Author’s response to reviews

Title: Development of a context-sensitive physical activity intervention for persons living with HIV and AIDS of low socioeconomic status using the behaviour change wheel.

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Development of a context-sensitive physical activity intervention for persons living with HIV and AIDS of low socioeconomic status using the behaviour change wheel.

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BMC Public Health

Dear Sir,

All the changes made in the manuscript are shown in bullet points below, as well as in bold in the manuscript. Line numbers specific to certain sentences may have changed because some sections of the manuscript have been shifted, as recommended by reviewer 2.

Reviewer One

Abstract

• It is unclear why gender plays a role in the description of this process. Come out and say you developed a context-specific intervention for low SES WLWH and justify it in the background: “We have mentioned that “The purpose of this study was to develop a contextualised intervention for promoting PA among women living with HIV and AIDS (WLWHA) of low socioeconomic status (SES)” and this has been justified in the background.
• The abstract mentions a mixed-method and a cross-sectional study, but none of this plays really a role in the manuscript. They are confusing and do not describe the rather theoretical development steps of this process. I also did not see any feedback that any low SES WLWH have provided to this process: The results of the four studies are described and how they each contribute to intervention development.

• The second sentence in the result section is very unclear and needs to be rewritten: The sentence has been re-written to “The PA intervention (a) utilised the Transtheoretical model of behaviour change and the Social Cognitive theory as the underpinning theoretical frameworks (b) included convenient PAs, such as walking, doing simple home-based exercises, engaging in activities of daily living or doing simple exercises at the community centre (c) used education, reward, training in PA, modelling exercise activities and enablement to increase the opportunity to engage in PA as intervention functions (d) used service provision as policy priorities, and (e ) used a direct face-to-face mode of delivery”.

• The Behavior Change Wheel has a wide range of policy implications that have not been looked at in great detail: The following sentences have been added “The BCW provides a useful and comprehensive framework for the development of evidence and theory-based PA interventions for PLWHA of low SES. The BCW can thus be used in the development of interventions that ‘talk’ to policy by bridging the health inequality gap.”

Background

• L 75 Please provide some numbers for this statement: We cannot provide specific numbers, however, we have changed the statement to read:” In spite of the evidence of the health benefits of PA, evidence suggests that PLWHA in Africa do not engage in adequate amounts of PA (Murenzi, 2011; Muronya, Sanga, Talama, Kumwenda, & Oosterhout, 2011; Edward, Oladayo, Omolola, Adetiole, & Adedayo, 2013; Olsen et al., 2015). We have provided more evidence from the literature that PLWHA in Africa do not engage in adequate amounts of PA.

• L78 Many PLWH of low SES walk a lot, carry a lot, and based on your description they are not physically active. Many would not see this as exercise, so bringing this more into the focus of these individuals is important work. Please insert a definition for physical activity that is based in an African context and not the American Academy for Exercise Sciences. It is unclear what makes the Behavior Wheel appropriate to LES populations when planning an intervention: The fact that many would not see activities of daily living as exercise has been highlighted in the new paragraph. The definition of physical activity has been contextualised. We have also stated that “The BCW is specifically appropriate
for promoting PA among persons of low SES because it also incorporates behaviour change techniques that are grounded in theories (e.g. Social cognitive theory[SCT] and the Transtheoretical model [TTM] that have been found to be effective in promoting PA amongst persons of low SES.

• L 90 page 5 needs references for the two theories SCT and TTM: References have been provided.

• L 94 I am lost what intervention you delivered in Xhosa? This paragraph is completely out of context: This has been rectified by adding the sentence “This section of the paper describes the contextualised PA intervention for PLWHA which was developed using strategies outlined in this paper”.

• L102 Define short-term in your measurable goals please: Rectified through adding “Short-term goals were those which could be achieved in six days (i.e.) before our next contact with the participants”.

• L103, where were these exercise classes held? Again, this whole section makes not really sense because important context is missing: The intervention was conducted at a community centre caring for HIV-positive Black African Xhosa-speaking women in a low-income community in the Western Cape Province, in South Africa.

Behavior Wheel Change Paragraph

• L162 If the COM-B system and the TDF when combined offer indeed a complete theoretical model for understanding behavior change, when do you seek the input from the Low SES WLWH along that process?: In the materials and processes section we mention study 4, where focus group discussions were conducted to explore participants intervention preferences and their barriers to physical activity.

• Much of this analysis reads to me as based on the opinion of the authors after an extensive literature review. Is that correct, please convince me otherwise: The analysis is very much informed by a systematic literature review that we did and published [see study 1 in the Materials and processes section]. We use both the steps outlined in the BCW for intervention design and evidence from the preliminary studies we conducted.

• Please spell out abbreviations such as APEASE for the first time: The abbreviation has been spelled out (Affordability, practicability, effectiveness, acceptability, side effects and safety, and equity).
Materials and Process

- The short summaries of the four studies does not add to a more in-depth understanding of how the authors arrived at the new framework. It is unclear where participants were really involved besides study 4, but even there I did not see that they discussed any of the theoretical dimensions of the new model: We now explicitly state the results of the studies and their contributions towards the development of the intervention.

