

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Patterns of objectively-assessed sedentary time and physical activity among Japanese workers: a cross-sectional observational study
AUTHORS	Kurita, Satoshi; Shibata, Ai; Ishii, Kaori; Koohsari, Javad; Owen, Neville; OKA, Koichiro

VERSION 1 – REVIEW

REVIEWER	Jennifer L. Gay Associate Professor University of Georgia, United States of America
REVIEW RETURNED	09-Apr-2018

GENERAL COMMENTS	<p>Overall this is a well-written manuscript, that addresses a need for studies outside the western hemisphere, and to confirm (or not) the self-reported physical activity data by domain. A few suggested edits are provided below.</p> <p>The introduction focuses almost entirely on sedentary behavior even though the methods and results include both physical activity and sedentary behavior.</p> <p>The small cell size for physical labor in full-time workers precludes inference. Recommend tempering the results and discussion accordingly.</p> <p>I found the results pertaining to hourly patterns to be the most interesting, and the most novel. However, there was not much discussion of this point, in the abstract, or as a highlight. The hourly patterns also lend themselves to intervention development; considering the timing of work-based physical activity interventions can be informed by these results.</p>
-------------------------	--

REVIEWER	Francois Fraysse University of South Australia, Australia
REVIEW RETURNED	14-May-2018

GENERAL COMMENTS	<p>This is a well designed and well written study, which I believe makes a significant contribution to the field.</p> <p>The Methods section I believe needs more refining, in particular the following points:</p> <ol style="list-style-type: none">1. Page 7 lines 10-18: were these variables self reported? In particular, was “main occupational activity type” self reported or derived from occupation data?2. How were the work hours obtained? Was that part of the self reported data? Overall, content of self-reported data needs more
-------------------------	--

	<p>detail. Did participants report their working hours daily? What about sleep?</p> <p>3. Did you assume the device was taken off just before bed time and put back on the next morning straight after get up time? If not, you may potentially be missing some of the daily wake activity before and after bed time. It would be worth mentioning this and/or giving more details.</p> <p>4. Page 7 lines 50-54: I believe the thresholds for sedentary / LPA / MVPA are inaccurate, they should be ≤ 1.5, $1.5 < LPA \leq 3$ and $MVPA > 3$. Otherwise there's no activity corresponding to 1.5-1.6 and 2.9-3 METs.</p> <p>5. –Page 7 lines 56: The definition for “breaks in sedentary bouts” is odd, if we take what you have written literally it would mean all non sedentary time is a break in sedentary bouts. On the same vein, how can there be 9-11 breaks per sedentary hour (table 1) if the minimum length of a sedentary bout is 30min? Please describe more carefully what constitutes a “break in sedentary bouts”.</p> <p>Regarding results:</p> <p>6. Table 1: the percentages in parenthesis refer to the % for the given occupational activity type which seems odd. Moreover, for most of the variables presented I do not think these percentages bring much usefulness. You could consider removing these for legibility.</p> <p>7. Table 1: I would strongly recommend removing the last section of the table presenting summary physical activity measures. Keep table 1 limited to demographics data, and present physical activity results separately (which you do in table 2). The asterisks including statistical significance for this section of the table are also unclear: do they mean all physical activity variables were significant, or at least one of them? Finally, some of the physical activity percentages in that section of the table do not add to 100% (“sitting” adds to 100.1 and “physical labor” to 99.9%).</p> <p>8. Table 1: the “physical labor” group comprises 11 participants but the “occupation” data only sums to 10 for that group.</p> <p>For Discussion:</p> <p>1. P15 lines 49 to end of paragraph: these sentences are oddly worded.</p> <p>2. Limitations: the “sitting” occupational activity group was by far the largest, and the “physical labor” group was very small (n=10). I would question the significance of comparisons between that latter group and the others. This needs to be stated in Limitations.</p> <p>Other comments:</p> <p>I would recommend removing all data related to part time workers. You only present figures and tables for these without discussing any results. Part-time worker data does not bring any value to your study and as such I would suggest removing any results pertaining to this group.</p> <p>I would like to commend the authors on presenting the daily activity data for the different occupational groups (Figure 1). This is a very nice and intuitive way of visualising results.</p>
--	--

REVIEWER	Anna Pulakka Department of Public Health, University of Turku, Finland
-----------------	---

GENERAL COMMENTS

This article presents objective measured patterns of sedentary behaviour and different levels of physical activity in different occupational groups in Japan. Although daily activity patterns have been studied earlier, there are no studies presenting them in different occupational groups or from Japan, thus this article adds to the current knowledge. The article is mainly clearly written but I have a few comments.

