Author's response to reviews

Title: Accelerometer-determined physical activity and self-reported health in a population of older adults (65-85 years): a cross-sectional study.

Authors:

Hilde Lohne-Seiler (hilde.l.seiler@ui.no)
Bjorge H Hansen (b.h.hansen@nih.no)
Elin Kolle (Elin.Kolle@nih.no)
Sigmund A Anderssen (s.a.anderssen@nih.no)

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Author's response to reviews: see over
Dear Dr. Natalie Pafitis

Thank you for giving us the opportunity to re-submit our manuscript “Accelerometer-determined physical activity and self-reported health in a population of older adults (65-85 years): a cross-sectional study”. We wish to thank Reviewer One and Reviewer Two for their thoughtful and insightful comments. We have taken the comments into consideration, and responded to each comment, and made the necessary changes and corrections. In revising the manuscript we have highlighted the changes using track changes mode, in addition to line numbers throughout the manuscript.

The revised manuscript has also gone through proofreading and text editing, and based on this process additional changes have been done.

We hereby hope we have addressed all points to your satisfaction.

Sincerely,

Hilde Lohne-Seiler
Response to Reviewer One and Reviewer Two

All the specific comments from both Reviewer One and Reviewer Two have been addressed. A point-by-point response to each reviewer’s remarks and changes made in the text are listed below.

Response to Reviewer One

Reviewer One’s comments

1). Minor Essential Revisions.

“Page 5; Design: Please, indicate the following information: Number of men and women, reasons for the discrepancy between the number of subjects with informed consent and the final number of subjects in the study.”

Our response:

We have now added information in the revised Method section about the number of women and men, in addition to the reasons for the discrepancy between the number of subjects with informed consent and the final number of subjects in the study (page 5, line 109-113).

2). Minor Essential Revisions continue.

“Methods: Indicate the different age group.”

Our response:

The different age groups are included in the revised Method section (page 5, line 105-106).

3). Minor Essential Revisions continue.

“Page 10, line 16: “Of the waking hours per day, the sample...”. Do you mean ‘whole sample’?”
Our response:

Yes, we mean “whole sample”. Therefore, this is now included in the revised Result section (page 11, line 255).

4). Minor Essential Revisions continue.

“Discussion: this section focuses on the comparisons between the results found in this study and those found in previous research; however, I miss more novel information (explanations) for these results. This section should be improved.”

Our response:

The comment is acknowledged, and we have tried to present some possible explanations in the revised Discussion section (page 13, line 294-296).

5). Minor Essential Revisions continue.

“Page 12, line 3: Authors state that the differences between this study and others may be due to the use of accelerometers to quantify physical activity; however, studies 10, 13, 14, 15, 16… use the same type of methodology.”

Our response:

The comment is acknowledged, and we have tried to elaborate this in the revised Discussion section (page 13-14, line 300-308). We have also added a new reference (Anderssen et al., 2008: reference number 41) in the revised Discussion section (page 13, line 303) and in the reference list (page 25, line 589-591).

6). Minor Essential Revisions continue.

“Page 13, line 1: “then” >>> “than”.

Our response:

This has been done (see revised Discussion section page 15, line 331).
7). Minor Essential Revisions continue.

“Page 14, lines 5-8: Consider this: “It is important to maintain PA levels as long as possible in order to provide better health, quality of life, and thereby prolonged independence”.

Our response:

We have added some considerations to the sentence above in the revised Discussion section (page 19, line 432-435).

8). Minor Essential Revisions continue.

“Page 15: I consider that “self-reported height and body mass” are also limitations of this study.”

Our response:

This comment is acknowledged, and we have added “self-reported height and body mass” as a limitation in the revised Discussion section (page 18, line 422-423).

Response to Reviewer Two

Reviewer Two`s comments

1). Major Compulsory Revisions.

