Reviewer's report

Title: The relationship between school physical activity policy and objectively measured physical activity of elementary school students: A multilevel model analysis

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Reviewer: Natalie Colabianchi

Reviewer's report:

This paper examines the effect of various school-level policies on objectively measured physical activity across 17 schools in Canada. Overall, it is a well-written paper; however, several clarifications and further justification are needed to strengthen the paper.

Major Compulsory Revisions:

The authors examine light to vigorous activity as their outcome. Their rationale for including light activity in addition to moderate to vigorous activity is that the cut points they used to define MVPA were conservative (yet by including light activity participants are getting 3.5 hours a day of activity). Their rationale is not entirely satisfying as they could instead choose different cut points for their MVPA definition. If they want to include light activity for theoretical reasons, they should bolster their justification with additional references (including additional studies that examined the benefits of light activity in kids) or perhaps just model proportion of sedentary.

The authors need to clarify why they control for sedentary time, especially in light of the fact that they include light activity in the moderate to vigorous outcome. Total accelerometer counts are made up of sedentary, light, moderate and vigorous activity. Because the latter three categories constitute their outcome, the balance of the counts/minute—here, defined as sedentary time—is a direct function of wear time (i.e., wear time - defined outcome = sedentary time). If it is theoretically important to control for sedentary time, then proportion of sedentary time might be a better measure (if, in fact, the authors are not intending to control for wear time).

For how long was data collected in each school and across the study? Could the ICC be influenced by seasonality (i.e., the between school variance is partially due to collecting activity data over different seasons?)

The response rate for school inclusion was quite low (11.5%). The authors should comment on how the low response rate may affect the results and whether there are any administrative data that could be used to compare schools that participated versus schools that did not. Similarly, the response rate for students was low (50%). Again, could the authors comment on how the low response rate may affect the results and whether there are any administrative
data that could be used to compare students that participated versus students that did not? It would also be informative to know the extent to which various variables resulted in the loss of participants. For example, if the weekend day requirement for accelerometer wear was dropped, would that increase the response rate? Did some kids have complete data but not a parental survey?

Although the authors did find one significant association, there were 21 other school variables that were not significant. Thus, the conclusion should also emphasize the lack of associations in the 21 other school variables and note that the one significant finding may have occurred only by chance (given the number of analyses run). Along these lines, the abstract should state how many environmental characteristics were examined so readers who only read the abstract have a sense of what proportion of environmental characteristics were significant.

The discussion introduces new variables which were not previous described (how policies are communicated, origins, etc.) If additional results are going to be discussed, they should be described in the methods and results rather than having a first introduction in the discussion.

Is there a significant difference in physical activity levels between maintenance schools and action schools? If so, could the authors speculate why students in maintenance schools would have lower activity levels than students in action schools?

Minor Essential Revisions

In the first paragraph of the study design, the authors write “three phases” but only list two ranges of data collection, so it is not clear what the three phases were.

Table 2: Are statistics calculated for schools or for students? I had assumed schools but most (all) of the percentages are not the result of a number divided into 17 so it is not clear.

The second last paragraph before the discussion is confusing as written.

Discretionary Revisions

The authors speculate in the discussion that different samples could be the reason why their results are different when comparing a study using self report physical activity versus objectively measured activity. Please clarify whether the 17 schools in this study are a subset of the 30 schools in the previous study. If so, more details are needed on how these schools were selected and how they might be different. In theory, the speculation (different results because different samples) could be tested if these 17 schools are a subset of the original 30 by examining the effects using self report in the same sample of schools with only objective data.

As a supplemental analysis, the authors also examined the effects of the
school-level predictors on physical activity just during the school day. They need to state why their main analysis is presented in the context of physical activity throughout the day versus just during school. Why is the former preferable? If the latter is preferable, the results and tables should reflect that analysis.

Provide some basic descriptive on who filled out the school survey (e.g., % principals, % counselors, etc.).

**Level of interest:** An article of importance in its field

**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