1. The introduction focuses almost solely – and discussion for the most part - to sedentary behaviour, although results are presented of physical activity also. To make the article more coherent, I would suggest to add previous literature on physical activity patterns to the Introduction or then remove the results related to physical activity.

2. Introduction, page 4, lines 19-23: what does this sentence mean? Are all the employed people (60% of the population) employed full time?

3. Methods, page 6, lines 45-47: is the accelerometer valid for measuring MVPA?

4. Related to the previous point, page 7, lines 22-56: the accelerometer estimates are presented in terms of METs. What is the criterion measure against which the accelerometer was validated to measure METs?

5. Page 7, lines 13-18: could the authors elaborate a bit more on how the occupational activity type groups were formed? What does it mean that they were referenced to the Japanese standard classification of occupations? Does this classification include information on the typical activities in each occupation?

6. Page 8, line 31 and page 9, line 23: what were the sociodemographic variables that were used as covariates?

7. Results: generally, the authors want to highlight the differences between the occupational activity types in the text, which is a justified comparison. However, it is difficult to see the differences in sedentary time and activity patterns between the occupational types as each occupational type is presented in its own figure. At the minimum, adding confidence intervals to the figures might help in comparing different occupational activity types.

8. Page 11, lines 24-31: these are examples of confusing sentences in the results. The results section would benefit from some clarification as to which groups are compared and in what time frame.

9. Page 11 of the Results section: the authors use terms “descriptive and statistical differences”. What do they mean by those? Does “descriptive” mean a difference which is not statistically significant? I would be easier for the reader if the authors used standard terminology.

10. In the additional analyses including only part-time workers, the “physical labor” group had only one participant. I think the information from that one participant can be either excluded from the results or the walking and physical labor groups could be combined for those analyses.

11. Table 2 is missing the heading for occupational activity types, which makes headings for “sitting”, “standing” etc. difficult to understand. In addition, could the authors explain why they use standard deviations for the sedentary and PA levels for the total sample and confidence intervals for occupational activity types in tables 2, S1 and S2?

12. Discussion, page 15, lines 23-29: does this sentence refer to non-working days?

	<p>13. It would be good to mention limitations of the accelerometer measurement in the discussion.</p> <p>14. English is mainly fluent but would probably benefit from language editing at time, e.g. page 6, lines 8-9 and page 8, line 37. Furthermore, some of the terms are used inconsistently, e.g. “occupational activity type”, occupational-activity type”, “physically active job type”, “job type”, “job involving sitting/standing/walking/physical labor”, “occupational task group” etc.</p>
--	--

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Overall this is a well-written manuscript, that addresses a need for studies outside the western hemisphere, and to confirm (or not) the self-reported physical activity data by domain. A few suggested edits are provided below.

Thank you for this positive assessment and your constructive comments.

1-1. The introduction focuses almost entirely on sedentary behavior even though the methods and results include both physical activity and sedentary behavior.

Thank you. Following this comment, we can see that we were not sufficiently clear about the aim and context of the study. The main focus of this study is sedentary behavior. We have now included a statement in the *Introduction* section addressing the links between sedentary behavior and physical activity. We now aim to explain more explicitly that there are distinct health consequences of sedentary behavior, light-intensity physical activity (LPA), and moderate-to-vigorous physical activity (MVPA), with the context being here that the time available in a day for these behaviors is finite, such that time in sedentary behavior can lead to less time in LPA, MVPA, or both. We aimed to examine whether these patterns would be different among occupational activity types during working and outside working-time or if sedentary behavior and physical activity patterns during working time would influence with those in leisure time. Such information can provide clues on what might be more preferable and realistic approaches to reducing workers’ sedentary time. We have now elaborated this perspective in the Introduction section.