“The analyses require some clarification. Paragraph 3 of the statistical analysis section refers to univariate analyses but then adds that test centre, age, BMI and self-reported health were treated as confounders. No further mention is made of adjustment for these confounders although tables 2 and 3 state that analyses were adjusted for test centre. It is necessary to clarify which of these potential confounders were adjusted for in each set of the analyses (clearly age would not have been included in the age group analyses)”.

Our response:
We have now tried to clarify which of the potential confounders were adjusted for in each set of the analyses in the revised Method section (page 9, line 184-189).

2). Major Compulsory Revisions continue.

“I am concerned that the possible effects of differences in accelerometer wear time have not been considered, as this is not reported. Failure to account for such differences can lead to a number of problems with the interpretation of the data. Minimum wear time for inclusion was 10 hrs although it seems unlikely that a 10 hr period would capture all waking time in this population, meaning that some activity (before they put the monitor on, after they took it off and before the went to bed or at other points during the day for i.e. before or after water based activities) will not have been measured. It is reported that wear time (mean 14 SD 1.2hrs) within the sample was variable but it is not clear whether wear time varied significantly between age groups or between genders. Without knowing this it is possible that the observed differences in physical activity may simply reflect differences in wear time between groups. For example the statistically significant (23 minute) difference in sedentary time between men and women in the youngest age group could possibly be due to men wearing the monitor for a longer period (i.e. having more measured behaviour) than women, rather than a true difference in sedentary behaviour. This is also particularly important when considering the percentage of wear time spent at different activity intensities or overall daily counts per minute as these values are a functions of daily wear time. Two people could record 60 minutes of sedentary behaviour but if one wore the accelerometer for 10 hrs and one wore it for 15 hrs their percentage sedentary time would be different (10% vs #7%) even though the absolute values are the same. One way to address this would be to formally test for between group differences in accelerometer wear time. Another way would be to adjust the between group analysis for wear time (minutes/per day).”

Our response:

To address the Reviewer’s comment we have analyzed whether wear time (the number of valid minutes per day) vary across sex within age groups and across age groups. No significant differences between sexes and age groups regarding accelerometer wear time were registered. The outputs across sex within age groups were (analysis based on Student’s t-test for independent sample): 65-69 yr 840.6 ± 15.4 (SEM) sec and 842.4 ± 17.4 sec (p=1.0), for
women and men respectively, 70-74 yr 840.2 ± 7.6 sec and 837.6 ± 8.4 sec (p=1.0), for
women and men respectively, 75-79 yr 845.6 ± 16.8 sec and 851.9 ± 19.0 sec (p=1.0), for
women and men respectively, 80-85 yr 850.2 ± 28.4 sec and 809.9 ± 34.7 sec (p=1.0) for
women and men respectively. The outputs across age groups were (analysis based on
Univariate analysis of variance with Bonferroni adjustments): 65-69 yr* 840.9 ± 11.7 sec, 70-
74 yr* 838.6 ± 5.7 sec, 75-79 yr* 849.8 ± 12.7 sec, 80-85 yr* 833.6 ± 22.3 sec. *p=1.0
between age groups.

Based on this, we assume that the observed differences in i.e. time spent being sedentary,
reflect real differences and not differences in wear time. We have added these reflections in
the revised Discussion section (page 18, line 415-419).

3). Major Compulsory Revisions continue.

“The tables require further information and clarification. The study reports significant
differences between age groups in overall physical activity level (counts per minute) and in
steps per day although no significant differences are reported in table 2. These are only
described in the text. Table 3 highlights the differences between sex within age groups but
does not report the between age group differences (again these are only described in the text).
The foot notes in the tables should describe any covariates included in the model, as
described above it is not clear what has been included. Tables 2 and 3 report 95% confidence
intervals differently. An example from table 2 is ‘-25-52’ while in table 3 these are reported
as ‘-42.9 to -3.3’. These should be consistent. I would suggest using the format in table 3, as
when reported as in table 2 it is unclear whether the upper limit of the confidence interval is
positive or negative (and therefore whether the 95% CI includes zero).”

