Author’s response to reviews

Title: Gender and grade differences in objectively measured physical activity and sedentary behavior patterns among Japanese children and adolescents: A cross-sectional study

Authors:

Kaori ISHII (ishiikaori@aoni.waseda.jp)
Ai SHIBATA (shibata@taiiku.tsukuba.ac.jp)
Minoru ADACHI (adachi@cc.okayama-u.ac.jp)
Keiko NONOUE (sonanc3@city-okayama.ed.jp)
Koichiro OKA (koka@waseda.jp)

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Author’s response to reviews:

Response to Reviewer #1

Reviewer’s comment 1

General Comments:

This paper provides information on objectively measured physical activity and sedentary behavior in Japanese children, a very important topic for the promotion of public health.

This reviewer understands how difficult is to write a manuscript in another language, but there are some awkward sentences and grammatical errors. It is suggested a proof read for future drafts of this manuscript.

The manuscript suffers from some issues relative to the written style, methods and results description and presentation. These issues are described below. Therefore, the manuscript needs major revisions before it can be considered for publication.

Answer
We greatly appreciate your comments and revised the manuscript accordingly as described below.

Reviewer’s comment 2

Abstract

The aim of the study misses the reference to sedentary behavior and should be in concordance with that stated in the introduction section.

Answer

As suggest, we have added “sedentary behavior” to the Background section of the Abstract (page 2, line 29).

Reviewer’s comment 2

In the methods authors stated "Two-way analysis of covariance and logistic regression analyses, adjusted for weight..". Authors should added "weight status".

Answer

We have added “weight status” to the Methods subsection of the Abstract (page 2, line 39).

Reviewer’s comment 3

Introduction

Although the introduction is reasonably well written it may be improved to re-writing the sentences in lines: 71-74;

Answer

Thank you for your suggestion. We have revised the introductory section (Background, pages 4–5) for language and improved flow. We have revised the sentence specified as follows:

“Descriptive epidemiological studies assessing objectively measured physical activity among children suggest that boys are more active than girls and that physical activity declines in both genders with age, while sedentary behavior is higher in girls and increases in both genders with age [8-11].” (page 4, lines 73-76).
In addition, we have improved the flow and removed redundancy of the third paragraph (Page 4, line 79-) by moving and integrating the first sentence into the end of the paragraph.

“Only a few such studies in Japanese children have been reported, and most have used self-reports to assess gender and age differences in physical activity. However, recent evidence indicates that self-reports may underestimate activity. Furthermore, self-reports do not provide an adequate description of the duration and intensity of physical activity [14,15], although they are useful for assessing where and what type of physical activity the children are engaged in [16]. Recently, devices such as pedometers and accelerometers have been introduced to objectively measure and detect children’s physical activity. These devices provide objective measurements, and so are of much greater utility for assessing the duration and intensity of physical activity.”

Reviewer’s comment 4

Methods

The methods should be in detail and should be written in order to allow the replication of the study. There is much information that misses in methods section:

- Authors stated in lines 99-102 that the study was performed in Okayama city in 2010 and 2011 in 2815 children aged 3 to 15 years; however this study has 691 participants. Authors should describe here in detail the study designed and the sampling.

Answer

We have moved the sentence about study sampling from the Results to the Methods (page 5, lines 106-109). We have also altered the description of the sampling for logical flow.

”In total of 2,815 children (1,474 boys and 1,341 girls) age 3–15 years completed the survey. A total of 787 agreed to participate in the physical activity (accelerometry) component of the study, but 96 had missing physical activity data. Thus, 691 children and adolescents (329 boys and 362 girls) with valid physical activity data were included in the final analyses.”

Reviewer’s comment 5

- In lines 120-122 authors cited an article that validated the Lifecorder, but they should include in the text the coefficients obtained in that study.
Thank you for your suggestion. We have added the correlation coefficients between physical activity energy expenditure as measured by Lifecorder and that measured by the doubly labeled water method (page 6, lines 126-130).

” A previous study among Japanese children reported that physical activity energy expenditure using the doubly labeled water method was significantly correlated with physical activity intensity as measured by the Lifecorder (sedentary; $r = -0.78$, light to moderate physical activity; $r = 0.71$, vigorous physical activity; $r = 0.83$) [19].”

Reviewer’s comment 6
- In lines 130-131 authors should added how many zero count period is recognized as invalid.
- In lines 131-132 authors should added information on the participants inclusion criteria. It is mandatory to have a weekend thay to meet the inclusion criteria? Or participants with 3 or more days can be included evethought the didn’t have 1 weekend valid day? And how many hours were considered a complete day?

Answer
We have revised the sentences as follows (page 7, lines 140-143):

“Continuous zero counts of $\geq$20 minutes were excluded as non-wear periods. Participants were included for analysis if they had complete data on a minimum of 3 days (2 weekdays and 1 day on the weekend) and wear time was more than 600 minutes on each of the 3 days.”

Reviewer’s comment 6
Results
The results section should be improved to characterize the participants in order to a better understanding of the results and to answer properly to the aims of the study. Therefore, in the results section authors should change the following:
- In lines 150-152, this information should be in the methods sections.

Answer
We have moved the sentence on study sampling from the Result to the Methods as described in the response to comment 4 (page 5, lines 106-109).

Reviewer’s comment 7
- Table 1 does not characterize properly the participants. For example, when looking to the table I don't know how many participants from Preschool met the criteria to be considered Healthy weigh or Overweight or obese. And if they are all in the Healthy weigh this could explain why they are more active than those in the higher grades.

Answer
We have added the weight status for each grade group to Table 1. Higher-grade students had greater rates of overweight and obesity than lower-grade students. However, we performed the analyses adjusting for weight status, so differences in weight status cannot explain the differences in accelerometry results between preschool-age and older children.

