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: 18 March 2013

Reviewer: Alex Rowlands

Reviewer's report:

This paper uses a repeated measures design to assess the seasonal variation in physical activity, sedentary behaviour, fitness and sleep time in children. These measures are frequently taken using a single measure; this study allows the assessment of how representative one off measures of these variables are. I have a number of suggestions for the authors to consider.

Major essential revisions

1. The discussion could focus more on the effect of using a single snapshot measure to represent a given lifestyle indicator. This is an important message from this paper. For example:

   a. If a single measure has to be used when would be the best time of year to take a given measure? I.e. what was the most representative season? This is addressed in a study on adults for pedometer steps by Kang et al. (Measurement effects of seasonal and monthly variability on pedometer determined data. J Phys Act Public Health. 2012: 9; 336-43).

   b. The relationship between activity measures and CRF was stronger when using the average of three measures. What about the relationship BMI Z score (or weight status)? Measures of health outcomes may be similarly strengthened if using more representative measure of activity and/or sedentary time.

   c. The prevalence of meeting the activity guidelines differed according to the season measured. This deserves more discussions. What are the implications of this? What are the authors'recommendations?

2. Descriptive information is given for boys and girls separately in the Table 1. However, the data for boys and girls is collapsed for other analyses (although sex is used as a predictor in the multiple regression). Consider analysing the data for boys and girls separately. This may be particularly pertinent given the age group. For example, the observed decrease in performance fitness with puberty is more likely in girls than boys.

3. Statistical Analysis: Consider looking at the effect of season X weekday/weekend instead of collapsing data across seasons for the weekend/weekday analyses. Most studies take a single measure so the magnitude of the difference between weekdays and weekends during different seasons is of interest.
4. Statistical analysis: state how sedentary time was adjusted for wear time. Were the other activity variables adjusted for wear time? If not, why not?

5. Results: CRF was 4% higher in spring. How does this compare to the repeatability of the test? In 3rd paragraph of the discussion it is stated that the children ran for longer in the second test in a validation study. How much longer? And how does that compare to the differences observed over seasons in the current study?

6. Results: Present the accelerometer wear time.

7. Discussion: Paragraph 4. What is meant by ‘Canadians are twice as sensitive to 10 mm rainfall…’?

8. Discussion: Paragraph 7. N.B. these variables don’t all add up to 24 h as light activity is not accounted for.

9. Conclusions: The proportion meeting MVPA guidelines changed according to season. This is key and should be stated here.

   a. If activity levels are lower in certain seasons they may be good times to intervene, but is it possible that these are difficult times to intervene as it may be harder to increase activity then?

Minor essential revisions

10. My understanding of this paper is that repeated measures were taken of the same children at 0 months, 3 months and 6 months. If this is the case ‘a cross-sectional study’ is not appropriate in the title. This is also stated in the ‘Strengths and Limitations’ section. Consider the term ‘observational’ instead.

11. Background: ‘as the reliability and validity of habitual….’ Insert ‘estimates of’ or ‘measures of’ before ‘habitual ….’


13. Physical activity and sleep assessment: The Evenson reference for the paediatric cut-point should be given as well as the reference for the Trost comparison study which demonstrated that it was the most accurate out of the ones they tested.

14. Anthropometric measurements: Were these taken at baseline only?

15. Statistical analysis: Two way ANOVA. Presumably this analysed the control and intervention group from the original study which were collapsed for this study as there was no effect of intervention on the variables of interest. Please be explicit here – there has been no mention of the control group.

16. Discussion: First paragraph. Specify the variables rather than healthier lifestyle (and elsewhere in paper). This only refers to activity measures.

Discretionary revisions

17. Physical activity assessment: Why was a 60 s epoch selected? It is recommended to use shorter epochs when assessing activity in this age group.

18. Why was a period of 15 minutes selected to indicate non-wear? This will
likely have included sedentary time.

19. Table 2: Consider presenting the distance run as well as the estimated V02max.

20. What was the rationale for investigating the effect of parents born outside Denmark? No explanations or interpretations appear to be presented for this.

21. Strengths and limitations: It is stated that the effect of school can be assessed. What was the effect of school?

22. It appears to me that the 3rd paragraph of the discussion is more key to the main focus of this paper than the 2nd paragraph. Consider re-ordering.

Minor issues not for publication

23. Abstract: Results, last sentence. Presumably this should read ‘intraclass correlation’?

24. Study population: ‘Children were excluded from the ….’ Presumably the criteria should read ‘3 weekdays and 1 weekend day’?

25. Results: ‘No inter-individual differences were found…’. This compares children meeting and not meeting inclusion criteria? No need for ‘inter-individual’.

26. Results: 2nd paragraph. ‘4th graders accumulating 5.4 min/day less MVPA, being 32.4 min/day more sedentary…’ Should this be 28.8 min/day?

   a. Same paragraph: puberty: 12 min/day more sedentary. Should be 12.4 min.

27. Discussion: Paragraph 5. In this paragraph there are a couple of references to differences between weekends and between weekdays and variation during weekends etc. Should this be between weekdays and weekends?

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

Quality of written English: Needs some language corrections before being published

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

Declaration of competing interests:

I declare that I have no competing interests