Author's response to reviews

Title: The contribution of office work to sedentary risk

Authors:

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Author's response to reviews: see over
Editor’s comments:

“This is an interesting study and your data are especially good. However, the reviewers have raised a number of points which need to be addressed before the decision about acceptance can be taken. Importantly, as the Reviewer #2 suggests, try to find ways of analyzing your rich data in a more interesting way to address the correlations between PA at work and PA outside work.”

- The reviewers’ comments have been copied below and our responses addressing each comment are presented in bold bullet points.

Reviewer 1 comments:

Version: 1 Date: 11 January 2013
Reviewer: Dane Van Domelen
Reviewer's report:
Summary:
“This is an interesting and useful contribution to the literature. The authors do an excellent job providing details on the study methods (recruitment, physical activity monitor specifications and data-processing decisions, etc.) and report interesting new insight into the contribution of office work to overall levels and patterns of sedentary behavior.”
Major compulsory revisions:
None
- We thank the reviewer for their kind comments and address the specific concerns below.

Minor essential revisions:

1. In Abstract Results, definition of “brief duration light intensity activity” should be stated as it is for “sustained sedentary time.”
   - We have added the time of brief duration of light activity into the abstract results.
   - “Office workers experienced significantly more sustained sedentary time (bouts >30 minutes) and significantly less brief duration (0-10 minutes) light intensity activity during work hours compared to non-work time (p<0.001).”

2. In Abstract Conclusions, last sentence should be modified or removed. The
study did not address whether interrupting prolonged sedentary time or increasing light physical activity has health benefits.

- As you have suggested, we have removed this sentence.

3. In Methods, Data Processing, please provide a justification for 500 min/d for inclusion. A cut-point of 600 min/d (10 hours/d) is much more common in the literature.

- We agree that a cut-point of 600 min/day is used widely. We chose 500 min/day inclusion threshold, as used in recent prior research (Jago et al, 2010 and Steele et al, 2009; added to manuscript), to minimise participant burden and to maximise the data that we could use. We were also concerned that the higher threshold may induce a systematic bias to people who wear an accelerometer for long periods and therefore our data may not have been as representative of the target population.

- The following was added to the Data Processing section in the Methods: “While minimum wear time of 600 minutes/day has been used in some studies [10, 31], minimal wear time was set at 500 minutes/day [41, 42] to limit participant burden and to maximise the data that could be used in analysis.”

4. The EVA figure should be modified so that differences in MVPA are more visible. MVPA time in minutes will always be small compared to sedentary time, even if the study population is very active. There could be important differences in MVPA that are simply not visible when graphed on the same scale as sedentary time.

- Thank you for pointing this out and we do appreciate the importance of highlighting the differences in physical activity levels. On the EVA figures we wanted to illustrate all ranges of physical activity that were measured, but as you mentioned there is a problem with MVPA as it represents such a small proportion of the day. We have modified the scale and perspective of the charts to make the MVPA apparent.

Also, the text and figure caption seem to be at odds with each other – are these weekly totals or daily totals?

- We have modified the caption for figure 2(e) to now read “Total non-work time over a whole week”

5. In Results, Relationship between… section, Pearson correlation for sedentary time with non-work days may not be appropriate, since non-work days can only take on a small number of values, e.g. 1, 2, 3? Use of a Spearman correlation coefficient or an ANOVA comparing mean sedentary time across number of non-work days might be more appropriate.

- There appears to be some confusion about the data used to examine these relationships. The data that were used were pairs of data for each subject, for example the proportion of sedentary time during work hours related the proportion of sedentary time, with data pairs for all 50 subjects. We chose to use Pearson’s correlation because the data met parametric assumptions and is
generally a more powerful test than Spearman’s rank order correlation. We have modified the text to clarify the variables.

6. Discussion paragraph on health promotion interventions in workplace settings should briefly address issues of productivity and feasibility, e.g. from employer’s point of view.
   - This is an important point in implementing workplace programmes and we have added some brief comments regarding this to the manuscript.
   - “While it may not be feasibly in all office environments, providing the opportunity to spend some time during work hours standing by use of a sit/stand work station [24, 47], could encourage light intensity activity with minimal impact on work productivity. Further, time away from a desk does not necessarily need to be non-productive - workplaces could encourage incidental office activity such as ‘active e-mails’ or walking meetings. Future workplace interventions to reduce sedentary behaviour should therefore consider the effect on work productivity and attempt to measure if programmes have a positive or negative impact on productivity”

7. Statement in Discussion that “public health campaigns should now also concentrate on programmes to modify sedentary and light activities” should be removed as it is not substantiated by the study data.
   - Our data demonstrates that a large proportion of office worker awake time is spent in sedentary and light activity. As outlined in the Introduction, prior research has established that these are important determinants of health. Therefore we suggest that there should be more attention to modifying these determinants. We agree that our language was perhaps too strong in emphasizing this point. We have therefore softened our directive encouraging public health campaigns.

