Reviewer's report

Title: Short sleep duration and obesity among Australian children

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Reviewer: Jean-Philippe Chaput

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The cross-sectional study by Shi and coworkers aimed at examining the relationship between sleep duration and obesity in Australian children aged 5 to 15 years. The authors confirmed that short sleep duration is associated with obesity, especially in boys aged 5-12 years. Although the paper is well-written, a number of opportunities exist for improvement.

Major Compulsory Revisions

The increment in knowledge over what is already known about the subject is very little. Numerous studies (including meta-analyses, prospective cohort studies and intervention studies) have reported the short sleep–obesity connection. The present observational, cross-sectional study does not add very much to our understanding as to why lack of sleep leads to weight gain. Furthermore, the study is based on self-reported measures of sleep and BMI, thereby diminishing the validity of the results.

It is surprising that the authors consider physical activity/inactivity as a confounder in the association between sleep duration and obesity. In statistics, a confounding variable is a variable that correlates (positively or negatively) with both the dependent variable (i.e. obesity) and the independent variable (sleep duration). However, the confounding variable is not between the two variables (sleep and obesity here) and should not explain the relationship. Physical activity/inactivity should rather be considered an effect modifier in the association (like food intake). I suggest the authors to be clear about that in their analyses. If the adjustment for physical activity/inactivity does not change the OR, then the authors should mention that this self-reported variable does not seem to explain the association in their study.

Minor Essential Revisions

Abstract: The design of the study (observational, cross-sectional study) should be indicated.

Abstract, Introduction section (3rd paragraph), and Discussion section (1st and 3rd paragraph): The authors mention that short sleep duration is positively associated with obesity. This is misleading, because sleep duration is inversely or negatively associated with obesity (inverse correlation).

Introduction, 3rd sentence: Writing that short sleep duration is related to glucose
tolerance and insulin sensitivity is misleading. I would rather write that short sleep duration is related to decreased glucose tolerance.

Statistical analysis, Table 1: The authors mention that comparison of mean values between the 3 groups of sleep duration has been done using linear regression analysis. However, this method does not allow such comparisons. The authors should rather use an ANOVA and post-hoc analysis to contrast mean differences.

Results, 3rd sentence: "Sleep duration significantly decreased with increasing of age". The use of terms "increase" and "decrease" implies an intervention – the authors should use terms such as greater/lesser or higher/lower when describing associations. The P value should be added here.

Table 2, 13-15 years: The authors should explain in the Discussion section why short sleepers in this age group have 50% less chance of being obese. The problem probably originates from the large age range, where children and teenagers are pooled together. Indeed, puberty is generally characterized by an increase in height that is not concomitantly followed by an increase in weight of the same magnitude. In my opinion, the inclusion of adolescents is not a strength of the study and the authors may come to the wrong conclusion that short sleep duration is helpful for body weight regulation of teenagers.

Discussion, 3rd paragraph: Although the association of short sleep duration with obesity is stronger in children, the authors should mention that short sleep duration has also consistently been associated with obesity in adults.

Discussion, 5th paragraph: "Most studies use physical activity as a confounding factor when assessing the association between sleep duration and obesity". True, but this is a mistake, because physical activity is rather an effect modifier of the association.

The authors should mention as a limitation of the study that the dietary pattern of children was not assessed. This is particularly important here, because an increased food intake is the most plausible mechanism explaining the short sleep–obesity connection.

Another limitation is that no difference is made in sleep duration between week days and weekend days. Several studies are showing that people catch up their sleep debt during weekends.

Discretionary Revisions

Introduction, second paragraph, 3rd sentence: I would replace "a recent review" by "a recent systematic review" because the two kinds of articles are different in the way the literature is searched (a systematic review is definitively more robust).

Introduction, last paragraph: no hypothesis is given. In science, we accept or reject hypotheses, not questions.
Were the participants all whites?

Table 1 and Table 2: It would be more logical to swap the short and long sleepers.

Conclusion: The concluding paragraph is repeated.

**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