Author’s response to reviews

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

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Author’s response to reviews:

Dear Editor,

Please find enclosed the revised version of our manuscript, “Comparison and validation of accelerometer wear time and non-wear time algorithms for assessing physical activity patterns in children and adolescents” (BMRM-D-18-00305R1) for resubmission to BMC Medical Research Methodology.

As requested by the reviewers, we have made the appropriate changes in the paper, which have been highlighted in red. Our responses to the reviewers’ comments are included in the following pages.

We thank the reviewers for their constructive remarks, which have helped us to improve the quality of this manuscript. We hope our manuscript will now be suitable for publication in BMC Medical Research Methodology.

Technical Comments

1. Move List of Abbreviations after the Conclusion.
Done.

2. Include Consent to participate under section “Ethics approval and consent to participate” as mentioned in Methods.

Done.

3. Figures - Figures should be uploaded as separate files, and each figure of a manuscript should be submitted as a single file. Please remove the figure legends embedded within the figure files. All figure titles/legends should be listed and placed at the end of the main manuscript, after the References, and not within any of the figure files.

Done.

4. Re-arrange the declaration sections as seen below:

- Ethics approval and consent to participate
- Consent for publication
- Availability of data and material
- Competing interests
- Funding
- Authors' contributions
- Acknowledgements

Done.

Editor Comments

1. The reviewers' comments regarding the relevance of this manuscript are fairly comprehensive. I would like to see a careful revision of the Background section in response to their comments. While we are not bound by your work being a significant advance in methodology, it is essential to be comprehensive, objective, and scientifically rigorous.

As requested, the background has been modified.

2. The number of participants in the study and those excluded should be part of the Results section and not the Methods.

The change has been made.

3. Why is it necessary to restrict analysis to "Valid days"? How does your definition of a valid day affect your findings?
Effectively, the definition of a valid day does not impact our analysis and findings. As suggested, we performed our statistical analysis with all participants, expected 3 participants on 4 due to missing data following the 4 days (monitoring failure).

4. Methods - linear mixed models were used for what purpose? What does "comparison of wear time and PA patterns" mean here?

We apologize for this clumsy sentence since this sentence is uncompleted. We used linear mixed models to compare the log diary method to each other algorithm methods for the measurement of wear time and PA levels.

5. At this time, it is difficult for me to assess whether this manuscript reports an adequate advance in knowledge in this area and merit acceptance in BMC Medical Research Methodology instead of suggesting a transfer to BMC Research Notes. I would like to see a revision and allow the reviewers to recommend based on the revision, whether to transfer your manuscript to BMC Research Notes.

If the manuscript is transferred to BMC Research Notes, we will not continue.

Reviewer reports

Eivind Aadland, PhD (Reviewer 1): The present study aimed to assess agreement between different non-wear time algorithms applied to accelerometry and a diary (reference) in a small, convenient sample of children. Although the study build on a sound piece of research, the paper does not exploit the potential of the data, and the study lack reference to several essential papers in the field, which would allow for conducting better analyses and provide a much more nuanced discussion of the findings. In the current form, the paper provide very limited new insight. Some main points and concerns are given below:

1) Several previous studies have aimed at determining and/or compared different non-wear criteria for accelerometry, but is lacking in the present paper:


Thank you for these references. As requested, the background has been modified.

2) The analyses should be improved in several ways:

a. Use of Bland-Altman plots, showing both the bias (on a group level) and the random variation (on an individual level) would allow for a much better reporting and visualization of the findings than the plots given herein, which shows concordance. Please provide.

As requested, we added Bland-Altman plots in our statistical analysis.

b. Aadland et al suggests reporting of number of non-wear periods per day (as done by Chinapaw et al, Toftager et al, and Aadland et al) provide a simple diagnostic tool for considering whether a chosen non-wear time criterion seems sensible. Please provide this information for both accelerometer data and the diary, which can be directly compared to these previous studies.

