Reviewer’s report

Title: Comparison and validation of accelerometer wear time and non-wear time algorithms for assessing physical activity levels in children and adolescents

Version: 1 Date: 17 Dec 2018

Reviewer: Paul McCrorie

Reviewer’s report:

Overall, the authors have improved the manuscript in certain places, e.g. in response to reviewer 1’s comments re: agreement visualisation and Bland Altman plots. There are also some improvements in the clarity throughout (particularly methods), however, I am still left unconvinced that the authors have demonstrated (in their narrative or analyses) their contribution over and above the newly cited papers - and therefore how this paper advances our knowledge.

The included section within the background section does make reference to the other papers that have been published in the field, however what this paragraph lacks is a genuine critique of why the current study provides new insight: reviewer 1 explicitly identifies the 'one superior point' that the current study has in its favour yet this is still poorly conveyed in the background section and - from interpreting the comment from reviewer 1 - hasn't been included as a separate analysis that specifically explores the intricacies and exact agreement between each period and not just total wear time. It is this point that should be the focus of the 'adequate advance in knowledge' mentioned by the editor. I think the authors try to make reference to it in the first of the two sentences on page 6, lines 36-44 (as I can see it) but it isn't completely clear what is meant. Either way, I believe this is still under developed and needs to be strengthened.

page 6, lines 36-44 (as I can see it):

"No specific time points for wear and non-wear were provided in the logbook that could lead to an error in the ability to identify the better algorithm. These conflicting results lead confusion for researchers and practitioners who have to make better decisions in their data collection using accelerometer, in order to obtain more valid and comparable data."

Additionally, the final sentence in the above states….. "conflicting results lead to confusion…". The authors don't really frame their discussion in the terms of why their study findings alleviate those concerns (or at least strongly defend the use of 30min classification as superior to all other algorithms) - particularly considering they promote of a non-wear time algorithm that is in disagreement with those already published. How does this improve confusion? I fully appreciate that if your results suggest 30 minutes is the better option then you should present these findings but this needs to be presented alongside a cogent and nuanced discussion with reference to previous work in the field (as mentioned by reviewer 1). In general, the discussion needs to be elevated from the descriptive to the more critical. Some finer points:
* There are a quite a few occasions where reference is made to adults and older adults literature; however, there is a vast amount of children and young people literature (of which you now cite) that is more appropriate and could frame a substantial portion of the discussion.

* The added section regarding 'mean number of wear time periods' should be used in the discussion to compare and contrast referencing previous work. You have added a small paragraph in the discussion but it doesn't really add anything to the wider argument that the paper relates.

* Figure 2 suggests that the 10min algorithm significantly underestimates % of those meeting 10 hours on 3 out of 4 days (with the other day prob close to significance). The 60 minute algorithm significantly over-estimated on Day 2 only. This seems really interesting. Why on one day only when the other days are much closer to the log book reference? Specific analyses looking at classification accuracy of individual non-wear periods (as suggested by reviewer 1) could prove useful to explore this.

* What do your findings mean for the field? Does it add to the confusion as you mention in the background or should researchers working with children and adolescents use a 30min non-wear algorithm to process their data? Why would your results provide stronger justification of processing decisions than the other papers cited (i.e. a 60min classification)?

Other comments

The paper needs to be checked thoroughly for grammar and typo's, including the new sections that have been added. There are quite a few issues so it might be a good idea to have someone proof-read before re-submission.

Tables and Figures

All tables and figures could benefit from further description/labelling either at the bottom of tables or embedded into figures.

Bland Altman plots should be labelled for mean diff and limits of agreement. Y axis should have unit of measurement (mins) in label. They seem to be different sizes and scales. I think it would be beneficial for the reader to see them all on the same scale and size.

Figure legends for Figure 1 and 2 are reversed (page 25).

Figure 2 has no x or y axis labelling. When it stands alone, it is unclear what the y axis refers to.

**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.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
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Yes

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
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