<p><u>Introduction (page5 line 106-116)</u></p> <p>Although there are distinct health consequences of sedentary behavior, light-intensity physical activity (LPA), and moderate-to-vigorous physical activity (MVPA) [21,22], the time available for each of them in a day is finite. More time spent in sedentary behavior indicates less time spent in LPA, MVPA, or both, indicating that these behaviors are linked. Thus, it may be important to examine patterns of not only sedentary behavior, but also LPA and MVPA concurrently. A small number of previous studies has simultaneously examined</p>

sedentary and active behavior patterns during working and leisure-time [9, 12-15, 17, 18]. However, little is known about how different the patterns or relationships between sedentary behaviors and physical activities during working and leisure-time would be between those in types of occupations with different activity requirements.

1-2. The small cell size for physical labor in full-time workers precludes inference. Recommend tempering the results and discussion accordingly.

Thank you. As suggested, we have acknowledged this issue as a limitation in the *Discussion* section.

Discussion (page 17 line 424-428)

Third, the response rate was relatively low. Our middle-aged participants were recruited initially by random sampling, which may have introduced some sampling bias; only 10 were recruited whose jobs involved physical labor. Therefore, the findings may not be generalizable to the broader middle-aged worker population, in particular to those whose jobs involve physical labor.

1-3. I found the results pertaining to hourly patterns to be the most interesting, and the most novel. However, there was not much discussion of this point, in the abstract, or as a highlight. The hourly patterns also lend themselves to intervention development; considering the timing of work-based physical activity interventions can be informed by these results.

Thank you for this excellent observation. As suggested we have added a point on hourly patterns to the *Strengths and limitations* section. Regarding timing of work-based physical activity intervention, it would effectively be another paper if we were to do so because our main focus is sedentary behavior. However, to address this comment, we have now acknowledged it as a topic for future studies.

Strengths and limitations of this study (page 3 line 57-58)

- Examination of hourly patterns of sedentary behavior and physical activity was novel.

Discussion (page 16 line 412-414)

Future intervention studies are necessary to clarify spreading effects whether promoting breaking behavior by LPA on working-hour may transfer to leisure-time behavior and activity. The hourly patterns for LPA and MVPA would also be useful to consider in relation to the timing of workplace physical activity interventions, which is fruitful as a future research topic.

Reviewer: 2

This is a well-designed and well written study, which I believe makes a significant contribution to the field. The Methods section I believe needs more refining, in particular the following points:

Thank you for the positive assessment and your constructive comments.

2-1. Page 7 lines 10-18: were these variables self reported? In particular, was “main occupational activity type” self reported or derived from occupation data?

As the Reviewer correctly pointed out, all variables described in “Socio-demographic data and occupational type” were self-reported. Occupational activity type was separately and independently obtained from occupation. We have modified the description in the socio-demographic data and occupational activity type subsection in the *Method* section to clarify these points.

Methods (page 7 line 190-195)

Socio-demographic data and occupational activity type

Age and gender were obtained from the basic resident register. Height, weight, educational level (university or further education; high school or less), marital status (currently married; single), employment status (full-time; part-time), occupation (professional and engineering; administrative and managerial; clerical; sales; service; security; agricultural, forestry and fishery; transport and machine operation; manufacturing process; others) were self-reported in questionnaire. Main occupational activity type was also self-reported. Participants were asked to choose the occupational activity type that most accurately described their work from the following 4 categories: sitting, standing, walking, and physical labor. Body mass index (BMI) was calculated from self-reported height and weight. Occupations were referenced to Japanese standard classification of occupations [27].

2-2. How were the work hours obtained? Was that part of the self reported data? Overall, content of self-reported data needs more detail. Did participants report their working hours daily? What about sleep?

Thank you. We have added information about how work-hours were obtained in the *Method* section.