Thank you for this suggestion. As requested, a table (5) about the number of non-wear periods per day according to log diary and the different non-wear criteria has been added in the manuscript.

c. The present study is superior to Aadland et al regarding one point: specific time points for wear and non-wear were provided in the diary. This means that the dataset allows for determining the exact agreement for each period as wear and non-wear from the diary and the accelerometer files, not only a comparison of total wear time. This would provide a very good basis for evaluating the performance of the non-wear time criteria, given that you argue the diary is trustworthy, and would provide new knowledge in the field.

Thank you for this remark. This one has been added in our manuscript.
3) The present study recommends 30 min of consecutive zeroes as the best non-wear time criterion in children and youth, although previous studies have recommended 20 and 60 minutes. This is a critical issue that needs to be thoroughly elaborated on, with reference to the findings and recommendations given in the above mentioned studies.

As requested, this point has been discussed in the discussion section.

4) Please provide the diary as a supplemental file.
   Done.

5) Use of a diary is mentioned as the main strength of the study, but it can easily also be argued it is the study's most important limitation. Please state more clearly/elaborate on how/why you believe the self-report is trustworthy.

As requested, this concern has been developed in discussion section (limits).

6) The term "PA patterns" is used in the study, but I do not see how the findings relate to patterns. I recommend "PA levels" are a better term.

Done.

Paul McCrorie, Ph.D (Reviewer 2): In general, the paper is well written, clear, and concise with its content and message, if sprinkled with some grammatical issues and typos. Non-wear decisions in accelerometry studies are important for the accurate categorisation of sedentary time and PA outcomes and variability does exist in the literature with regards to their use and reporting. This has been echoed in the literature over a number of years. However, I am left unconvinced with the novelty of the paper's findings and the explicit contribution that the paper makes to the literature base. A number of studies have been left uncited within this paper; studies that have completed similar/identical analyses with larger samples in recent years. Therefore, I would suggest that this paper does not meet the high standards of BMC Medical Research Methodology.


Thank you for these references.

I would like to provide some comments on a few sections that will hopefully aid future submissions (although not exhaustive):

Abstract

There is insufficient detail within the abstract for the reader to clearly understand why this study is important (should be in background) and what was actually done (Methods). In particular, the methods section of the abstract needs to be re written to convey what was actually done (journal guidelines state...." how the study was performed and statistical tests used"). For example, we have no idea about age range of participants, but this is incredibly important to know. Because the methods section is quite light, we are unaware that the 'r' coefficients in the results section are actually concordance coefficients rather than Pearson correlation coefficients. If someone has a short time to read papers, they will use the abstract to extract the important information - in this instance, a reader would incorrectly assume you had tried to assess agreement by using an unsuitable method.

Furthermore, the conclusion of the abstract should have a strong statement of what the study contributes to the literature over and above what we already know. Presently, this isn't the case.

As requested, the abstract has been rewritten.

Background

Similar to the abstract, in future submissions, I feel the authors should really spend some time on this section and focus on conveying the importance of the paper as a contribution to the literature. Why does it add anything over and above what we already know? What has been done before? Why is your paper better?

As requested, the background has been modified.

Methods

I had concerns over the wide range of ages used in the study and understand from previous work that differences in prolonged sed bouts, and differences in lengths of breaks between sed bouts change as children age. This is something that you do not discuss or consider in this paper.

As requested, this concern has been added in discussion section (limits).
I wonder if it would be more fruitful for future analyses to consider age as the primary focus of any paper?

Thank you for this suggestion. However, our sample size is not enough high to perform an analysis considering age as primary focus.

Furthermore, remember to explain this section as clearly as possible. There is a considerable amount of assumed knowledge required on the reader's part. What is a count? What software was used to initiate, download, and process data? Why were the accelerometers placed on the lower back and not hip? How would this impact non-wear analysis? Why would you allow for interruptions of 2 minutes in a non-wear algorithm? Is a log-book really considered 'gold standard'? Do you know if the young people completed the log books in real time or were the completed via recall?

As requested, the methods section has been more developed.

Figures

CCC graph need a key to explain what the figures are showing. 95CI are missing from description.

95 CI was represented by the line and the point represented the coefficient value. However, as suggested by reviewer 1 to add many analyses and figures, we decided to use a table for showing these results.