (PCS)"; missing closing "]".

2015 Martin et al.: "10,00 steps/day goal" correct?

2016 DeVito Dabbs et al.: Check for typos (bullet points and period marks).

Table 2:

Check for typos and spell out abbreviations.

Table 3:

The caption should clarify what "Yes", "No", "Unclear" stands for. Could a column with a summary assessment for each included study be added?

**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.

Unable to assess

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

Yes

**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:

Acceptable

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

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