8. Discussion needs to address the difference in MVPA observed on work days vs. non-work days. Why is it that office workers have more MVPA on work days than on non-work days? Travel to and from work?
   - We are happy to provide some discussion on this interesting point. We have added the following to the manuscript:
   - “There were higher levels of MVPA on work days compared to non-work days. Examining the work-time on a work day results showed that the higher levels of MVPA were accumulated during non-work time on work days. Whilst we did not collect data on what activities contributed to these higher levels of MVPA, both active transport to and from work and/or participation in leisure time activities and sport are likely to have been important contributors to MVPA exposure.”

9. Authors should mention possibility of selection bias in Discussion, e.g. workers who volunteered to wear accelerometer may be more likely to be the type that exercises in their free time.
• We agree this is a possibility and have added this concern to the limitations section of the manuscript:
  “There may have been a selection bias to more active participants as those who volunteered may be more likely to be active which could have resulted in an underestimate of sedentary time in the cohort”.

Discretionary revisions:
10. In Background, paragraph 1, suggest removing word “independent” from first sentence since cited studies differ in what they adjusted for.
• “Independent” has been removed

11. Authors might consider moving the definition of sedentary activity to earlier in the Background section.
• Definition has been moved to the first paragraph.

12. It is somewhat uncommon to see 120 minutes used for non-wear time; 60 minutes is more common. However, a diary seems to have been the primary tool for identifying non-wear, so a more conservative signal-based method is reasonable.
• We acknowledge that 60 minutes has been widely used to estimate non-wear time, however, in pilot studies with office workers, we have found that prolonged sedentary time (in excess of 60 minutes) was being misclassified as non-wear time to an unacceptable degree, we therefore chose to use 120 minutes to more accurately reflect the particularly detrimental prolonged sedentary time. In the present study, over a whole week, 12.65 hours (759.03 minutes) of prolonged sustained sedentary time (sedentary bouts > 60 minutes) would have been misclassified as non-wear time if the 60 minute cut point would have been used. We have included the justification in the Methods now.
• “Periods greater than 120 minutes with counts of zero were considered non-wear time, rather than periods of greater than 60 minutes as pilot testing observations showed some office workers were sustaining sedentary time for greater than 60 minute bouts.”
• We have also added the following in the Results:
• “Prolonged sustained sedentary bouts (sedentary bouts>60 mins) accounted for 12.7 hours over a whole week.” And in the Discussion:
• “Further, this study found that office workers were sedentary in bouts of greater than 60 minutes (and less than 120 minutes) for over 12 hours a week. Studies that estimate non-wear time by the use a 60 minute cut point of continuous activity counts of zero, could potentially be misclassifying prolonged sustained sedentary time as non-wear time.”

13. Authors might add a little more detail as to how working hours were determined. In particular, were working hours meant to include travel to and from work, or were they strictly to include time in the office? This could affect the results.
• Details clarifying how participants were instructed to define ‘working hours’ has been added into the Procedure section as suggested:
  “from the time seated at a desk/workstation until leaving the office”.

14. In first block of Results, it would be interesting to see how consistent the workday vs. non-workday differences in activity were. For example, for what percent of participants was sedentary time greater on work days? And for what percent was light activity greater on non-work days? High percentages would strengthen the findings.
  • Thank you for your suggestion. The analysis was done and the following was added to the text:
  “78% of all participants had proportionally more sedentary time on work days compared to non-work days and 84% of participants had proportionally less light activity on work days compared to non-work days.”
  • We have also highlighted this in the Discussion to support the importance of the findings for the majority of the office workers:
  “These findings were consistent amongst participants with the majority of participants more sedentary (78%) and having less light activity (84%) on work days compared to non-work days”

15. I am not sure that Figure 1 part e is necessary. Non-work time on work days may very well be different than non-work time on non-work days, so I would prefer seeing the results as shown in a through d. If authors choose to remove part e, then they might also remove paragraph under Results, Sedentary time, light and moderate/vigorous...
  • We respectively disagree on this point. Whilst 1(b) and 1(d) enable a comparison of the patterns of activity during non-work time on work days and non-work days, they do not provide a summary of all non-work time with which to compare to all work time 1(c). The latter is important to our aim of examining the overall contribution of work time vs non-work time to activity exposure. In the Discussion we have stated “Office workers spent the majority of their time, both at work (97.1%) and during non-work hours (95.7%), in either sedentary or light activity with MVPA only accounting for a very small proportion of wear time” further, again we state “Office workers in this study experienced more prolonged, uninterrupted sedentary time, fewer breaks in sedentary time and fewer brief bouts of light intensity activity during work hours compared to non-work periods”, highlighting the important comparison between work hours and total non-work time

Minor issues not for publication:
16. In Results, Overall contribution… section, believe authors incorrectly state that 36.5 hours is 48.5% of wear time when they mean 48.5% of total sedentary time.
  • Thank you for pointing this out, it has been corrected in the manuscript.

