Peer Review File

Article information: https://dx.doi.org/10.21037/mHealth-21-28

Reviewer A

Strong review and analysis of the many papers that have explored the utility of Fitbits in pediatric populations with chronic illness.

Comment 1. Would recommend a bit more analysis of the age range of the patients and whether this may influence the discrepancies between the papers. The youngest patient was 3, and the oldest was 35; if the barriers of using the Fitbit cited are difficulty of use in pediatric patients, it would be worth exploring in the discussion the differences that may be expected between a true pediatric population vs a young adult one.

Response: We appreciate this insight from the reviewer and agree with their comment.

Changes in manuscript: We added the number (3) of studies that used participants aged 21 or older (see Page 7, Lines 371-372). We added a paragraph acknowledging the implications of a wide age range within our study (see Page 17, Lines 1637-1643).

Comment 2. Don't agree with the characterization of outcomes such as health-related quality of life and improved physical activity as "broad and non-specific." HRQOL in particular is a multidimensional concept with many domains. Would re-word.

Response: We appreciate the reviewer's comment and agree with their suggestion.

Changes in manuscript: We changed the language from "Such changes were often broad and non-specific…" to "Such changes were often observed across many aspects of life…" (see Pages 14-15, Lines 1299-1540.

Reviewer B

This review provides an overview of the use of Fitbits in children and adolescents with chronic health conditions. The authors review Fitbit accuracy, feasibility, acceptability, association with health outcomes for pediatric populations. This is an important and timely topic given that the clinical utility of Fitbits remains unclear, especially in pediatric populations. A better understanding of Fitbit feasibility and utility can help inform current interventions and increase accessibility of physiological data collection. However, the manuscript, in its current form, has issues that need to be addressed before being considered for publication.

Below are the main issues. Following these concerns are suggestions on how to address the issues and improve each section of the paper.

Comment 1. Introduction would benefit from restructuring, stronger arguments for this paper, and clearer aims.

Response: We appreciate the comments about the introduction section and agree with them.

Changes in manuscript: Many structural changes in the introduction have been made including reduction of non-key information and strengthening and clarifying aims.

Comment 2. Key information in methods is missing.

Response: We appreciate and agree with this comment.

Changes in manuscript: A PRISMA flow diagram was added (see Figure 1) to explain in detail the article and data extraction process. Two sentences were also added identifying the roles of both authors in the research process (see Page 6, Lines 336-339).

Comment 3. Presentation of findings are redundant and need to be simplified in writing.

Response: We appreciate this reviewer comment and agree. We reviewed the results section and eliminated redundancies to highlight most important findings.

Changes in manuscript: Changes made throughout Results section.

Introduction

Comment 1. The introduction takes several paragraphs to get to the main point (e.g., do not mention Fitbit until end of page 3). Authors should integrate points into a concise paragraph.

Response: We appreciate this suggestion by the reviewer and agree that the introduction is long. We have made changes to shorten this section and present the information more concisely.

Changes in manuscript: Many changes made throughout introduction section.

2. The paragraph about the impact of chronic health conditions on the family (lines 68-78) are out of scope for this review and should be removed. The focus of this paper is on the use of Fitbits for children rather than family/parents.

Response: We appreciate this comment from the reviewer and agree that a section about parents' impacts was not necessary in our paper. Yet, we believe that acknowledging this briefly is still important to understanding holistically why Fitbits are of increased interest to those with chronic illnesses.

Changes in manuscript: The aforementioned paragraph was removed and two sentences summarizing its main points were added to a relevant paragraph (see Page 3, Lines 66-69).

3. On lines 89-92, the need for considering a different type of intervention (technology-based) is unclear. A brief and strong argument for the value of technology-based interventions would help (or why family-based, school-based may have limitations).

Response: We appreciate the reviewer's comment and agree that further justification should be provided for technological interventions.

Changes in manuscript: We added several sentences elaborating on family- and education-centered interventions and why technology-based interventions are increasing in interest and prevalence (see Page 4, Lines 140-145).

4. There needs to be stronger arguments as to why Fitbits are important to study.

- For example, authors mention that current physiological assessments are invasive, uncomfortable, and expensive. Therefore, they should more clearly state that Fitbits overcome these barriers.
- In addition, they can consider value of Fitbits for accessibility (delivering virtual interventions in context of telehealth), promoting agency or self-efficacy in children, and self-monitoring or tracking goals.

Response: We appreciate this comment from the reviewer and agree with their suggestion.

Changes in manuscript: A sentence was added about how Fitbit devices meet the healthcare challenges and needs of young people (see Page 5, Lines 267-270).

5. It is unclear what is novel about this review. Is this the first review on Fitbits in pediatric populations? What else is important about this review? Why is it needed and beneficial?

