Reviewer's report

Title: Physical activity and clustered cardiovascular disease risk factors in young children: a cross-sectional study (The IDEFICS study)

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Reviewer: Robert McMurray

Reviewer's report:


This is an interesting article examining the relationship between physical activity levels and a combined score for cardiometabolic risk (CMR) factors. In addition, it is one of the first to develop PA guidelines based on a health outcome. The sample is sufficient and obtained from a diverse geographic area in Europe. The age range of the sample is also novel; a group in need of study and evaluation. The use of accelerometry to estimate physical activity levels and the methods to obtain the various risk factors are appropriate.

There are several items that should be taken into consideration to strengthen the manuscript. First and foremost, although the sample size is quite large, the sample appears to be quite health and the reader is not provided any information on how many, or what percentage of the children are actually at risk. For example, the low mean and standard deviation of the HOMA scores suggests that there were really no children “at risk” for insulin resistance. Similar comments could be made about BMI, blood pressures and triglycerides. This suggests that even those children in the highest quintile of “risk” may not be truly “at risk”. This reviewer recommends some comment on this issue in the discussion section, or state as a limitation in that section of the discussion. Second, the introduction starts out like a treatise on obesity. Since obesity is one of the CMR factors, this reviewer suggests starting the introduction focusing on the issue of the CMR factor of which obesity is one. Also, please define CMR factor for the reader. Third, terms “Score A” and “Score B” could be easily confused and the reader has to refer back to methodology. Could better terminology be used that are more suggestive of the score? For example “CRF” and “CRF+VO2max”. Since the study involved several countries and several locations, was there any attempt at “quality control” for those research assistants making the measurements? Fourth, this reviewer found it very interesting that CR fitness was included as a risk factor and a dependent variable like the PA. One wonders about colinearity issues with PA one side of the equation and CR fitness on the other side?

In the Methods there was mention of a scale of 0-6 for SES. Please provide the reader with the direction of the scale; e.g. 0=low SES and 6=high SES. A couple
of clarifications on accelerometry are needed in the methods. The authors state that two different accelerometers were used. Is there any data regarding a cross-validation between the two units and was one specific models used for the children and the other for the parents? Since there were so many sites and children and not all accelerometers provide the same counts for a given task, the authors should provide any information concerning cross-validation between specific accelerometers. Also, the authors should provide a rational for the “average PA” score and what that score tells the reader. There may be some concern with only six hours of accelerometry data representing a day. Why was this (minimum 6 hr) used? Could it be a limitation? Finally, what was the methodology used to develop the recommendations for the minutes of MVPA?

The authors used VO2max as their indicator CR fitness. This methodology includes weight and therefore fat mass. Thus, the inclusion of VO2max and adiposity are collinear and results in an overestimation of the significance of adiposity. Why not use laps completed for the fitness measure? This was directly measured and reduces the inaccuracies that occur with the use of the prediction equation and eliminates any colinearity with obesity. Finally in the methods, please provide a rational for using one standard deviation above the mean to indicate CMR. If you examine the data provided in Table 1, one SD above the mean for any of the risk factors would still be considered “within normal limits”.

The Results section states that there were significant differences between the sexes for most characteristics and CMR factors. However, when you view the data there is actually little numerical differences. Could it be that the statistical results are simply related to sample size and there is not any clinical relevance? Similarly, there were 19 statistical tests for each age group (Table 1). A correction factor for multiple tests is recommended. Likewise, the partial correlation were statistically significant, but how meaningful is an r = 0.086 which accounts for < 1% of the variance? This should be addressed in the Discussion section. With regard to the PA results, some information (minutes) regarding the limits of each quintile would be of great benefit for the reader. Table 4 does provide information on counts/minute but most readers will not be sufficiently knowledgeable to interpret the counts. This reviewer also recommends placing the PA results before the logistic regression analyses.

As presented the discussion provides little information beyond the results. There should be some discussion of the differing age-group results beyond the one sentence provided (I counted the same sentence four times in the Discussion that said this was novel but provided nothing beyond that statement). Some discussion could provide new and relevant information. Also, the CMR factors appear normal (Table 1), a reader (and this reviewer) would be interested in knowing which of the CMR factors is/are causing the elevated risk score? This reviewer recommends moving the limitations section toward the end of the discussion and include the overall healthy sample as a limitation as mentioned above. The authors are also directed to an article in Dynamic Medicine in 2008 by McMurray et al., that discusses the importance of PA and VO2max in predicting METs in youth. The section on comparisons with other studies could be reduced to allow for more discussion of the points mentioned above.
Couple of minor points:
“Body mass” not “weight” was measured.
The abstract needs a statement regarding what variables were included in the CMR factor score.
Please check the metrics under CR fitness. The “-1” should be to the power and not subtracted.
With the blood draw, was the overnight fast verified or checked?
In the Results section, why mention tertiles? As stated this suggests the authors are “double” publishing the results. If so the first publication should be noted in the Introduction or Methods sections.
Please be consistent with “cardiorespiratory”. Sometimes it is spelled as one word and sometimes it is hyphenated.
In the Conclusion, what is meant by “In younger children it seems that this role of PA is not such evident”?
Table 2 and figures: Please indicate what quintile is what; Q1 lowest, Q5 highest or the reverse.

**Declaration of competing interests:**

I declare that I have no competing interests