**Reviewer’s report**

**Title:** A novel integrative procedure for identifying and integrating three-dimensions of objectively measured free-living sedentary behaviour

**Version:** 1 **Date:** 03 Jul 2017

**Reviewer:** Tasuku Terada

**Reviewer’s report:**

This study investigated the differences and associations between sedentary time estimated by using SWA, ActivPAL, and the combination of the two devices. The Pearson correlation analysis showed significant but varying degrees of associations in sedentary time quantified by the three methods, whereas ANOVA showed significant differences in sedentary time estimated by the three methods. The manuscript is well written and is easy to follow. The reviewer has several suggestions to potentially improve the manuscript.

Major comments: It is not clear why correlation analyses are important. All three measures are estimating sedentary time. It is no surprise that they show significant correlations. Significant correlation does not seem to add much to the outcomes when ANOVA is showing significant differences between the measures. In this sense, analysis like bland-Altman plots may be more important as they provide information on a systematic bias and limits of agreement. Without a criterion measure, this may be a better approach to examine the similarity/difference between the measures.

Specific comments:

**Title:**

The title may need to be modified to more clearly represent the study. It is not clear what the authors mean by "characterizing three-dimensions of sedentary time". The study is aiming to quantify sedentary time by combining two objective measures. I don't think it is characterizing sedentary time.

**Abstract:**

It is a little confusing to have both SB and SED when the difference between the two is not clearly addressed. For example, in line 40, the authors stated that three SB measures were correlated. Are the authors really talking about sedentary behaviour or sedentary time?

Conclusion seems somewhat weak. It is certainly possible to combine information obtained from the two monitors and come up with sedentary time. More important question that needs to be addressed is how it is different from the other measures and what it implies.
Introduction:

Introduction is relatively clear. However, in line 112, the authors stated the purpose of the study was to characterise sedentary behaviour (SB). What does it mean to characterise SB? SB has already been characterised by the Sedentary behaviour Research Network. Based on this information, the authors estimated sedentary time by combining two objective measures. Two objective measures do not characterise SB.

Methods:

was the minimum wear time 5 or 6 days?

Lines 233-234. Pearson correlation may not add much information. The three methods are all targeting to quantify sedentary time. It is no surprise they are significantly correlated. In addition, the AP measure depended on SWA to determine waking period and integrated methods relied measures from both SWA and AP. These facts would probably increase the correlations between the methods. If the authors are to keep correlation analyses, the outcomes need to be explained in light of significant systematic differences shown by ANOVA.

Lines 234-236. This can be better represented by difference analysis, such as Bland-Altman plots.

Results:

Lines 249-250. The association was weakest between SWA and AP. However, the systematic difference was the greatest between SWA and INT. This partially explains the shortcoming of correlation analysis. In addition, overestimation of sedentary time by SWA was expected if the device categorises any activity >1.5 METs. However, r=0.37 is very low considering both devices are quantifying the same activity. More explanation is warranted in the discussion section.

Discussion:

There were significant differences in sedentary time between the methods used. Additionally, there were also large variability in correlation measures. This should be expanded in the discussion section.

Conclusion:

The first sentence of conclusion needs to be strengthened.
Minor comments:

Abstract:

Line 26, add "simultaneously"

Abbreviations, such as SEDSWA, SEDAP, and SEDINT need to be defined when they first appear.

Introduction:

Line 88. estimate sleep time or duration?

Line 99. accurately "and simultaneously"

Lines 103-105. This sentence needs to be corrected.

Lines 105-107: Both ActiGraph and AP have been used under free-living conditions. It is not clear why they are suited to laboratory based research but not free-living conditions.

Methods:

Line 133. Was free-living sedentary behaviour measured?

Line 139. If PA diary was completed for the purpose of the other study and has nothing to do with this study, it may be better to be excluded to avoid confusion.

Line 153. What is nitrite sleeve?

Line 165. Activity intensity was >1.5 METs.

Lines 185-186. What does "condensed from 15 sec to 60 sec" mean?

Results: remove parentheses or ±.

Line 264. Isn't p=0.04 significant?

Discussion:

Lines 293-295. This is unnecessary sentence. The ability of SWA and AP to determine sedentary time had already been demonstrated.
Conclusion:

Lines 335-336. I do not think "phenomenon" is the right word.

Figures:

Abbreviations need to be defined in the legends.

**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.

No

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

If not, please explain in your comments to the authors.

Yes

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

If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

**Quality of written English**

Please indicate the quality of language in the manuscript:

Acceptable

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