Response: We appreciate this comment from the reviewer. We believed that such explanation had been provided in the Strengths section of the Discussion, however we recognize it is important to address this earlier on in the article. To provide further clarification, we have now addressed the novelty of our paper in the Introduction.

Changes in manuscript: See Page 5, Lines 271-274.

6. The specific aims/objectives of this review need to be clearer (lines 114-123). Authors should number the aims, so they are clear to the reader and align directly with the results section. Also, the authors statement that they will "compare" studies – this is unclear as the results are descriptive.

Response: We appreciate these comments from the reviewer and agree the aims should be more clearly identified and enumerated, as well as that the use of the word "compare" is unclear.

Changes in manuscript: The paragraph describing the studies' aims was condensed and rephrased (see Page 5, Lines 274-282). Sentence stating "We will examine and compare studies…" was removed in revision.

7. The paragraph outlining the rest of the paper is not needed (lines 124-132). They can incorporate a sentence or two at end of prior paragraph outlining paper if they want to provide overview.

Response: We appreciate this comment by the reviewer and agree with their insight.

Changes in manuscript: This paragraph was removed.

Methods

8. Authors need to include a PRISMA diagram to display searching and extraction process.

- See article on suggestions for Scoping Review: https://journals.lww.com/ijebh/fulltext/2015/09000/guidance_for_conducting_systematic_scoping_reviews.5.aspx

Response: We appreciate this comment from the reviewer and agree a figure should be added.

Changes in manuscript: A figure was added of a PRISMA flow diagram explaining our methodology in greater detail (see Figure 1).

9. Authors need to include more information on the review process: Who reviewed? How many authors? Inter-rater reliability?

Response: We appreciate this comment by the reviewer and agree clarification should be provided.

Changes in manuscript: Sentences added explaining who carried out the methodology and acknowledging bias (lack thereof) (see Page 6, Lines 336-339).

10. A summary table that provides overview of key data extracted would be helpful (as indicated in article on scoping reviews above).

Response: We appreciate this comment and agree.

Changes in manuscript: A table was added with key data fields collected (see Table 1).

Results

11. The structure of the results should align directly with the main aims of the study. The subsections are confusing to reader otherwise.

Response: We appreciate this comment from the reviewer. However, in having more clearly specified the aims in the introduction in relation to how they are organized in the results, we believe that this comment has already been addressed and resolved.

Changes in manuscript: We previously clarified primary aims of the study (See Page 5, Lines 274-281). We also renamed result subsection titles and merged the "Study Characteristics" subsection with that on objectives and characteristics (See comments 12 and 13 below).

12. Results could be better organized with following subsections:

- Study Aims, Methodology, Characteristics
- Fitbit Accuracy, Acceptability, and Feasibility
- Fitbit Health and Clinical Outcomes

Response: We appreciate this reviewer insight and agree with the subsection retitling.

Changes in manuscript: The subsections within the Results section were retitled to be "Study Characteristics, Objectives, and Methodology," "Fitbit Accuracy, Acceptability, Feasibility, and (Dis)Advantages," and "Fitbit Health and Clinical Outcomes."

13. Study Characteristics (lines 250-260) should go earlier in Results because helps provide context for rest of the findings.

Response: We appreciate this comment from the reviewer and agree.

Changes in manuscript: The two paragraphs previously under subsection "Study Characteristics" were moved to the beginning of the first section now titled "Study Characteristics, Objectives, and Methodology."

14. Findings in writing are redundant with information in Tables. Authors should simplify writing in results section to focus on main take-aways (e.g., main methodologies used, main findings) for each results section and refer to Tables for more specific details (e.g., number of articles in each section).

Response: We appreciate this comment from the reviewer and recognize such redundancies. We have reviewed the results section again and removed/reduced redundancies if possible.

Changes in manuscript: Changes made throughout Result Section. Examples include removal of the number of articles studying each chronic disease and reduction of the list of chronic diseases studied (only four are now listed) (see Page 7, Lines 363-364).

15. Authors should clarify how the studies test for feasibility/acceptability.

Response: We appreciate this reviewer comment and agree with their suggestion.

Changes in manuscript: A sentence was added clarifying how acceptability and feasibility were tested for and/or measured (see Page 9, Lines 539-541).

Discussion

11. Remove heading of "Principal Findings."

Response: We appreciate the reviewer's comment and agree.

Changes in manuscript: "Principal Findings" heading removed and other headings in Discussion adjusted appropriately.

12. Discussion should be organized in same way as aims and results sections.

Response: We appreciate this comment by the reviewer and agree.

Changes in manuscript: The subsections within the Discussion section were reordered and retitled to be "Fitbit Inaccuracy," "Fitbit Feasibility," and "Fitbit Effects on Health," followed by "Biases," "Strengths and Limitations," and "Suggestions for Future Research."