Methods, Study design and procedure (page 6 line 157-160)

Participants were guided to wear the accelerometers during waking time (put it on straight after getting on) and to remove them during sleeping (take it off just before going to bed) and

water-based activities such as bathing or swimming. In addition, participants were asked to record for every day during the period of accelerometer wear, their time getting up, putting on the accelerometer, leaving home to travel to their workplace, starting their job, finishing their job, arriving at home, taking off the accelerometer, and going to bed.

Methods, Data management (page 8 line 211)

The data were extracted according to the following four time periods: working-hours (from starting to finishing job on work day), non-working hours (from wearing accelerometer to starting job and from finishing job to taking off accelerometer on work day), working day (a sum of working and non-working hours), and for non-working days (from wearing to taking off accelerometer). Work-hours were obtained from the activity diary.

2-3. Did you assume the device was taken off just before bed time and put back on the next morning straight after get up time? If not, you may potentially be missing some of the daily wake activity before and after bed time. It would be worth mentioning this and/or giving more details.

Thank you. As the Reviewer correctly assumed, we asked the participant to put the accelerometer straight after they get up (get out of bed) and take it off just before they go to bed. We have added the detailed information regarding instruction of the timing when participants should wear the accelerometers in the *Method* section.

Methods, Study design and procedure (page 6 line 154-157)

Those who finally agreed to participate were asked to sign the consent form, wear the accelerometer and record the activity diary for 7 days, respond to the questionnaire, and then return all of these within two weeks. Participants were guided to wear the accelerometers during waking time (put it on straight after waking up) and to remove it during sleeping (take it off just before going to bed) and during water-based activities such as bathing or swimming.

2-4. Page 7 lines 50-54: I believe the thresholds for sedentary / LPA / MVPA are inaccurate, they should be ≤ 1.5 , $1.5 < LPA \leq 3$ and $MVPA > 3$. Otherwise there's no activity corresponding to 1.5-1.6 and 2.9-3 METs.

Thank you for pointing out this omission. We have modified the statement, accordingly.

Methods, Data management (page 8 line 217-219)

The five measures of sedentary behavior and physical activity were first extracted for each time segments: total sedentary time (min/day; % of wear time), sedentary time accumulated in prolonged sedentary bouts (% of wear time), number of sedentary breaks (times/sedentary hour), and LPA (% of wear time) and MVPA (% of wear time). Total sedentary time, LPA

time, and MVPA time were defined as all wearing time for any activity with an accelerometer-estimated intensity of ≤ 1.5 METs, $1.5 <$ and < 3.0 METs, and 3.0 or more METs, respectively.

- 2-5. Page 7 lines 56: The definition for “breaks in sedentary bouts” is odd, if we take what you have written literally it would mean all non sedentary time is a break in sedentary bouts. On the same vein, how can there be 9-11 breaks per sedentary hour (table 1) if the minimum length of a sedentary bout is 30min? Please describe more carefully what constitutes a “break in sedentary bouts”**

Thank you for your comment. We agree that our initial description of breaks in sedentary behavior was rather brief and caused confusion. We have now expanded on and clarified the relevant description.

Methods, Data management (page 8 line 214-226)

The five measures of sedentary behavior and physical activity were first extracted for each of the time segments: total sedentary time (min/day; % of wear time), sedentary time accumulated in prolonged sedentary bouts (% of wear time), number of sedentary breaks (times/sedentary hour), and LPA (% of wear time) and MVPA (% of wear time). Total sedentary time, LPA time, and MVPA time were defined as all wear time for any activity with an accelerometer-estimated intensity of ≤ 1.5 METs, $1.5 <$ and < 3.0 METs, and 3.0 or more METs, respectively. A sedentary bout was defined as a period of uninterrupted sedentary time [1]. Total sedentary time was calculated by a sum of uninterrupted sedentary time lasting ≥ 1 minutes. A prolonged sedentary bout was defined as a period of uninterrupted sedentary time lasting ≥ 30 minutes [1]. Sedentary time accumulated in prolonged bouts was calculated as the sum of prolonged sedentary bouts (% of wear time). A sedentary break was defined as a non-sedentary bout in between two sedentary bouts [1]. The number of sedentary breaks was calculated by the total number of sedentary breaks divided by time spent in all sedentary behavior.

