Reviewer’s report

Title: Virtual Reality among the Elderly: a Usefulness and Acceptance Study from Taiwan

Version: 0 Date: 19 Mar 2019

Reviewer: Jason Fanning

Reviewer's report:

Thank you for the opportunity to review this work. The authors present a small single-arm pilot study on older adults' perceptions of nine virtual reality (VR) applications. The authors collected data on constructs from several applied (the TAM) and theoretical models (TPB), and reported basic Pearson correlations. It is not clear that the authors have conducted a preliminary review of physical activity promotion efforts for older adults, behavioral mechanisms driving effective studies, or the current state of technology-supported activity interventions. The methods are poorly described and appear unsystematic. The results are unclear, and the discussion seems unrelated to the data collected and the results reported. This reviewer believes the authors would benefit from a review of both the content and structure of other work in the area, and a careful rewrite of this manuscript. Due to the low quality of the writing and reporting, I have focused only on broad issues:

General Comments
1. A thorough rewrite is needed to iron out issues related to wording and grammar. Likely because of issues in this area, the entire manuscript reads as superficial and unorganized. A thorough and careful rewrite may address many of the issues outlined here.

2. The structure of the manuscript as a whole is rather sloppy, with much of the important information missing (e.g., any information on rationale for the statistical test used; the data on the "discussion"/qualitative content the authors note in the abstract) or misplaced (e.g., information on measures and statistical tests in the introduction and results sections). A quick review of other published work and the use of a reporting checklist may help with this.

3. Similarly, it seems as though many important ideas are poorly understood by the authors. For instance, the authors seem to pick single constructs from a number of theories (e.g., the intentions construct from theory of planned behavior) but do not assess the other key constructs (e.g., perceived behavioral control, attitudes, norms) nor their relationships. They seem to suggest that the system usability scale is a statistical test, and try to derive causative relationships from Pearson correlations. The descriptives table does not contain most demographic variables and is very oddly formatted. Key figures are not logical.

Specific Comments:

Abstract
1. It is unclear what the primary outcome measure is, whether formal qualitative assessment
procedures were used, and the study design employed. Several measures show up in the results section that are not mentioned earlier.

2. The results note effects on measures that are not collected, including physical activity and mental health outcomes.

Introduction

1. It is recommended that the authors refrain from ageist wording, such as "There will always be two problems addressing older populations: declining productivity and increasing health expenditure." This may just be an artifact of word choice, but is something worth considering.

2. The authors do a poor job of covering the very large body of intervention science specifically focused on promoting physical activity among older adults. Similarly, they do not discuss many of the core limitations of virtual reality and gamified interventions. Most notable is the very short duration of effects. A more focused discussion on existing physical activity interventions for older adults, the core behavioral mechanisms underlying those that are successful, and a clear indication of how the short term influence of VR and another gamified techniques may fit into these broader intervention frameworks is needed.

Research Model

1. It is unclear what the authors are indicating with H1-H5. This paragraph also appears to be laying out the measures used, which would be more appropriately done in a more clear manner in the methods section.

2. Is there a theoretical rationale for the research model detailed in Figure 1? It seems as though the authors simply selected a handful of constructs from different frameworks and tossed them together.

3. The authors note that they utilized theory of planned behavior, but do not report on other central variables, including perceived behavioral control or attitudes. They also do not assess the relationships as detailed in the theory of planned behavior. Importantly, the authors also stop at intentions rather than assessing activity behavior itself.

Methods

1. The system usability scale is a questionnaire, not a statistical test.

2. The authors need to report whether assumptions were checked for correlations.

3. A rationale is not given for the use of basic correlations here, and it seems as though correlations do not suite the story the authors are trying to assemble.

Results

1. The descriptive characteristics table is very odd - the authors would benefit from a quick review of other manuscripts to see how these are typically done.

2. Why do none of the bars rise to 100%? These should be percentages, correct?

3. The authors follow an odd reporting format, often including methods content and skipping over much of the important content, commenting on significance without displaying p values, etc.

4. The abstract suggested that qualitative interviews were conducted - where is this information?

Discussion

1. The results are very much over-interpreted, with causative language being used frequently. The results only show that those who generally liked the system also tended to want to use it more. This is intuitive and not illustrative of the utility of this as a tool for promoting physical activity in older adults. The lack of physical activity data make it very hard to determine whether using the VR headsets indeed promotes activity as the authors hope it does.
2. Discussion that falls outside of the data collected, including discussion of effects on physical activity and mental health, should be removed from the manuscript.

**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

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Please indicate the quality of language in the manuscript:

Not suitable for publication unless extensively edited

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