Reviewer's report

Title: Seasonal variation in objectively measured physical activity, sedentary time, cardio-respiratory fitness and sleep duration among 8-11 year-old Danish children: A cross-sectional study

Version: 2 Date: 25 June 2013

Reviewer: LUIS GRACIA-MARCO

Reviewer's report:

The aim of the present article is to examine between-season and within-week variation in physical activity, sedentary behaviour, CRF and sleep duration in a large group of 8-11 year-old Danish school children. Additionally, authors reported the level of these lifestyle indicators, identified correlates of the lifestyle indicators and investigated the connection between them.

Overall the manuscript is well written but some comments must be considered to make it clearer and improve its quality.

Background:
- Is overweight/obesity one of your outcomes in this article? There are some allusions along the manuscript and you are not using body fat, BMI…as outcomes in your article.
- “…accelerometer determined sleep duration…”- this is a bit confusing as in your methods it seems sleep duration was self-reported. Please, clarify.
- “…in northern Europe”- it would be useful to comment before this that your study has been done in northern Europe.
- aim. The authors said that this is a cross-sectional study, however it is confusing as when I read the methods it seems you did a longitudinal study. In the methods you said “Children were excluded if they did not have valid measurements from all three seasons in either PA…”. Therefore, it seems longitudinal. Could you please clarify?

Methods:
- Mean age of participants?
- Clarify cross-sectional vs. longitudinal as stated above.
- 60 seconds epoch should be acknowledged as a limitation of the study and discussed. Children’s PA is characterized by short periods of time and 60” epoch has been shown to underestimate vigorous PA in children (See papers Rowlands AV 2006, 2007)
- 60 minutes disregarded before analysis. Is there any evidence that support this?
- CPM expressed as total vertical counts. This is not clear as you used a triaxial
accelerometer. Did you set the accelerometer to count only in the vertical axis? If yes, why? Please, clarify.

- Difference in sleep duration...(page 5) is 3.8 min. The authors said this is a small difference however p<0.001. Therefore, although small it seems the two approaches significantly differ?

- CRF- this is a suggestion, do not start a sentence using abbreviation (apply to the whole document), it is not formal. In addition, can you briefly give some more information about the test?

- Questionnaire data: any reference that support not to include some active video games in screen time?

- Statistical analysis: Did the authors checked the normality of the variables? Did the authors checked if there was sex-interaction to justify why showing the data males and females together? Qui-square test should be Chi-square test. The authors talk about the effect of an intervention? Did you do an intervention? Could you please re-organize a bit this section using full-stops? Please clarify all this issues.

Results:

- Table 1 shows results separately for boys and girls, but then all tables analyse participants all together. Would be interesting to include an additional column with the whole sample descriptive characteristics.

- Table 3. Less PA, more sedentary time, less sleep time and more CRF? This needs to be discussed in the discussion.

Discussion:

- last line of page 7; (e.g. cut-off and wear time criteria). What about epoch? There were differences in epoch setting? This needs to be discussed at some point in the discussion. Smaller epochs are more accurate specially when working with children.

- page 8, last lines of 1st paragraph. “Using the objective measurement of sleep…”, in the methods the authors said that sleep time was self-reported?

- page 8 “studies looking at seasonal changes in sedentary time using accelerometers are sparse, inconsistent and cross-sectional of nature. Are cross-sectional studies in relation to these outcomes a limitation? Recent reviews have shown that both cross-sectional and longitudinal studies have provided consistent findings regarding seasonality and PA levels (Carson and Spence 2010; Rich et al 2012).

- page 10, line 6. As these children did not accumulate more MVPA…maybe this is influenced by your epoch?

- page 10, paragraph 2. Our negative correlation observed between sleep duration…and viceversa. These lines are too repetitive. Re-write please. Why do you think there is a negative correlation?

Limitations: We did not use information from diaries…However, using a diary to note down non-wear time is an effective… Both ideas seem opposite. First you
said is ambiguous and then is effective? Please, clarify.

Conclusions
Why do you talk about southern latitudes? In this study you have data from northern europe, so conclusions should be limited to this.

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

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

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