Reviewer's report

Title: A 12-week after-school physical activity improves endothelial cell function in overweight and obese children: a randomised controlled study

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Reviewer: Kevin R Short

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These are the comments to be conveyed to the authors:

The finding that EPC number increases and cIMT decreases in response to 12 weeks of supervised exercise training in overweight adolescent children is significant. There are other studies that have previously shown that EPCs increase in response to aerobic exercise, but the effects of aerobic plus resistive exercise have not been demonstrated. The novelty of the study is somewhat limited considering that there wasn't a group that performed only the resistive exercise; as a result it remains unclear if the responses reported in the current study are due to the aerobic exercise component only or if the resistive component added to the response. From a public health standpoint, of course, resistance training is highly encouraged, but from a clinical science standpoint, the value of resistance training on the primary outcomes in this study are not clear from the study design.

Key concerns:

1. The sample size of each group is relatively small. It would be useful to explain in the Methods how the sample size was determined before the study began. Which variable(s) was/were considered the primary outcome(s) to determine the power and appropriate sample size?

2. The change in carotid IMT is somewhat unexpected in just 12 weeks because this measurement can be challenging to perform and the rate of change tends to be slow. To increase confidence in the results the authors should report the test-retest variability in their research center.

3. Similarly, there should be some test-retest statistics reported for the endothelial progenitor cell (EPC) measurements. The control group shows rather large increases in CD34 and CD133 that raise some concern about the stability of these outcomes. Although the corresponding changes in the exercise group were larger, the high variability should be explained. Additionally, legends for the EPC figures are too brief: please explain how the data are expressed (% on the y-axis is percentage of what?).

4. What was the timing of the post-intervention measurements relative to the last exercise session? Presumably, it could be as little as 17-18 hours if performed the morning after the last exercise, or as much as a few days. This timing is critical for understanding the changes reported. For example, as the authors cite,
recent studies have shown that EPC content in the circulation increases following a single bout of exercise. This is likely due to the mobilization of existing EPCs. However, it is unclear in the present study if the increase in EPCs is due to the effect of the last exercise or adaptation to a higher level of habitual physical activity. Likewise, VEGF is known to rise and fall following exercise to the timing of the measurements is critical.

5. The discussion is too long and unorganized. There needs to be better structure and flow from one topic to the next.

6. The authors should seek assistance with English grammar and style.

Additional concerns:

1. If group assignment was truly random, it would be rather lucky for the two groups to be so closely matched at baseline for the variables in Table 1, including the number of boys and girls per group. Was there some attempt at matching?

2. There is no mention about whether there were any participants who discontinued the study due to illness, injury, or other reasons. This should be stated clearly.

3. Was there confirmation of activity and diet maintenance in the control group? Similarly, there should be some assessment of the overall level of physical activity in both groups. A question that is unanswered is whether the exercise group added to the total weekly physical activity or at least vigorous activity by participating in the study programme, or if they reduced time spent in activities outside of the study programme.

5. What type of dietary advice was provided to the participants? Although it is plausible that they would experience a reduction in waist circumference with 12 weeks of exercise, the total volume of activity is unlikely to be enough to account for a decline in body mass and BMI unless they performed additional exercise outside of the programme and/or reduced dietary energy intake, especially in light of the fact that they are still growing.

6. There is a partial explanation for strength testing in Methods but this needs to be expanded. The results of strength tests before and after the intervention should also be provided.