Reviewer's report

Title: Impact of accelerometer data processing decisions on sedentary time and physical activity measures from a large cohort study

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Reviewer: Melvyn Hillsdon

Reviewer's report:

This study examines the effect of different accelerometer data processing decisions on estimates of the amount of time participants wore their accelerometer and how much time per day was spent being sedentary and at different intensities of physical activity in a large sample of older women.

Major

In general I think the results section could be written with greater clarity. It would help readers if the text followed the layout of table 2. Sentences from 144 onwards just seem to run into each other.

Title

The title does not represent the fact the much of the focus of the paper is on wear time estimates when I think it should.

A ‘consort’ type diagram showing the flow of participants who were invited to wear an accelerometer through to the denominators for Table 2 (1 day and 4 day) would be really helpful and will make it clear where numbers are lost up to the point of analysis. See Figure 1, Sabia et al Am J Epidemiol. Mar 15, 2014; 179(6): 781–790 for an example.

Line 193 highlights that the sample size for analysis varies according to the various rules applied. I feel that this could feature more in the analysis as this is an important factor if the lost participants introduce bias into the sample (supplementary file suggest it does). Therefore, I would request that the authors report differences in sample characteristics as well as the N when applying the different methods for data processing.

Minor

Line 64 Reference required for Lee and Shiroma

Line 66 I’m not entirely sure it is true to say that data processing decisions and their effect on sample size and summary estimates has not been quantified. See Toftager et al IJBNPA 2013,10:140

Line 93 It would be helpful for external validity to have a brief summary of the 8,373 women who returned accelerometers and how they compared to the 39,876 who took part in the main summary. Also, how representative were the
women in Table 2 compared to those that were invited to wear an accelerometer.

Line 120 A short note explaining why the algorithm for VM data was altered would help the readers with less expertise in this area.

Line 125 The full link to the physical activity package in R would be helpful as the link in the reference is too general and does not work.

Line 149 It would be beneficial if % as well as N values were presented in Table 2 with the denominator clearly shown (presumably the 7,650 eligible women minus those who returned devices that failed).

Line 163 It needs to be made clear how the wear-times in Table 2 and reported in the text were derived. E.g., Are they for all valid days and if so how were any differences in the number of days included taken account of? Wear times appear to differ by day of week and between weekday and weekends making direct comparison with differences in days tricky.

Line 174 Same point as above for Table 3 results. How were differences in number of valid days dealt with?

Line 201 You say the amount of missing accelerometer data did not vary from 1-7 days yet the N’s for women with # 1 day and # 4 days is different suggesting fewer women complying with the greater number of days required.

Line 214 You recommend a combined approach for mail out methods on this line and the conclusion yet I think the data really only indicates that you need to know when the participant first wears the accelerometer and when they finally take it off for returning by post. These are the only occasions you cannot infer wear time from an algorithm. This minimizes the burden on the participant and the researcher.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests