Reviewers report

Title: Metabolic syndrome risk score and time expended in moderate to vigorous physical activity in adolescents

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Reviewer: Kevin R Short

Reviewer's report:

Summary
The examination of how the volume of physical activity is related to risk for metabolic syndrome and its components in children is an interesting, although not entirely novel question. The authors have some potentially interesting data but the current presentation needs improvement. It would greatly help to develop a stronger rationale for the study that highlights both the novelty and significance of this study relative to what is already known. Expansion of the results and interpretation is also recommended.

- Major Compulsory Revisions (which the author must respond to before a decision on publication can be reached)

Abstract. The background and rationale need strengthening. It would help to identify what gap in knowledge this project was meant to address. How is it novel?

Background. Most of the background information is useful. The reader is provided with a nice description of MetSynd and current approaches to quantify it. However, the rationale for the fundamental question addressed in this study was not adequately developed and there is no hypothesis presented. The authors are encouraged to define the problem: what is known about the relationship between MVPA and MetSynd in adolescents? What are the problems with existing studies and what are the gaps in knowledge that need to be addressed. Why is this important? And finally, within the aim statement describe how this study was designed to overcome previous limitations or extend beyond current understanding. Otherwise there is no transition between the background the study design.

Methods. Children who had parents with diabetes or cardiovascular disease were excluded. Explain why that was done and the implication for the results. Did the exclusion only include cardio-metabolic diseases, i.e., what about cancer, neurologic, psychologic, or other diseases? Define family history: did you exclude only those children with a first degree relative with disease or did you secondary relatives count too? Was there a consideration for biologic versus other (e.g., adoptive) parents?

Methods. Clarify: was the MetSynd z-score calculated by comparing the
participant’s test result against established normative data? As presented it appears that the z-scores are applicable only to the current study cohort.

Results. What were the calculated values for MetSynd score for boys and girls? They don’t appear in the text or tables?

Results. A more thorough description of the population is needed. By aggregating the data only into male and female groups the reader cannot know much about the distribution of the results. For example, show the BMI and list how many of the students were considered normal weight, overweight, or obese. For the risk factors in Table 2, include a notation about how many of the students exceeded currently used thresholds for defining MetSynd to help put the results in context. Likewise, how many students met the current criteria for MetSynd, and how many had 1, 2, or more components of MetSynd?

Results. In the introduction a rationale is presented for using continuous scores for MetSynd and its components. However, the physical activity results are divided into categories. Why not treat the accelerometer data as continuous data as well and then use regression statistics to examine the relationship between physical activity and MetSynd score?

Results. The ROC curve is missing.

Discussion. The first sentence of the discussion cites the finding that the highest MVPA is associated with the lowest MetSynd score. This finding requires further interpretation. What is the magnitude of effect? Can the authors present odd-ratios for the physical activity groups as was done in some of the cited papers?

Discussion. Several prior studies are cited in the discussion that had very similar outcomes. These should have been cited in the introduction when establishing the rationale for the current project (see comment above). Additionally, when cited in the discussion there should be more comparison and integration of the prior studies with the current results.

Discussion. When citing the study by Andersen et al (ref 11) on page 9, it would be more helpful to summarize the findings rather than relist the results. Describe how much MVPA was performed by the most and least active quintiles in that study, for example, so that the reader can relate it to the current results.

Discussion. One of the limitations that should be acknowledged is that the current results only apply to this cohort of children since the z-scores are computed on this sample. Other groups of children may have different outcomes. Is there a way to resolve this to strengthen the generalizability of the current findings?

- Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Abstract. Listing the statistical tests used isn’t necessary. Use the space for
Abstract. The statement “...adolescents must perform at least 88 minutes of MVPA for a healthy metabolic profile” is vague. Is this 88 minutes per day or per week? Define healthy profile relative to the number of metabolic risk factors or their severity. What is considered healthy?

General. Avoid the abbreviation “Mets.” It could be confused for METS, which is often used to describe physical activity in epidemiology studies. Consider instead MetSynd or something similar.

Methods. Blood tests. Add a statement describing whether the blood was obtained from a fingerstick or venipuncture.

Results. Consider combining Figures 1 and 2 so that it easier to compare boys vs. girls. The y-axis labels should be more descriptive and/or the figure captions must explain the figures in more detail. The font size for the numbers on both axes is too small to read. Those numbers should be closer in size to the axis titles.

- Discretionary Revisions (which are recommendations for improvement but which the author can choose to ignore)

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests: I declare that I have no competing interests