

Peer Review File

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Reviewer A

This is an interesting and important article for the field as the relevance and applicability of simple mHealth initiatives with good outcomes is clear. However, the article needs to be more focused and clearly presented as at present it is unclear what exactly is being described – the article states that the intention is to describe the development but the results actually relate to the use of the app in piloting. I have provided detailed comments below for consideration.

Running head

This is inaccurate, as the app was for parents/carers, not children themselves.

Reply: Thank you for your comment. You are correct.

Changes in the text: App for Caregivers of Children with Developmental Disorders

Abstract

Line 42 – reconsider use of the word ‘proven’ – this implies a high volume of evidence which I don’t think is applicable here.

Reply: Thank you for your comment. You are correct. We know this is a study with a limited number of subjects. We did not mean over sell our research. Also, since the sentence was in the background section, we were referring to the mHealth in general not specifically to our research.

Changes in the text: We remove the word “proven” to read “Evidence-based mHealth interventions have been successful for an array of physical and mental health conditions”. We also moved this last sentence to the beginning of the Background section of the abstract to make sure the readers would consider it a statement about previous research rather than our research.

Line 45 – what does ‘early childhood therapy’ mean?

Reply: ‘early childhood therapy’ is the term used to describe the services and supports that are available to young children with developmental delays and disabilities and their families. They often include a combination of speech therapy, physical therapy, and other types of services based on the needs of the child and family. We added a sentence in the introduction to explain what ‘early childhood therapy’.

Changes in the text: Sentence added in the introduction section: “Children with developmental disorders (DD) who live in developed country and their families often received monthly early childhood therapy that can include a combination of speech therapy, physical therapy, and other types of services (1).

Key findings

□ These report findings not dealt with in the abstract – ensure reporting is consistent across sections.

Reply: We appreciate your feedback. We agree with your evaluation.

Changes in the text:

- mHealth interventions can be used in low- and middle-income countries even without a reliable Internet connection.
- In countries with multiple official languages, instructional audio should be provided in multiple languages to help the user engage with the technology.

□ Line 85 – edit to ...(MARS) to be...’

Reply: edited

Changes in the text: edit to “(MARS) to be

Introduction

□ First sentence requires a supporting reference.

Reply 1: You are correct. We have included a reference. Please note that after this round of revision the first sentence is now the second sentence

Changes in the text: Reference added: Sevcik RA, Ronski MA. Communication interventions for individuals with severe disabilities: exploring research challenges and opportunities. Baltimore: Paul H. Brookes Publishing Co.; 2016. xxiii

□ Sentence beginning in line 124 does not fit with the rest of this paragraph – it is unclear what the point being made is here and how this is relevant.

Reply 1: Thank you for your comment. We believe the sentence is relevant because the absence of a reliable Internet connection in South Africa forced us to develop a standalone application. We agree with you that the sentence would have been better placed in a different section of the introduction.

Changes in the text: We moved the sentence to a different place in the introduction. We also rephased some parts of the sentence.

Line 134 – add ‘For example’ before describing examples of different mHealth apps

Reply 1: Thank you

Changes in the text: Added ‘For example’

Are there any examples of mHealth being used in South Africa specifically? If so, it would be good to add these in.

Reply 1: Thank you for your suggestion. We added two studies that used mHealth solutions in South Africa.

Changes in the text: A previous research study implemented and evaluated a community-based hearing and vision screening program for preschool children in the South Africa, supported by mHealth technology (20). In another research study in South Africa, text messages sent to women during pregnancy showed an improvement in achieving complete maternal-infant continuum of care (21).

Sentence ending line 149 requires reference

Reply 1: You are correct. We have included a reference.

Changes in the text: Reference added: Sevcik RA, Ronski MA. Communication interventions for individuals with severe disabilities: exploring research challenges and opportunities. Baltimore: Paul H. Brookes Publishing Co.; 2016. xxiii

Methods

This section states that participants included children which is incorrect – the participants are the parents/carers who tested the app – no data was taken on child outcomes.

Reply 1: Thank you for your comment. We agree with your evaluation.

Changes in the text: We removed the sentence about the children.

How were participants recruited?

Reply 1: Thank you for your comment. We added this clarification in the text.

Changes in the text: Caregivers were recruited through speech-language therapy clinics offered by four public hospitals in and around South Africa’s capital city, Pretoria.

Insufficient detail is provided here about analysis and measurement.

Reply 1: Thank you for your comment.

Changes in the text: We expanded the sections.

The description of the development of the app is provided in the results section but this is confusing. The paper does not actually present results about how the app was developed – this should be part of the methodology and it should be clear throughout that the paper focuses on initial piloting of the app.

Reply 1: We agree with your assessment. We decided to change the title of our paper and rephased the purpose section. Also, the description of the development of the app was moved from the results to the methods section.