13. Add clinical implications of findings within future directions.

Response: This comment is appreciated, and we agree.

Changes in manuscript: A sentence was added linking clinical findings of Fitbit devices to future research suggestions (see Page 20, Lines 1816-1820).

14. Heading format should be consistent with journal style.

Response: We appreciate this comment by the article. We reviewed the Author Guidelines set forth by mHealth again and used heading formats from other articles published in mHealth as further guidance.

Changes in manuscript: No changes made.

Reviewer C

This paper presents a scoping review of the utility of Fitbit devices among children and adolescents with chronic health conditions. The paper presents a well-structured review of a broad range of studies that report on the application of Fitbit in clinical trial settings. The main contribution of the paper is the mapping and description of studies that provided some form of evaluation of e.g. the feasibility, accuracy, and feedback. I have two major concerns with the paper and a few minor.

Major

Comment 1. The authors only discuss the review results within the scope of the review (Fitbit for children and adolescents), which is less convincing since there are many relevant studies that do go at great length with examination of the accuracy, feasibility, and feedback of Fitbit devices. The discussion could be improved by connecting with these studies and change the conclusions accordingly. Consider reducing the word count of the current discussion and use the freed space to include studies in clinical studies in general.

Some examples

Shin, G., Jarrahi, M. H., Fei, Y., Karami, A., Gafinowitz, N., Byun, A., & Lu, X. (2019). Wearable activity trackers, accuracy, adoption, acceptance and health impact: A systematic literature review. Journal of biomedical informatics, 93, 103153.

Lai, B., Sasaki, J. E., Jeng, B., Cederberg, K. L., Bamman, M. M., & Motl, R. W. (2020). Accuracy and precision of three consumer-grade motion sensors during overground and treadmill walking in people with Parkinson disease: cross-sectional comparative study. JMIR rehabilitation and assistive technologies, 7(1), e14059.

Andersen, T. O., Langstrup, H., & Lomborg, S. (2020). Experiences with wearable activity data during self-care by chronic heart patients: qualitative study. Journal of Medical Internet Research, 22(7), e15873.

Rosenberg, D., Kadokura, E. A., Bouldin, E. D., Miyawaki, C. E., Higano, C. S., & Hartzler, A. L. (2016). Acceptability of Fitbit for physical activity tracking within clinical care among men with prostate cancer. In AMIA Annual Symposium Proceedings (Vol. 2016, p. 1050). American Medical Informatics Association.

Response: We appreciate this comment and agree that it is important to acknowledge Fitbit accuracy demonstrated in studies of adults.

Changes in manuscript: Several sentences citing Fitbit accuracy in adult populations (healthy and those with chronic diseases) were added (see Page 12, Lines 1031-1038).

Comment 2. The paper is generally well-written and easy to read. However, there are several sentences that are hard to follow and the paper in general needs to be proofread. I am not native in English myself, but I find the paper not meeting the standard for a high impact journal paper.

Response: We appreciate this comment by the reviewer. We comprehensively reviewed the paper again to improve writing quality. Additionally, our paper was reviewed by an editorial staff of an affiliation of the corresponding author.

Changes in manuscript: Changes made throughout manuscript.

Minor

Comment 3. The results of the review do not clearly describe the potential bias of the feedback visualization given to the end-user and the potential e.g. for misinterpretation or invalid/non-objective measurements for clinical trials. Some of the example papers above do consider this problematic which I would suggest the authors to consider.

Response: We appreciate this comment from the reviewer and agree this is a potential bias.

Changes in manuscript: Paragraph was added about this bias (see Page 16, Lines 1547-1553).

Comment 4. The motivation for the review, which is presented in the introduction could be aligned better with the results e.g. there is a paragraph on disease burden among parents, which seems out of scope for the paper.

Response: We appreciate this comment from the reviewer and agree.

Changes in manuscript: We appreciate this comment from the reviewer and agree that a section about parents' impacts was not necessary in our paper. Yet, we believe that acknowledging this briefly is still important to understanding holistically why Fitbits are of increased interest to those with chronic illnesses.

Comment 5. "The Fitbit" and "Fitbits" seems odd. Consider using "Fitbit device".

Response: We appreciate this comment and agree.

Changes in manuscript: The manuscript was reviewed and the majority of the uses of "the Fitbit" and "Fitbits" were substituted for "Fitbit devices" or "Fitbit trackers."

Comment 6. There are many different types of Fitbit and the details sometimes seem to be missing. Consider making a table with all the devices used or include it in a column in a table already suitable. Details on what the devices measure could be part of the table and e.g. year of production/market availability.

Response: We appreciate this comment and agree that the variety of Fitbit devices should be acknowledged.

Changes in manuscript: A column was added into the study characteristics table with Fitbit models used.