Author's response to reviews

Title: The fractionalization of physical activity throughout the week is associated with the cardiometabolic health of children and youth

Authors:

Ian Janssen (ian.janssen@queensu.ca)
Suzy L Wong (ian.janssen@queensu.ca)
Rachel Colley (ian.janssen@queensu.ca)
Mark S Tremblay (ian.janssen@queensu.ca)

Version: 2 Date: 3 May 2013

Author's response to reviews: see over
REVIEWER #1

Major Compulsory Revisions

Comment 1: A child could accumulate 350 mins/week of MVPA and be classified as inactive according to this paper. Consider alternative labels such as low active, or insufficiently active.

Response: Based on this recommendation, we have changed the name of the “inactive” group to “insufficiently active”.

Comment 2: The authors should acknowledge the potential misclassification of participants with less than 7 days of valid accelerometer wear time.

Response: We have acknowledged this limitation and its potential impact on the study findings in the limitations paragraph in the discussion section (lines 315-318)

Comment 3: Cardiometabolic risk factor percentiles and corresponding parameter estimates need to be explained further. The authors should also explain if there is clinical significance associated with percentile changes for any of the risk factors.

Response: We have added some additional text to the methods to explain the percentile scores (lines 151-154). We feel that the description provided in the Results on lines 233-237, as well as the examples that are given, explain to the reader what the parameter estimates mean.

Comment 4: The authors should consider reporting averages for the cardiometabolic risk factor by activity groups.

Response: These group averages are now reported in Table 1.

Comment 5: The authors should revisit the alignment among the study objectives, the analyses and the points made in the discussion. The authors state that MVPA was associated with the outcomes and that more MVPA was better. Given the data available, analyses could have been performed to specifically test these relationships. The authors also indicate that fractional activity was associated with better outcomes yet there no statistically significant differences on 7 of the 8 outcomes and there were large CI.

Response: We are not clear what the reviewer is asking of us by their comment “Given the data available, analyses could have been performed to specifically test these relationships”. This comment is quite vague and no specific suggestion has been provided. We have looked back on the objectives, the type of observational data we have available, and the analyses used, and we feel that these all fit together and that the analyses test the relationships we set out to test.

As indicated in the statistical analysis section (lines 206-209), our interpretation of the statistical results did not focus on p values (which many would suggest is an outdated way of
thinking), but rather were interpreted as recommended by the British Medical Journal. These recommendations indicate that inferences drawn by comparing p-values are dubious and interpretation of a lack of significance as evidence of no effect is usually incorrect. Thus, we primarily paid attention to the overall patterns of differences, which indicated that the cardiometabolic risk factor percentile scores were 5 to 7 units worse in the Infrequently Active group than in the Frequently Active group. With that being said, we have re-worded several sections and comments in the Abstract and Discussion to note that most of the differences between these two groups were not statistically different.

Comment 6: The authors indicate that the paper may have been underpowered to compare the infrequently active group to the frequently active group. Careful consideration should be given to this issue given there were no statistically significant differences between groups on 7 of 8 outcomes.

Response: See response to previous comment. Also note the paper includes a statistical power section (lines 210-213).

Minor Essential Revisions:

Comment 7: Consider reporting if there were significant associations among sex or age and the cardiometabolic risk factors.

Response: Sex and age differences in cardiometabolic risk factors are well document, and in fact, important to control for when doing a study like ours by creating sex and age normalized values (in our case percentile scores). Because we derived internal percentile scores for the cardiometabolic risk factors by age and sex (lines 149-150), the percentile scores for the cardiometabolic risk factors did not vary by age or sex.

Comment 8: The authors should explain “fasted sample” (page 5).

Response: As explained on lines 97-99, the fasted subsample consists of participants who completed their mobile exam center visit in the morning (~50% of the participants came to the clinic in the morning).

Comment 9: The authors should condense the three sentences starting with “For participants with...” into a single compound sentence. (page 7).

Response: We have condensed these sentences into one sentence as recommended.
**REVIEWER #2:**

*Minor Essential and Discretionary Revisions:*

**Comment 1:** Abstract. In the Results part, instead of mentioning non-significant differences between the frequently active and the infrequently active group, I would suggest to describe the significant differences in the specific outcomes.

**Response:** We have changed the Abstract to not the significant differences.

**Comment 2:** Methods. Line 87-89. What are the differences in characteristics between subjects with and without available information on physical activity and cardiometabolic risk factors? This should be described in more detail and also applies to line 306-308 in the Discussion.

**Response:** The main problem around missing data relates to the missing accelerometer data. Participants with incomplete accelerometer data tended to be heavier, less active, and of a lower socioeconomic status than participants with complete and valid accelerometer data. For these reasons, Statistics Canada created a special sample weight variable to use on the Canadian Health Measures Survey when examining any of the accelerometer data. This special sample weight variable helped ensure the representativeness of any analyses based on the accelerometer data. With that being said, the representativeness of a sample is primarily an issue when looking at the descriptive characteristics of the sample when the intention is to make inferences to the population the sample was drawn from (e.g., prevalence of obesity, inactive, hypertension, etc.). The focus of our study was on detecting relationships between variables (e.g., relationship between physical activity frequency and blood pressure), and there is no reason to believe that such relationships would be different in eligible participants who did and did not have complete study data.

**Comment 3:** Line 144-146. Extrapolating the findings of only 4 days of wear time may introduce misclassification of exposure. Did the authors perform a sensitivity analyses in which the children with only 4 or 5 valid days (8.2% + 17.2%) were excluded, to see whether this influences the results?

**Response:** Unfortunately, due to the very small sample size of individuals with 6 or 7 valid days of accelerometer wear time, we were unable to perform any such analyses when those with only 4 or 5 valid days were excluded. We have discussed this limitation and its potential implication on the study findings in the discussion section (lines 315-319).

**Comment 4:** Line 198 and further. Since information on body mass index is available, I would highly recommend to show a third model, additionally adjusting for BMI, as the associations between physical activity and cardiometabolic risk factors may be largely driven by BMI.
Response: We ran a third model that also included BMI as a covariate. There were no discernible differences in the effect estimates vs. the model that did not include BMI as a covariate (see lines 260-262).

Comment 5: It would be interesting to see the results of Table 2 when the total active group (frequently active + infrequently active) are compared to the physically inactive group. Perhaps these results can be presented in a Supplementary Table.

Response: Differences in cardiometabolic risk factors between active and inactive children and youth are well documented in the literature. The objective of this paper was not to compare such groups, but rather to compare cardiometabolic risk factors in physically active children and youth who accumulate their weekly moderate-to-vigorous physical activity in different patterns.

Comment 6: Information on physical activity was available from accelerometers. Is there any information on the types of physical activity that the children performed (e.g., endurance, strength, or flexibility training)?

Response: Unfortunately, the information on the context and specific type of activity was not available in a way that we could pair it up with the accelerometer data.

Comment 7: In Table 1, the 95% range instead of the 95% CI is given. Please report the minimum and maximum values as well, to give the readers an idea of the variation in the sample (which may be very small for variables such as HDL and triglycerides).

Response: Table 1 presents the 95% confidence interval and not the range. We are unsure what led you to this conclusion as we feel this is clearly labelled on the table. For confidentiality and disclosure reasons, we are not allowed to report the minimum and maximum values in this survey.

Comment 8: In the text, it is stated that age and sex were not included as covariates (line 181), whereas the legend of Table 2 states otherwise. Please clarify.

Response: We apologize for the error. Age and sex were not included as covariates (as they were not related to the outcomes and therefore did not meet the criteria for confounding) and we have corrected the legend of Table 2.