The Results section

- 2-6. Table 1: the percentages in parenthesis refer to the % for the given occupational activity type which seems odd. Moreover, for most of the variables presented I do not think these percentages bring much usefulness. You could consider removing these for legibility.**

Thank you for this helpful observation. We have modified the Table 1 accordingly.

- 2-7. Table 1: I would strongly recommend removing the last section of the table presenting summary physical activity measures. Keep table 1 limited to demographics data, and present physical activity results separately (which you do in table 2). The asterisks including statistical significance for this section of the table are also unclear: do they mean all physical activity variables were significant, or at least one of them? Finally, some of the physical activity percentages in that section of the table do not add to 100% (“sitting” adds to 100.1 and “physical labor” to 99.9%).**

Thank you. As suggested, we have removed the last section of the Table 1, and moved the characteristics of sedentary behavior and physical activity to the Table 2. We have also clarified the results of the statistical analyses for both Tables 1 and 2.

2-8. Table 1: the “physical labor” group comprises 11 participants but the “occupation” data only sums to 10 for that group.

Thank you. The missing data for each sociodemographic attribute has been noted at the footnote of the Table1.

The Discussion section

2-9. P15 lines 49 to end of paragraph: these sentences are oddly worded.

Thank you. The statement has been revised accordingly.

Discussion (page16, line 407-412)

Similarly, the previous study in French working adults using a self-report questionnaire found that the occupational activity levels involved in jobs were negatively associated with leisure time spent sedentary, on both working and non-working days [20]. Future intervention studies could help to clarify whether promoting breaks from sedentary time by more LPA during working hours may influence leisure-time sedentary behavior and physical activity.

2-10. Limitations: the “sitting” occupational activity group was by far the largest, and the “physical labor” group was very small (n=10). I would question the significance of comparisons between that latter group and the others. This needs to be stated in Limitations.

Thank you for your suggestion. The distributions on occupational activity types in this study, in which sitting occupations are the most prevalent, whereas physical labor occupations are the least prevalent, seems to be similar to those in the general Japanese working population. However, those with occupation involving physical labors may have been less likely to have responded our random sampling postal survey, possibly due to lower educational attainment and household income level, or unhealthy behaviors, or bad health status, which can be characteristics of non-responders for health-related surveys. This could lead to selection bias and inaccurate estimation of physical activity and sedentary behavior levels. As suggested, we have added this possibility of selection bias as a limitation in the Discussion section, as described in our response to comments 1-2 above (Discussion; page 17 line 424-428).

Other comments:

2-11. I would recommend removing all data related to part time workers. You only present figures and tables for these without discussing any results. Part-time worker data does not bring any value to your study and as such I would suggest removing any results pertaining to this group.

Thank you for your suggestion. The purpose of this study was to describe the patterns of sedentary behavior and physical activity in working adults. While the number of part-time workers is less than full-time workers, presenting their sedentary and physical activity behaviors patterns may be informative. This is because of the fact that the employment pattern becomes more diversified from life-long employment system in Japan. However, BMJ open recommends our manuscript to do not exceed 4000 words, with up to five figures and tables. Thus, we presented all tables and figures as supplemental materials in our manuscript. Now, we hope that our explanation is enough to keep the results on part-time workers. We would be happy to remove them, if that is considered to be necessary.

2-12. I would like to commend the authors on presenting the daily activity data for the different occupational groups (Figure 1). This is a very nice and intuitive way of visualising results.

We thank the Reviewer for this positive comment.

Reviewer: 3

This article presents objective measured patterns of sedentary behaviour and different levels of physical activity in different occupational groups in Japan. Although daily activity patterns have been studied earlier, there are no studies presenting them in different occupational groups or from Japan, thus this article adds to the current knowledge. The article is mainly clearly written but I have a few comments.

Thank you for this positive assessment and your constructive comments.

3-1. The introduction focuses almost solely – and discussion for the most part - to sedentary behaviour, although results are presented of physical activity also. To make the article more coherent, I would suggest to add previous literature on physical activity patterns to the Introduction or then remove the results related to physical activity.

We appreciate this good point from the Reviewer. Following the similar suggestion from the Reviewer 1 (please see our response to the comment1-1 above), we have revised the *Introduction* section (Introduction, page 5 line 106-116).