Our response:

All the significant differences seen in Table 2 and Table 3 have now been reported in the
revised tables after the Reviewer’s request. The footnotes in Table 2 and the footnotes in
Table 3 are now describing the covariates that have been included in the model in the revised
tables. 95% confidence intervals are now reported in a consistent way in Table 2 and in Table
3 in the revised tables.
4). **Major Compulsory Revisions continue.**

“Are all participants retired from full or part-time employment? This is not clear from the methods section (though in the discussion [paragraph 8] it describes a period ‘following retirement to 85yrs’). Comparisons are made across age groups using data from individuals with at least 4 days of accelerometer wear. Physical activity is then averaged across these days. If some of these participants (most likely those in the youngest age group) are still employed then the number of working/non-working days included in the will affect their computed average activity levels. For example, if their occupation involves walking or any physical work and their physical activity measurement period includes only working days then their measured activity level may be higher than someone whose measurement period includes non-working days (where they may be less active). This may be a possible contributor to the finding that younger people have a higher activity level. It is therefore necessary to clarify whether any of the participants were employed or whether they were all retired (and therefore this study only considers leisure-time activity).”

**Our response:**

Acknowledged. The participants recorded through questionnaire if they were retired or in part-time/full-time employment and this is included in the revised Method section (page 8, line 168-169). Further, this information is presented in the revised Result section (page 9, line 203-207). These aspects have also been taken into consideration in the revised Discussion section (page 16, line 368-376).

5). **Major Compulsory Revisions continue.**

“Did the final sample of 560 who were included in the analysis differ from 628 who provided informed consent (in terms of age, gender, education level, BMI and perceived health)? Drop out analysis is mentioned very briefly in the discussion (paragraph 11) where it states that ‘responses varied according to sociodemographic variables’ although it is unclear which sociodemographic variables are being referred to and how they differed between those included and those not included in the analysis. As these factors may influence physical activity and sedentary behaviours it is important to test and report this. This should be
reported at the beginning of the results section and the discussion section could include further comment on how the inclusion criteria (4 valid days at 10 hrs) might have influenced the findings.

Our response:

Of the 628 who provided informed consent, 37 individuals did not return any data. Unfortunately, we cannot say whether these 37 individuals differed from the rest of the sample regarding anthropometrical data and socioeconomic status because we don’t have this information. However, there were no statistically significant differences between those included in the analysis and those not included in the analysis due to insufficient accelerometer wear time, on neither of the mentioned variables (age, sex, level of education, body mass index, or level of perceived health). This information is now included in the revised Result section (page 10, line 211-213). We have also added some more information to the drop-out analysis in the revised Discussion section, and according to the socio-demographic variables we are referring to the study by Hansen et al., 2012 (reference number 23 in the manuscript) (page 17, line 399-402).

6). Minor Essential Revisions.

“In paragraph 5 of the methods section (‘other variables’) the explanation of the computation of BMI is missing a few words. Presumably it should read ‘body mass (kg) divided by height in meters squared’.

Our response:

We have made the necessary corrections in the revised Method section (page 7, line 154).

7). Minor Essential Revisions continue.

“In paragraph 3 of the results section we are directed to table 3 for description of analyses of sex differences in steps per day. These are actually in table 2.”

Our response:

We have made the necessary corrections in the revised Result section (page 11, line 234).
8). Minor Essential Revisions continue.

“In general I feel that there are a number of sections where paragraph and sentence structure require attention as they are a bit muddled and unclear. An example is paragraph 9 in the discussion section: ‘Of the few studies available, a study mentioned above targeting community dwelling people in the UK from 65 yrs and older’. There are also quite a few typographical and grammatical errors. I would suggest that it is important that the authors go through the manuscript thoroughly in order to address these and improve the paper’s readability.”