- Page 11 238 Unpublished data was used to implement the evidence from preliminary studies into the new intervention process. So no one will be able to ever repeat this study process: Only one study has not been published and is still under review. Other studies have since been published.

- Page 12 Table 3 does not show questions that were asked and who was asked?: We have added the following statement preceding the table “Table 3 shows the questions that the researchers attempted to answer and the answers that were developed by the researchers in order to define the problem in behavioural terms as recommended by Michie et al. (2014). We have also modified the table to show the question and the answer.

- P 12 Lines 270-278 do not address safety, distance, temperature and cultural practices. They frequently determine in impoverished communities what is acceptable behavior and what is not. Did you ask in any of the studies. This is especially true for women: We have added the following statement “Additionally, participants were also supplied with information relating to safety when exercising (e.g., information pertaining to the importance of warm up, stretching, hydration during exercise etc.). Even though questions pertaining to permissible cultural practices among women were not asked, all exercise activities in the intervention were deemed to be morally, ethically, and culturally appropriate.

- P13 Who scored that table and based on what criteria did it receive a rating of promising or unpromising: The table was scored by the researchers in accordance with the steps of the BCW. Every step of the BCW methods is done by the researcher. We do state in line 260 that “Target behaviours were rated on (a) impact on behaviour change and, (b) likelihood of changing behaviour. The rating of each target behaviour was determined by examining if the target behaviour matched the low-cost target behaviours identified in the systematic review [23]. Please read line 260 – 269 in the original manuscript. Line 286 onwards shows the literature which was consulted in the rating process.

- P 16 The discussion does not address how this framework compares to similar work in Asian or South American impoverished communities, where exercise is frequently seen as time spent on idle activities: The following paragraph has been added “Our findings,
through the use of the BCW revealed that a contextualised PA intervention for PLWHA of low SES would include low-cost PA activities such as ADLs and walking. Contrastingly, other researchers focusing on the development and contextualisation of PA interventions for individuals of low SES have reported that, low-cost interventions that include walking tend to be taken up by educated, white, middle aged women (Foster et al., 2011). Other similar low-cost interventions for persons of low SES, that include walking, have been found to be fraught with barriers, to an extent that participants can’t possibly benefit from them (Hanson, Guell, & Jones, 2016). For example, participants of low SES are reported to view walking as being of little purpose with little understanding of the health benefits of walking (Hanson, Cross, & Jones, 2016). As such, researchers are encouraged to include educational sessions in their interventions for participants to understand the health benefits of different types of physical activities”.

- P 16 374 I would not see this as a separate study but the accumulation of four previous studies that resulted in a combined theory of behavior change: The sentence now reads “The intervention was developed by applying a rigorous systematic method that combined theory, participant preferences and practical considerations using the combined evidence from the accumulation of four previous studies.”

- I find the tables too numerous and also burdensome to read, as they frequently provide little detail.

For example Table 7 restriction - no, since it was not practical.... what are these statements referring to? Or the next statement related to environmental restructuring is the same - what does this mean?: One complication about writing a paper that leans on certain theoretical frameworks/model is that the reader themselves have to understand the theory in question. Compared to other researchers that employ the BCW and opt to skip some steps of the BCW method, we decided to include every step due to complications that arise when the reader doesn’t understand. Especially since the BCW is a new model. This is particularly important if the research is to be replicated elsewhere. All the tables are in line with the BCW method, taking out any may compromise the method and replicability. However if the reader wants to understand the meanings of terms and the tables, on page 11, after describing the eight steps of the BCW, we have added a statement that reads “ NB: To fully understand the use of the BCW in designing interventions, the steps and the associated tables, the reader is referred to Michie et al. (2014).”

- Thanks again, I find this work very important, I just think this manuscript needs significant more clarity before it really impacts the behavior of impoverished communities. No reply necessary

- Reviewer 2 (Reviewer 2): PEER REVIEWER COMMENTS: To view the full report from the academic peer reviewer, please see the attached file.
REVIEWER COMMENTS FROM REPORT: This is a very well-written, interesting and rigorous paper documenting the thorough development of a context-sensitive physical activity intervention using the Behavioural Change wheel as a framework. The rationale for the study is reasonable and the methods are extremely detailed allowing the reader to fully understand the process that was taken by the research team in deciding on the most pertinent, evidence based intervention functions and techniques. This study makes an important contribution to behavioural science from a methodological standpoint, in that it demonstrates how to meticulously and transparently apply the Behaviour Change Wheel and Theoretical Domains Framework to intervention design. It also gives insight into some of the most appropriate theoretical constructs and behaviour change techniques that apply to an important target population of Low SES African persons living with HIV and AIDS. Very good Job

REQUESTED REVISIONS:

• My only minor criticisms of the manuscript are firstly that it is missing a clear justification of the target population and why physical activity is of particular importance to them, and secondly that it is a bit disorganised in parts, which disturbs the flow and makes it hard to follow. To this end I have the following recommendations:

• The Abstract is good, although I was not fully aware of the aim/purpose of this particular manuscript until I'd read the main text. You could make this clearer by saying that the aim was not only to develop an intervention but optimise it using behavioural theory/frameworks in the background: The following statement has been added in both the abstract and at the end of the introduction “Given the foregoing, the purpose of this study was to develop a contextualised intervention for promoting PA among persons living with HIV and AIDS (PLWHA) of low socioeconomic status (SES). A secondary aim of the study was to optimise the PA intervention using behavioural theory/frameworks derived from preliminary studies and the literature”.

• I would like to see the background make a stronger case for why we need this intervention. I think the evidence cited but you could develop some of your points to tell the reader what the evidence is specifically for PLWHA (Lines 70-74). Is the argument that PLWHA are at greater risk of low PA or that PA has specific benefits for the management of HIV and AIDS?: We have added a second paragraph “The use of highly active antiretroviral therapy (HAART) to manage the effects of HIV/AIDS was associated with adverse morphological conditions such as lipoatrophy (loss of fat in the facial area and the upper and lower limbs) and lipohypertrophy (fat accumulation in the abdominal, cervical and breast areas) (Tanaka et al., 2015). PA has been found to mitigate the adverse effects of HAART (Tanaka et al., 2015). Unfortunately, PLWA of
low SES, particularly women are at a greater risk of low PA (Smit et al., 2006; Murenzi, 2011), and this is usually related to low SES (Mabweazara et al., 2018). Accordingly, as is the aim of this study, Mabweazara, Leach & Ley (2016) have advocated for the development of contextualised and theoretically informed PA interventions for PLWHA of low SES.”

In Paragraph 2 (Line 77-79) you could also make the case stronger by adding some numbers to describe inactivity and the prevalence of HIV/AIDS in Low SES: We added the following statement “This is so because, most people living with HIV are found in low- and middle-income countries, with close to 66% located in sub-Saharan Africa (UNAIDS, 2018). In South Africa specifically, the number of people living with HIV increased from an estimated 4.25 million in 2002 to 7.52 million by 2018 (Statistics South Africa, 2018). Furthermore, self-reported data from 51 mostly low- and middle-income countries showed that one-fifth of adults are classified as physically inactive (Gaskin & Orellana, 2018).”

Line 89-175: This section of the manuscript appears to me to not fit here as it generally summarises the methods and results that come next. I think you could cut this section down and only describe why it is best practice to ground the intervention in behavioural theory and use a rigorous framework for developing the content and not tell the reader what you did in the intervention itself (as this repeats itself later). You do in fact touch on this in Paragraph 3 of the background so it might be suitable to leave this here and finish the background by stating the aims of the study/paper. Then the section entitled ‘Models and frameworks informing the study’ (Lines 125-168) could in fact move to the methods section (e.g. to the section starting on Line 218 ‘Use of the BCW’). Line 170-175 could be moved to/ integrated with paragraph 3 of the background: We have moved the section entitled ‘Models and frameworks informing the study’ to the methods section just before the section entitled ‘Use of the BCW’. Line 170-175 has been moved and integrated with paragraph 3 of the background.

It would be helpful if you told the reader in the Materials and processes section that the results of the 3 preliminary studies will be described and highlighted in relation to the APEASE process/BCW framework throughout the results. My instinct as a reader was to try and find what the outcomes of these studies were and it took me a while to work out that they were documented throughout the different steps of the results. I would recommend adding this line in instead of stating that 'the results of this study were used...' (Lines 204-205 and 209-210) as you should describe any results in the results section itself: The results of the four studies have been added in the Materials and processes section. Additionally we have added a sentence “The results of the 4 preliminary studies
will be described and highlighted in relation to the APEASE process/BCW framework throughout the results.” At the end of the Materials and processes section.

- The results are reported very well - no comments

- My instinct is that the discussion might be an appropriate place to summarise briefly what the resulting intervention looked like (i.e. condense Lines 89-124 of the Background). I would suggest after the first paragraph: The resulting intervention has been added to the discussion section after the first paragraph.

- Line 357: again, reinforce to the reader that PLWHA of Low SES is a high risk group: We have added the sentence “PLWHA of low SES are a high risk group for inactivity (Smit et al., 2006; Murenzi, 2011).”

- The final line (359-360) is a bit redundant so you can remove as evidence of its use in other settings is not evidence that it has not been done in this one: The line has been removed.

- Line 377: you need to expand on why using two theories rather than just one is a strength - what is the evidence supporting this statement? The following sentence has added “Multiple theories allow for the use of different strategies or BCTs thereby offering greater opportunity for inducing change (Webb, Joseph, Yardley, & Michie, 2010).”