3-2. Introduction, page 4, lines 19-23: what does this sentence mean? Are all the employed people (60% of the population) employed full time?

Thank you. We have revised the statement accordingly.

Introduction (page 4 line75)

Among the Japanese adult population, the worksite is a key setting in which to address sedentary behaviors, since approximately 60% of the total population are employed, and 60 % of those employed are full-time workers (>40 hours/week) [8].

3-3. Methods, page 6, lines 45-47: is the accelerometer valid for measuring MVPA?

Thank you. The accelerometer devices used in this study have revealed to be valid for measuring not only sedentary behavior and LPA, but also MVPA. A validation study was conducted against indirect calorimetry¹. To address this comment, we have added more detailed description regarding the validity of this accelerometer device in the *Methods* section.

1. Ohkawara K, Oshima Y, Hikiyama Y, Ishikawa-Takata K, Tabata I, Tanaka S. Real-time estimation of daily physical activity intensity by a triaxial accelerometer and a gravity-removal classification algorithm. *Br J Nutr.* 2011;105(11):1681-1691.

Methods, Assessment of sedentary behavior and physical activity (page 7 line 176-178)

Participants were asked to wear a triaxial accelerometer, Active style Pro HJA-350IT (Omron Health Care Co., Ltd., Kyoto, Japan) on the left side of the waist for seven days. This accelerometer device has been reported to be valid and to accurately assess not only MVPA, but also low-intensity physical activity (including sedentary behavior), in comparison to indirect calorimetry [24, 25].

3-4. Related to the previous point, page 7, lines 22-56: the accelerometer estimates are presented in terms of METs. What is the criterion measure against which the accelerometer was validated to measure METs?

Thank you for your comment. Please see our response to the comment 3-3 above.

3-5. Page 7, lines 13-18: could the authors elaborate a bit more on how the occupational activity type groups were formed? What does it mean that they were referenced to the Japanese standard classification of occupations? Does this classification include information on the typical activities in each occupation?

Thank you for this suggestion. Participants were asked to choose the occupational activity type that most accurately describes from the following 4 types: sitting, standing, walking, and physical labor. As suggested, we have clarified how to obtain the occupational activity type, as described in our response to the comment 2-1 above ([Methods, page 7-8 line 191-196](#))

3-6. Page 8, line 31 and page 9, line 23: what were the sociodemographic variables that were used as covariates?

Thank you. We have elaborated the sociodemographic variables that were used as covariates in the *Methods* section.

Methods, Statistical Analyses (page 9 line 243-244)

Each of the five sedentary and physical activity measures were compared among four occupational activity types in 4 time periods (working hours, non-working hours, working days, non-working days) using Analysis of Covariance (ANCOVA) with Bonferroni post-hoc test, adjusting for gender, age, residential area, educational level, marital status, and BMI.

3-7. Results: generally, the authors want to highlight the differences between the occupational activity types in the text, which is a justified comparison. However, it is difficult to see the differences in sedentary time and activity patterns between the occupational types as each occupational type is presented in its own figure. At the minimum, adding confidence intervals to the figures might help in comparing different occupational activity types.

Thank you for your suggestion. As suggested, we have added the confidential intervals in the Figure1 and Figure S1.

3-8. Page 11, lines 24-31: these are examples of confusing sentences in the results. The results section would benefit from some clarification as to which groups are compared and in what time frame.

Thank you. As suggested, we have modified the description for the comparisons among occupational activity types results and included a new paragraph for each time frame.

Results (page12 line 286-304)

Regarding working hours, those with jobs involving sitting had significantly more total and prolonged sedentary time along with less LPA and MVPA in proportion, and less frequent breaks compared with those with three other more active jobs ($p < 0.01$). The differences in sedentary time between the sitting jobs and the other jobs types on working hours were 17.7–26.4% of wear time. In addition, those with walking jobs had significantly more total sedentary time in proportion than those with physical labor jobs ($p < 0.05$). Also, those with physical labor jobs had significantly more MVPA time in proportion than those with standing and walking jobs ($p < 0.05$).