17. In Results, Pattern of sedentary… section, 93.9 minutes per week of
bouted MVPA is actually not bad. Physical activity guidelines usually call for 150 minutes per week of sustained MVPA, and most studies show that only 2-5% of people achieve that.

- Thank you for highlighting this point. We have conducted further analysis on the proportion of participants meeting MVPA guidelines. We have added the following to the text in the Results section:
  - “14% of participants had > 150 minutes per week of moderate intensity activity in bouts of 10 or more minutes, additionally 14% of participants had >60 minutes per week of vigorous intensity activity in bouts of 10 or more minutes.”
  - and in the Discussion:
  - “Of interest were the findings that 26% of participants achieved physical activity recommendations for MVPA in bouts of >10 minutes [58], which is a higher proportion that has been found in large population research [31, 59]. These results may be a product of living in a city with a climate and culture that is very conducive to participation in physical activity and also, the participants in general were well educated and worked in a corporate environment that encouraged and promoted physical activity.”

18. In Results, Relationship between… section, suggest adding negative signs to the r values for negative correlations. First one seems to be missing the negative sign.

- Thank you for pointing this out, corrections have been made to the manuscript.

19. Presentation of p-values should be more consistent. In Results, Relationship between… section, r-values of 0.93 and -0.96 must have p < 0.001, but it is only shown as < 0.01. Earlier in paper p < 0.001 is used.

- Thank you again, all p values now have 3 decimal places.

20. In Discussion, sentence should read “While inclinometer based devices, such as activPAL…” Two errors here – need to insert “as” and spelling of activPAL.

- The errors have been corrected in the manuscript.

Reviewer 2 comments
Title: The contribution of office work to sedentary risk
Version: 1 Date: 18 January 2013
Reviewer: David Berrigan
Reviewer's report:
“As written, your paper seems to explain how people with office jobs sit a lot. It's hard to be very excited about this finding. I think you have a more interesting data set – because of your time stamped objective data. So I hope you can think about revising this paper in a way that really addresses the correlations between PA at work and PA outside of work. To repeat, these are neat data, try to analyze them in a more interesting way.”
• We are sorry that the reviewer did not find the paper as interesting as we had hoped.
• Our main research question was to assess the contribution of office work to sedentary risk. This is a very important question especially in light of the increasing proportion of workers in sedentary jobs. While it is intuitive that office workers have high sedentary risk, at the time of data collection, there were no published quantitative data presenting work versus non-work sedentary exposure. During preparation of this paper, the first peer-reviewed paper was published (Thorp et al, 2012). This current paper, confirms the findings of Thorp et al (2012) and further extends the evidence to provide novel descriptions of the pattern of exposure to sedentary behaviour and physical activity during work hours and non-work periods and also describes the relationship between sedentary behaviour, sustained sedentary time, breaks in sedentary time, light and MVPA again during work hours and for non-work periods. Therefore, we believe this paper will make “an interesting and useful contribution to the literature” (Reviewer 1).
• In response to specific suggestions by Reviewer 1, we have added additional analysis and we feel that the correlations presented adequately test our secondary hypotheses (hypothesis 5) regarding the relationships between exposure and pattern of sedentary time and physical activity parameters at work and non-work.
• Further, with the additional analysis and the richer detail in the manuscript as suggested by Reviewer 1, we have highlighted the pattern of exposure of all activity levels - sedentary, light and MVPA and presented the findings in a novel way – specifically, the use of the EVA analysis. In response to Reviewer 1, we have also modified the EVA figures so that distinctions between patterns of exposure in all activity levels are clearer.
• This paper was the first to discuss the important reciprocal relationship between sedentary time and light activity during work hours and the associated implications to work-based health promotion interventions.
• Based on the specific findings in this paper we have suggested that future research should target increasing light activity and reducing sedentary time during work rather than traditional intervention approaches that have encouraged increased MVPA between productive work times.
• As we found that office workers that were sedentary at work also had the tendency to be sedentary outside of work, we have also suggested that sedentary office workers may be at an even greater risk of the poor health as a consequence of excessive sedentary exposure. This has implications for intervention pathways and targeting also.
• We feel that this paper can contribute to the development of activity guidelines for sedentary workers as it has highlighted the pattern of exposure and relationships between sedentary, light and MVPA during work hours and non-work periods.
• We hope that these changes, and the other changes made to
highlight the significance of the findings, will enable readers to more readily see the contribution this paper makes.