Reviewer’s comment 8
- Furthermore, in Table 1 I don't know the participants characteristics regarding their gender.

Answer
We have separated all values according to gender in the revised Table 1.

Reviewer’s comment 9
- Additionally, in Table 1 why authors did not included in the weight status the underweight category?

Answer
Thank you for your suggestion. International body mass index cut-off points defining overweight and obesity as >25 and >30 kg/m2 are for adults (age >18 years). To our knowledge, there are no established criteria for Asian children, so we cannot categorize underweight.

Reviewer’s comment 10
Discussion
Although the English style should be improved, the discussion section of the manuscript is reasonably well written.

Answer

The entire manuscript has been proofread in red text by a professional English-language science editor (see attached certification of proofreading).

Response to Reviewer #2

We greatly appreciate the comments. In accordance with these comments, we have revised the manuscript as described below.

Reviewer’s comment 1

The authors investigated gender and grade differences in objectively measured physical activity and sedentary behavior among Japanese children and adolescents

Abstract

L.27 - Please replace the expression "The level of physical activity" for "The physical activity level"

Answer

We have replaced "The level of physical activity" with "The physical activity level" (page 2, line 27).

Reviewer’s comment 2

* More details regarding the methods (i.e. model of accelerometer; number of accelerometer using days; cutoff value used for MVPA and sedentary time) could be included in the abstract rather than a long introduction.

Answer

As suggested, we have added all these details to the Abstract Methods section (page 2, lines 34-38).
Reviewer’s comment 3

L.32 - Please insert the term "sedentary behavior".

Answer

We have inserted “sedentary behavior” in the Background section of the Abstract (page 2, line 29).

Reviewer’s comment 4

Introduction


Answer

We have replaced the reference (page 15, lines 347-349).

Reviewer’s comment 5

* State clearly the hypothesis. The inclusion of 2-3 similar studies involving accelerometer and child could improve the hypothesis-driven nature of the introduction.

Answer

We have added an explicit hypothesis statement to the end of the revised introductory section (Background, page 5, lines 97-99). Moreover, we have also revised the description of through the background for logical flow.

Reviewer’s comment 6

Methods

*The epoch length used in accelerometer (2 min) may have biased the results. Several studies have been shown that recording accelerometer data in shorter epochs in young children captures more moderate-to-vigorous physical activity, which is a component of physical activity
guidelines for children. In this case the authors should be have used a shorter epoch in order to enable reliable data.

Answer

Thank you for this valuable comment. The accelerometer used in the study is only capable of measuring activity in 2-min epochs. This information is included in the Methods (page 6, line 130), and the short epoch mentioned as a limitation in the Discussion (page 13, lines 293-298). Specifically, we indicate the possibility that the shorter epoch may lead to underestimation of vigorous physical activity as such activity tends to occur intermittently in brief bursts (particularly in children).

“Some limitations of the current study should be considered. First, the accelerometer was capable of activity measurement only in 2-minute epochs, while a shorter epoch is strongly recommended for children because their physical activity is often intermittent [52]. Therefore, the amount of sedentary time and vigorous physical activity may be underestimated while light and moderate physical activity may be overestimated.”

Reviewer’s comment 7

L.126 - Use "nine" instead "9"

Answer

We have replaced “9” with “nine” (page 6, line 133).

Reviewer’s comment 7

L.127 - Please insert reference for physical activity levels and sedentary behavior cut-points used.

Answer

We have added the reference as requested (page 7, line 136).
* For data cleaning, how did you determine a valid day? Was it defined as a minimum of how many hours of accelerometer wear time? And awake non-wear time, was it defined as a period of how many consecutive minutes of zero counts?

L.132 - You have stated 3 days, but did you including at least one weekend day?

Answer

We have revised the sentences as follows:

“Continuous zero counts of ≥20 minutes were excluded as non-wear periods. Participants were included for analysis if they had complete data on a minimum of 3 days (2 weekdays and 1 day on the weekend) and wear time was more than 600 minutes on each of the 3 days.” (page 7, lines 140-143)

Reviewer’s comment 9

L.136, L162 - 164 - The description of the Chi-square tests needs to be improved or excluded, because I think it makes no sense to examine differences between included vs. excluded participants.

Answer

We have deleted all comparisons using the Chi-square test.

Reviewer’s comment 10

Results

L.152 - "had missing data on physical activity data" should be "had missing physical activity data"

Answer

Thank you for your attention to detail. This has been corrected (page 5, line 107).

Reviewer’s comment 11

Table 1 - Please replace "Ligit" for "Light"

Answer
Again, thank you for your suggestion. This has been corrected.

Reviewer’s comment 12
Table 2 - Please replace "lowere" for "lower"
Answer
We have corrected "lower".

Reviewer’s comment 13
Discussion
L.226 - Please write "nine" instead "9"
Answer
We have replaced “9” with “nine” (page 10, line 231).

Reviewer’s comment 14
* The discussion should be more critical by mentioning the details of the studies.
Answer
Thank you for your suggestion. We have revised the Discussion to include more details on the cited studies through the discussion. In addition, we have made many minor editorial and organizational changes to improve the flow of the Discussion (page 12, lines 262-276).

Reviewer’s comment 15
Overall, the paper concept is sound. There are needs to have modifications to grammar and statistical analysis section. I believe the epoch length used may have biased the results, because the consensus is that shorter epochs should be used to obtain a more accurate representation of young people's physical activity levels.
Answer

Thank you for your insightful comments. The revised manuscript has been proofread in red text by a native English speaker (see attached certification of proofreading).