Our response:

The revised manuscript has been carefully proofread and hopefully improved.

9). Discretionary Revisions.

“In the methods section I feel it would be of benefit to add to the description of the difference between low-intensity and lifestyle physical activities. Examples are given for lifestyle activity although none are given for low intensity activity. It seems that these are defined purely by accelerometer defined activity intensity rather than using any descriptive or contextual information on the actual activity. It would be useful to clarify what sort of activities might be considered low intensity as opposed to lifestyle activities and why you decided to examine these separately instead of using ‘light intensity activity’ (i.e. all activity between sedentary and moderate intensity).”

Our response:

We have included what kind of activities that is considered as low-intensity activity, in addition a reference (reference number 18 in the manuscript) is added to the definition in the revised Method section (page 6-7, line 135-137). We decided to examine low-intensity activity and lifestyle physical activity separately in order to make our data directly comparable to the data presented by Hagströmer et al. (2010, reference number 15 in the manuscript).

10). Discretionary Revisions continue.
“Was the self-reported perceived health scale condensed from 5 categories to 4? Very good and good are separate categories while poor/very poor are combined. I can assume by looking at the tables that this may have been due to low numbers in the ‘poor’ and ‘very poor’ groups although if this is the case it should be explained in the methods section.”

**Our response:**

It is correct that self-reported perceived health scale was condensed from five to four categories. “Very good health”, “good health” and “either good or bad health” were kept in separate categories, while “poor health” and “very poor health” were combined into one category “poor/very poor health”. This was due to the low numbers in the “poor” and “very poor health” groups. This information is now included in the revised Method section (page 7-8, line 158-162).

11). Discretionary Revisions continue.

“In the Statistical analysis section it is stated that Pearsons chi-square analyses were used to identify differences between the sexes in PA recommendations. Do you mean in the proportion of people from each sex who adhered to the current physical activity recommendations? This needs to be clearer.”

**Our response:**

We have clarified this comment in the revised Method section (page 8, line 178-179).

12). Discretionary Revisions continue.

“Paragraph 1 of the results section reports physical characteristics of the study sample. This information is repeated in table 1 and is not necessary in the text as well. This paragraph also details the most frequently reported diseases and conditions and most frequently reported activities. I am not sure what this information adds to the paper and feel that it could be removed. It is not included in the analyses and doesn't seem very relevant to the two main research questions which were to describe accelerometer defined physical activity and to investigate associations between overall physical activity level and self-reported general health.”
Our response:

We agree with the Reviewer’s comment regarding the information about the most frequently reported diseases/conditions and the most frequently reported activities doesn’t seem relevant to the two main research questions. We have therefore deleted this information in the revised Result section (page 9, line 200-203). As a consequence we have also deleted this information in the revised Method section (page 8, line 164-168). We have decided to keep the information about the participants’ education level in the Result section, since we are focusing on the overall sample in the text and not on the separate sexes as it is presented in Table 1.

13). Discretionary Revisions continue.

“I don’t feel that the description of table 2 in the results section (‘the PA variables are presented in table 2’) is sufficient. It should describe which outcome variables are presented and how (i.e. across sex and age categories).”

Our response:

Overall PA in cpm and steps per day across age and sex is now added to the description of Table 2 in the revised Result section (page 10, line 215).

14). Discretionary Revisions continue.

I feel that the results section needs be more coherent. There are a range of results to describe and therefore it is important that they are in a clear and logical order. Perhaps the use of subheadings to make a clear separation between description of results from each outcome measure may be of benefit. I think describing the results in a consistent order would also help. In paragraph one (overall PA level) age group analysis is presented before gender analysis and then in paragraph 2 (steps per day) the gender analysis is described first. Also, in paragraph 4 no mention is made of any gender differences in adherence to physical activity recommendations although these are noted in the table.”