Changes in the text: New title: A mHealth Application for the Training of Caregivers of Children with Developmental Disorders in South Africa: Rationale and Initial Piloting. New purpose: The purpose of this paper is to describe the initial piloting of the Nna’Le’wena mHealth app. In this paper, we also report the feedback about the quality of the app obtained from the caregivers enrolled in the project.

The two sections about the app (Development and App content and characteristics) were moved to the method section.

How were stakeholders involved in the actual development of the app? The introduction rightly asserts that the involvement of stakeholders is important in developing mHealth applications, but it does not appear that the authors involved stakeholders?

Reply 1: We published the research related to the focus groups somewhere else. There was a sentence towards the end of the introduction section. We agree that it was not the right place for it. We moved the sentence in the method section under “App development”.

Changes in the text: Focus group research was conducted ahead of the development and has been published elsewhere (22).

Abbreviations are used without full definitions

Reply 1: Thank you for your comment.

Changes in the text: We fixed all the abbreviations and added a reference to the statistical software used.

Results

Most of this section is taken up with content that should be in the methods. The actual results are presented in one final paragraph (beginning on line 292). These are rather limited and could have been expanded on. It seems that only parent reporting is used when the article suggests that app log data was also taken? It would be helpful to consider how much parental reports of their use of

the app (e.g., in terms of duration and sections used) match the actual objective logs taken by the app itself.

Reply 1: Thank you for your comment. We moved two sections of the results into the method as suggested before and here. We expanded the results section and described in details of tables. We added more data on table 3.

Changes in the text: Among the twelve caregivers, nine of them completed the entire 12 weeks training, one caregiver completed seven weeks, one caregiver completed four weeks and one caregiver stopped just after the first week. At the end of each week, caregivers answered questions about the language of the audio instructions used and about what activity they thought worked best to engage with their children. Caregivers reported 122 times about how they listened to the audio instructions. They listened in both English and Setswana half of the time (58, 47.5%), they listened in English one third of the times (39, 32.0%). They listened to the instructions in Setswana (11, 9.0%) for the least amount of time, despite reporting that Setswana was their preferred language. They did not listen to any audio instruction for approximately 10% of the times (11, 9.0%). Caregivers reported 117 times the activity that worked the best to engage with their children. The activity that caregivers considered as working the best was Playing (54, 46.1%), followed by Mealtime (38, 32.5%), Book reading (14, 12.0%) and, Dressing and Bathing (11, 9.4%). During the 12-week app training, the caregivers accessed the sections of the app that contained the help function 140 times. The help function that was accessed most often was related to the Mealtime topic (50, 35.7%), followed by Books (38, 27.1%), Playing (25, 17.9%) and Dressing and Bathing (27, 19.3%). Table 3 shows the results of the analysis of the questionnaire data and of the log file collected for the duration of the training.

□The MARS is not discussed in detail in the description of results and appears only in a table in which the raw MARS data is provided.

Reply 1: We agree with your comment. We expanded the section about MARS.

Changes in the text: Most of the caregivers showed high levels of engagement with ten of the twelve considering the app moderately interesting or very interesting. The quality of the information provided was reported highly relevant by ten caregivers. Two of them rated the quality of the app moderately relevant. The performance of the app was rated perfect by eight caregivers. One caregiver reported that the app was mostly functional and three caregivers reported that the app worked overall but that they experienced some technical problems. Half of the caregivers considered the app intuitive and stated that they were able to use it immediately. Four caregivers reported that it was easy to learn how to use the app and two caregivers said the app was useable after some time/effort. The navigation of the app was also rated high by ten participants stating that the app was easy to use or perfectly logical. The visual appeal of the app also received a high score with ten caregivers reporting that it had a high or outstanding level of visual appeal. All the caregivers would recommend the app to other people who might benefit from it. Caregivers never

selected the lowest two levels on any of the seven MARS subscales. Table 2 shows in detail the results obtained with the MARS.

□The numbers in table 3 are unclear – there were only 12 participants yet numbers report up to 85. I assume this is the total across the 12 weeks – this needs to be clarified and if my assumption is correct then it needs to be clear that the total number is therefore out of 144. The percentages also do not seem to match up – e.g., $19/144*100=9.9\%$ (not 10.6% as presented)

Reply 1: Thank you for your comment. You are correct that the table was not clear. Not all the caregivers completed the 12 week training. Since the survey was weekly, we do not have all the 144 potential data points.

Changes in the text: We rephrase the description of table 3. and added this sentence: “Among the twelve caregivers, nine of them completed the entire 12 weeks training, one caregiver completed seven weeks, one caregiver completed four weeks and one caregiver stopped just after the first week. ... Caregivers reported 122 times about how they listened to the audio instructions.”

□It was a missed opportunity to not record qualitative data about parents experiences and perceptions of the app – this would have helped suggest ways to develop the app further and consider the social validity. This should be highlighted as a limitation.

Reply 1: We agree with your comment. We added a sentence in the limitation.