As a descriptive feature of non-work hours, the more active the jobs in which workers were involved, the more was their proportion of total sedentary time and the less their LPA, except for those with mostly sitting jobs. In large part, the proportions of total sedentary time and LPA in those with sitting jobs were similar to those with the jobs involving physical labor.

The differences reaching statistical significance were as follow: those with standing jobs had proportionally less total sedentary time and more LPA than those with sitting jobs ($p < 0.05$).

Results similar to working hours were found for the total for working days, except for the prolonged sedentary time and sedentary breaks variables; there were no significant differences between those with sitting job and physical labor. The differences in sedentary time between the sitting jobs and the other jobs types on working days were 28.5-42.0% of wear time, respectively. In addition, those with standing job had significantly more LPA time in proportion than those with walking jobs ($p < 0.05$).

On non-work days, there were no significant differences apparent between the four occupational activity types.

3-9. Page 11 of the Results section: the authors use terms “descriptive and statistical differences”. What do they mean by those? Does “descriptive” mean a difference which is not statistically significant? I would be easier for the reader if the authors used standard terminology.

Thank you for your suggestion. Descriptive statistics are typically distinguished from inferential statistics (the latter is often expressed with “statistical significance”). Reporting the differences in pattern of sedentary behavior and physical activity using descriptive statistics may be appropriate. Following this comment and to clarify, we have added the descriptions of p values on the sentences showing results of inferential statistics, as described in our response to 3-8 above (Methods, page 12 line 286-304).

3-10. In the additional analyses including only part-time workers, the “physical labor” group had only one participant. I think the information from that one participant can be either excluded from the results or the walking and physical labor groups could be combined for those analyses.

Thank you. According to your suggestion, we have removed the data of physical labor group from the results.

Methods, Statistical analyses (page 9 line 246-247)

For part-time workers, only one person was engaged in physical labor tasks and thus their data were excluded from the analyses.

3-11. Table 2 is missing the heading for occupational activity types, which makes headings for “sitting”, “standing” etc. difficult to understand. In addition, could the authors explain why they use standard deviations for the sedentary and PA levels for the total sample and confidence intervals for occupational activity types in tables 2, S1 and S2?

Thank you for this comment. As suggested, we have added the heading for occupational activity types. The reason why we only used 95% confidential interval for sedentary behavior and physical activity data among occupational activity types in Table 2 was because data were “marginal means” adjusted by covariates. Other data were simply described as “means” (Table 1, Table 2 for all participants, Table S1, and Table S2).

3-12. Discussion, page 15, lines 23-29: does this sentence refer to non-working days?

Thank you. As the Reviewer correctly pointed out, this sentence refers to non-working days. To clarify, we have now added the term “on non-working days”.

Discussion (page 16 line 395)

Even though the average sedentary and activity patterns were not distinct among them, some dips in sedentary behavior along with increases in LPA were found in those with standing, walking, and physical labor job types, whereas the conditions in which sedentary behavior is the most dominant stayed constant throughout a day in those with sitting job types on non-working days.

3-13. It would be good to mention limitations of the accelerometer measurement in the discussion.

Thank you. As suggested, we have added the limitation of the accelerometer measurement in the Discussion section.

Discussion (page 17 line 428-430)

Fourth, accelerometers were unable to accurately differentiate sitting and very-static standing postures, and they cannot detect some types of physical activity such as cycling and water activity.

3-14. English is mainly fluent but would probably benefit from language editing at time, e.g. page 6, lines 8-9 and page 8, line 37. Furthermore, some of the terms are used inconsistently, e.g. “occupational activity type”, occupational-activity type”, “physically active job type”, “job type”, “job involving sitting/standing/walking/physical labor”, “occupational task group” etc.

Thank you. We have thoroughly revised the manuscript and removed any minor grammatical issues. We have also checked the manuscript to make sure about using the consistent terminology.

VERSION 2 – REVIEW

REVIEWER	Anna Pulakka University of Turku and Turku University Hospital, Finland
REVIEW RETURNED	16-Jul-2018
GENERAL COMMENTS	My concerns have been addressed adequately.