Author’s response to reviews

Title: Validation of Automatic Wear-time Detection Algorithms in a Free-living Setting of Wristworn and Hip-worn ActiGraph GT3X+

Authors:

Raphael Knaier (raphael.knaier@unibas.ch)

Christoph Höchsmann (christoph.hoechsmann@unibas.ch)

Denis Infanger (denis.infanger@unibas.ch)

Timo Hinrichs (timohinrichs@unibas.ch)

Arno Schmidt-Trucksäss (arno.schmidt-trucksaess@unibas.ch)

Version: 2 Date: 15 Feb 2019

Author’s response to reviews:

We would like to submit a revised version of the manuscript entitled: “Validation of Automatic Wear-time Detection Algorithms in a Free-living Setting of Wrist-worn and Hip-worn ActiGraph GT3X+” (Ref. No: PUBH-D-18-02862). Please see our responses below to the reviewer’s comments. As requested in point 6 by the editor the changes are not marked with “track-changes” or in different colors.

We thank the reviewers and the editor for their comments and taking the time to review this manuscript.

Nicole Proudfoot (Reviewer 1): This revision addresses most of the concerns raised in the original review. I do have a few remaining concerns and items for clarification:

1. Line 24: As stated in the original review, I do not think there is consensus on how activity data should be analyzed. Rather, the paper by Migueles and colleagues provides some guidance on accelerometry data collection and analysis. Please consider reworking this statement.

Authors: Thank you for pointing this out. We changed this statement. Please see lines 24 – 25.
Original: “There is consensus on how activity data should be recorded and how activity should be categorized and analyzed.”

New: “The authors provide some guidance on how activity data should be recorded and how activity should be categorized and analyzed.”

2. Line 100-106: I think the algorithm descriptions need to be clarified. Do you mean that Troiano defines non-wear as periods of consecutive 0-counts lasting at least 60 minutes, allowing for up to 2 consecutive minutes of 1-100 counts/min and Choi detects non-wear time as periods of consecutive 0-counts that last at least 90 minutes?

Authors: Thank you for this remark. We clarified the description. Please see lines 99 – 106.

Original: “The main difference between the two algorithms is that “Troiano” defines values of below 100 activity counts per minute over a period of no longer than 2 minutes as non-wear time. The algorithm “Choi” defines only values of 0 activity counts as non-wear times. Further, the algorithm Choi has a default setting for “minimum length on non-wear times” of 90 minutes. Detected non-wear times below 90 minutes are therefore automatically set as wear times.”

New: “There are major differences between the two algorithms. “Troiano” defines non-wear time as intervals of at least 60 consecutive minutes of zero activity counts, allowing for up to two consecutive minutes of counts between 1 and 100 counts. The algorithm “Choi” defines non-wear times as periods of consecutive 0-counts of a certain duration. This duration is defined as “minimum length of non-wear times”. The default setting by the manufacturer is 90 minutes. Detected non-wear times below 90 minutes are therefore automatically set as wear-times if this setting is not adjusted.”

3. There is a paper by Choi et al. (2012) that examined the Choi and Trioano wear time algorithms in accelerometers worn at both the waist and the wrist in older adults. This paper should be incorporated into the discussion. (Choi L, Ward SC, Schnelle JF, Buchowski MS. Assessment of wear/nonwear time classification algorithms for triaxial accelerometer. Med Sci Sports Exerc. 2012;44(10):2009-16.)

Authors: Thank you for this comment. We included this paper in the discussion section. Please see lines 188 – 194.
“By definition, non-wear times of under 90 minutes cannot be detected with this setting. The intention of this definition is to reduce type I errors and to prevent exclusion of participants due to a false non-compliance. The rationale for this >90-minute interval for the minimum length of non-wear time is based on a study by Choi et al. 2012 (13) in which wear-time detection was validated in a free-living setting in twenty-nine elderly subjects aged between 76 – 96 years. It is highly doubtful whether this algorithm can be applied to all target groups and correctly detect non-wear time in study samples such as ours that not only differ in activity levels but also show much different wear-time compliance and duration of non-wear epochs.”

Leigh Vanderloo (Reviewer 2): The authors have adequately addressed my comments. Thank you.

Assistant Editor Comments:

1. Ethics Approval and Consent to Participate

Currently, informed consent is included under “Methods”.

In your “ethical approval” section, please confirm whether informed consent, written or verbal, was obtained from all participants and clearly state this in your manuscript. If verbal, please state the reason and whether the ethics committee approved this procedure. If the need for consent was waived by an IRB or is deemed unnecessary according to national regulations, please clearly state this, including the name of the IRB or a reference to the relevant legislation.

Authors: We included the statement additionally in the Ethical approval section.

2. Funding

In the Funding section, please also describe the role of the funding body in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.

Authors: We included the statement: “The funding body was not involved in any kind in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.”
3. Authors Contributions

Please include a statement in the Authors' contributions section to the effect that all authors have read and approved the manuscript, and ensure that this is the case.

Authors: We included the statement: “All authors read and approved the final version of the manuscript.”

4. Abbreviations

We note that some abbreviations used in the manuscript text have not been included in the ‘List of Abbreviations’ section. Please ensure that all abbreviations present in the text are listed in this section.

Authors: We would appreciate if you could clarify which abbreviations are missing in the List of Abbreviations. The abbreviations used but not stated in the List are ActiGraph GT3X+, Actigraph GT1M, GENEActiv, IBM SPSS which are names of companies or devices (e.g. International Business Machines) and usually not listed. The further abbreviations used (i.e. cm, kg) are SI-units and usually also not listed in the List of Abbreviations.

5. Formatting

Please change the headings “Ethics Approval” to “Ethics Approval and Consent” and “Figure Legend” to “Figure Legends”.

Authors: We changed this accordingly.

6. Clean Manuscript

At this stage, please upload your manuscript as a single, final, clean version that does not contain any tracked changes, comments, highlights, strikethroughs or text in different colours. All relevant tables/figures/additional files should also be clean versions. Figures (and additional files) should remain uploaded as separate files. Please ensure that all figures, tables and additional-supplementary files are cited within the text.
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Authors: We provide a clean version of the manuscript without any track-changes.