Changes in the text: “Also, we did not collect any qualitative data from the caregivers about perception of the app and the experience with the training program. Such information could have helped further development and refining of the app”.

Discussion

□This is severely under-cited and makes no attempt to situate findings within the wider literature.

Reply 1: We agree with your comment. We changed the structure of the discussion section and we added several publications.

Changes in the text: See new discussion section.

□The structure here needs consideration – this section should begin with a summary of results, before moving onto implications of these (e.g., for the continued use of the app in South Africa) linked to literature, then discussion of limitations and areas for further research

Reply 1: Thank you for your comment.

Changes in the text: We changed the structure of the discussion section. There is now an introductory statement and three subsections: Technical observations, Training observations and Limitations and recommendations for future studies.

□It is unclear whether the authors plan to adapt the app based on caregiver feedback and the discussion gives the impression that the app was universally beneficial and regarded highly by all parents. Given that no data is provided about parent's actual use of the various elements of the app we cannot know whether some participants did not utilize the app, or utilized it less, and if so why this was the case.

Reply 1: We agree with your comment. We clarified in the discussion section.

Changes in the text: We changed the structure and content of the discussion section. We removed a few sentences that were not clear.

□More nuanced consideration of limitations is needed. Were there potential biases / lack of generalizability based on the participants who piloted the app? The lack of data about the impact of the app on parental confidence / implementation of strategies / child outcomes needs further consideration etc.

Reply 1: We agree with your statement. We rephrased the limitation subsection of the discussion section.

Changes in the text: There were limitations to our study. The Nna'Le'wena app was tested with a small number of caregivers of children with limited etiologies of DD. Only nine caregivers completed the entire 12 weeks of training. Also, we did not collect any qualitative data from the caregivers about their perceptions of the app, their confidence with using the app, or their experience with the instructional program. Such information could have helped with the further development and refining of the app. Potential bias of the participants who were involved in this phase of the app testing should also be considered.

□The assumption that the app would automatically translate to other countries / contexts is not founded and needs to be tempered – this is too strong a claim without data to support it.

Reply 1: We agree with your comment.

Changes in the text: We removed the sentence.

We also reviewed the quality of the grammar of the articles. We made several changes in the paper to make sure the flow of the article is improved.

Reviewer B

1. We failed to find any use of “developmental disability” in your text. Therefore, we’d suggest using “developmental disorders (DD)” as your keyword.

Reply: Yes, that is fine. I changed it to developmental disorders.

2. For the open-access database, it is suggested to provide the URL link for it.

Reply:We added references including web sites to Bit Web Server, PHP and MySQL applications in the text and reference section.

3. Figures and tables

- (1) We failed to find the citation of Figure 1 in your manuscript. Please check and supplement.

Reply:We added the sentence “Figure 1 shows four screenshots of our app.” In the text

- (2) Please recheck the highlighted data in Table 1.

Reply:We revised table 1 with the correct numbers. We had placed the decimal point in the wrong place. Thank you for checking this.

	Widow	1(.08)
Work status	Unemployed	10 (77.8)
	Part-time employed	1 (7.4)
	Full-time employed	1 (14.8)
Education	Grade 10 or less	7 (58)
	Grade 12	3 (25)
	1-4 years after school	1 (.08)
	5-7 years after school	0
	8-10 years after school	1 (.08)

- (3) To keep consistent, it suggested to keep one decimal place for the percentage in Table 1.

Reply:We added one decimal point. Not all the totals make 100.

- (4) Please recheck the highlighted data in the following sentence.

They did not listen to any audio instruction for approximately 10% of the times (11, 9.0%).

I did not listen to any audio | 14 (11.5)

Reply:We added the correct number. Thank you for checking this.

4. If available, please update your reference list by including related literature published **within a year**. Some of the references are outdated.

Reply: We updated some of the references with more recent ones. Some developmental disorders studies are important in the field so we left them even if slightly outdated. Studies in South Africa are very rare too. We replaced the following references with more recent ones.

14. Dalvit L, Kromberg S, Miya M, editors. The data divide in a South African rural community: A survey of mobile phone use in Keiskammahoek. Proceedings of the e-Skills for knowledge production and innovation conference; 2014.

16. Heron KE, Smyth JM. Ecological momentary interventions: incorporating mobile technology into psychosocial and health behaviour treatments. *British journal of health psychology*. 2010;15(1):1-39.

17. Burns MN, Begale M, Duffecy J, et al. Harnessing context sensing to develop a mobile intervention for depression. *J Med Internet Res*. 2011;13(3):e55.

18. Ben-Zeev D, Brenner CJ, Begale M, et al. Feasibility, acceptability, and preliminary efficacy of a smartphone intervention for schizophrenia. *Schizophr Bull*. 2014;40(6):1244-53

31. Jobe W. Native Apps vs. Mobile Web Apps. *International Journal of Interactive Mobile Technologies*. 2013;7(4).