Our response:
In order to keep the results in a clear and logical order we have now included subheadings, in addition to some revision work in paragraph one, two and four after the Reviewer Two’s request. We have organized the different paragraphs so the age group analysis is presented before the sex group analysis, and in paragraph four we have added sex differences in adherence to physical activity recommendations. See the revised Results section (page 9-12).

15). Discretionary Revisions continue.

“In paragraph 2 of the results section I would suggest adding to the two sentences describing the age by gender analysis of sedentary time and low-intensity PA so it is clearer which figures refer to which groups. There is also no mention in this section of any (or the absence of) significant between group differences in lifestyle physical activity.”

Our response:

This has been done in the revised Result section (page 11, line 241-251).

16). Discretionary Revisions continue.

“Paragraph 1 of the discussion section only refers to overall physical activity level and general health analysis. I’d suggest that this paragraph briefly summarizes all of the principle findings including the between group differences in intensity specific physical activity.”

Our response:

The between group differences in the intensity specific physical activity categories are no included in the first paragraph of the revised Discussion section (page 12-13, line 278-282).

17). Discretionary Revisions continue.

“Paragraph 3 of the discussion section refers to’ light intensity activities’ which have previously been described as either low intensity or lifestyle activities. This should be consistent throughout.”

Our response:
We have gone through all the sections and provided that “low-intensity PA” is used in a consistent way throughout the revised manuscript. “Light intensity activities” is now corrected to “low intensity activities” in the revised Discussion section (page 13-14, line 305-307).

18). Discretionary Revisions continue.

“Paragraph 4 of the discussion section could do with reordering slightly for better flow. It begins to make a point about health consequences of sedentary behaviour then moves on to interventions, then returns to health consequences of sedentary behaviour.”

Our response:

We agree and have therefore done some reordering for the purpose of getting a better flow in the revised Discussion section, paragraph four (page 14, line 312-324).

19). Discretionary Revisions continue.

“Paragraph 6 of the discussion section (relating to the steps per day analysis) is too brief. It states that these results are in accordance with some other studies but does not give any details of their findings or possible differences in the age groups examined or methodologies used. Are the findings exactly the same? Is the magnitude of the difference the same? In the same age groups? Using the same methodology?”

Our response:

We agree with the Reviewer that paragraph 6 in the Discussion section is too brief. We have therefore added more information to this paragraph in the revised Discussion section by giving more details to the referring studies (page 15, line 339-346).

20. Discretionary Revisions continue.

“Paragraph 9 of the discussion section compares the findings with a study examining associations between steps per day and self-reported health. It seems strange to compare the
present findings relating to PA level (in cpm), with those from a previous study examining steps per day, when steps per day were also measured here. Was this association examined?”

Our response:

The association between self-reported health and steps per day has now been examined. There were no differences between the groups regarding steps per day. This information has been included in the revised Discussion section (page 17, line 383-384).

21). Discretionary Revisions continue.

“In any study using accelerometers to define physical activity the use of minimum wear time criteria is a limitation as it can lead to some measureable activity not being included in the analyses. Examining a 10 hr period (the minimum in this case) of a person’s day by definition excludes all time outside of this period (and as described previously it seems unlikely that 10 hrs represents all waking hrs in this population). As certain behaviours may be more likely to occur at certain times of the day (for example people may be more likely to engage in sedentary behaviours before they go to bed) the start and finish time of their measurement period will affect which behaviours are captured. Without 24 hour measurement this is very difficult to account for but should be acknowledged as a limitation.”

Our response:

We agree with the Reviewer’s comment and reflections about the use of accelerometer and possible limitations related to wear time. Ideally, a 24 hour protocol is used however this is not feasible using hip-worn accelerometers. Furthermore, we agree in the comments regarding a 10 hours/day limit for including an individual’s accelerometer data, however the sample was compliant to the accelerometer protocol with a mean wear time of 14.0 hours per day. We have acknowledged these reflections as a limitation in the revised Discussion section (page 18, line 415-419).