Author’s response to reviews

Title: A school-based intervention improved dietary intake outcomes and reduced waist circumference in adolescents: a cluster randomized controlled trial.

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Author’s response to reviews:

We appreciate the valuable comments. Responses to the comments are preceded by the letter R; extracts of the manuscript are preceded by the word Extracts.

Reviewer's report:

This article describes the findings of a large school-based intervention. The paper focuses specifically on results related to changes in dietary habits and waist circumference and all provides some results of a process evaluation. Results related to at least one other outcome measured (physical activity) in the same study have been published previously. Specific comments below:
ABSTRACT

- The abstract does not mention that the results of the process evaluation will also be included as outcomes reported on in this paper ("This paper reports the effect on dietary outcomes (fruit and vegetables intake, added sugar, unhealthy snacking, unhealthy snacking at school and breakfast intake) and waist circumference"), thus I was a little surprised to read so much on the methods and results of that portion of the study.

R: Following comments from the reviewer, we narrowed down the process evaluation section. We retained dose and reach of the intervention strategies to understand the effect by intervention stage.

We have reformulated the research objectives in the Abstract as follows:

Extract:

This paper reports: (i) the effect on fruit and vegetable intake, added sugar intake, unhealthy snacking (consumption of unhealthy foods eaten during snack time; i.e. table sugar, sweets, salty snacks, fast food, soft drinks and packaged food), breakfast intake and waist circumference; and, (ii) dose and reach of the intervention.

- Key words could be improved. Spelling mistakes should be corrected.

R: The following keywords are now included:

Health promotion, dietary intake, Andes, cluster randomized controlled trial

- In abstract and throughout, I am not familiar with the term "less competitive foods". After reading the complete article I understand that is used to mean less healthful foods, correct?

R: We thank the reviewers’ comment. We have replaced “competitive” foods with “unhealthy foods” throughout the whole document to ensure clarity. Additionally, we explain what unhealthy snacking means in the abstract.

- A problem first noted in the abstract and repeated several times in the manuscript was a confusion of the interpretation of the results on daily fruit and vegetable intake. The results imply an increase in grams of fruit/vegetable intake when comparing the intervention to the control group (23.88 g), but the authors consistently use the term "decreased".
R: At the end of the intervention, fruit and vegetables intake decreased in both the intervention and control groups (see Table 3). Fruit and vegetable intake differences (baseline - follow-up) are negative values; therefore, the net Beta coefficient in the regression models is a positive value, which introduces confusion in data interpretation. Although fruit and vegetable intake decreased, the intervention group did better with a lower decrease in fruit and vegetable intake. The decrease in fruit and vegetables intake was 23 grams lower among the intervention group, which means that the program was not able to increase the intake, but, has the capability to attenuate the decrease of fruit and vegetable intake during adolescence.

The manuscript has been adapted accordingly for clarity.

INTRODUCTION

- Rather than spend any time on describing global prevalence of obesity and diabetes among adults, authors should discuss prevalence rates in school-age children directly and then discuss how obesity tracks into adulthood.

R: We revised the introduction accordingly (see first paragraph, page 4).

- Page 5, the authors mention school-based interventions conducted in Chile, Mexico in Brazil, yet only cite a single paper of a study conducted in the US. Was this a referencing error?

R: Indeed, this was an oversight which has now been corrected. This section now includes a reference to a systematic review of school-based interventions in LMICs, together with more recent publications in the region.

- Page 5, additional information is needed to explain why the Andean region of Latin America might need specific interventions. This reviewer agrees, in principal, that the statement is true, but a least 1 sentence justification is needed.

R: the following sentence has been added:

Extract:

Unfortunately, school-based interventions have not been performed in Andean States such as Colombia, Bolivia, Ecuador and Perú, where the ethnic, cultural and social context differs in comparison with other Latin American countries [18, 19]. This is especially important as health promotion success rates rely on context considerations [20].
METHODS

- This section is very long. As at least one article is already published with the same intervention, could a more succinct methods section be provided?

R: We understand the reviewer’s point. The published paper presented methods (i.e. strategies, objectives) and results for physical activity and physical fitness components, hence reducing this part might compromise correct interpretation of the findings. We did reduce substantially the process evaluation methods and results.

- There are many areas that the English grammar could be improved, but specifically the paragraph beginning with "Unhealthy snacking…” should be re-written.

R: The paragraph has been rewritten and the whole document has been revised by a native speaker.

- This reviewer is unsure about adjusting for sex, as it was a matching criteria for the school clusters.

R: Indeed, the schools were matched by type of school, which includes sex of the adolescents. Performing the analysis with and without adjustment for gender did not yield any important differences. Nevertheless, taking into consideration that the possible difference in intervention effects by individual sex, and baseline differences (more girls participated in the intervention group (66.2% in the intervention group vs. 58.2% in the control group); we considered it important to adjust the analysis for gender differences and therefore have decided to keep the original results.

RESULTS

- Page 16, comparisons would be easier to interpret with the complete information. For example the authors wrote: "At baseline, adolescents from the intervention group consumed, on average, more fruit and vegetables (7%) than those in the control group. Whilst adolescents in the control group consumed more competitive foods during snacking (11%)." In both sentences we are missing the % in the opposing group (control in the first sentence and intervention in the second sentence).

R: Complete information is included in the revised version.
We have reformulated the text as follows to clarify the differences:

Extract:

Outcome data at baseline and the two follow-up periods are reported in Table 4. At baseline, adolescents from the intervention group consumed (7%) more fruit and vegetables than those in the control group (median (IQR) intake: 204.6 g (19.1-337.0) for the intervention and 191.5 g. (104.1-304.2) for the control group). Whilst adolescents in the control group consumed 11% more unhealthy foods during snacking (median (IQR) intake: 94.5 g (27.5-220.0) for the intervention and 97.5 g (40.0-258.0) for the control group)

- The authors state: "No significant differences in outcomes at baseline were found between the final sample remaining for analysis and the participants lost to follow-up." No differences with respect to what?

R: In the data analysis section we explain: Outcome data differences at baseline between participants who dropped out and those retained for analysis were assessed using linear regression models adjusted for treatment allocation matching pairs and cluster design.

The results were reformulated as follows:

Extract.

No significant differences in primary and secondary outcomes at baseline were found between participants who dropped out and those retained for analysis

- As stated in comments above, there was considerable confusion with the interpretation of the results related to fruit/vegetable intake.

R: As described in the abstract comments, these results were reformulated throughout the whole manuscript. Furthermore, we have reformulated the discussion section to clarify this issue:

Extract:

At the end of the intervention, fruit and vegetable intake decreased in both the intervention and control groups, but this decrease was lower in the intervention group. Although the intervention was unable to increase the fruit and vegetable intake, it effectively attenuated the decrease of fruit and vegetable intake during adolescence. Still, the intake in the intervention group in the
present study remained below the recommended intake of 400 g of fruits and vegetables per day [38] and the effect is lower compared to other school-based health promotion programs in this age group [39, 40]. We should note though that the latter programs included fruit and vegetables as the only outcome.

- The authors state that effects were larger during the first stage and level off after stage two, but that does not seem to be the case for sugar or (what the authors call) competitive foods intake. I think what the authors mean is that the biggest change was between baseline and first follow-up, versus between the first and second follow-up. Because if you compare baseline to the second follow-up versus baseline to first follow-up the changes are greater for at least the 2 items I previously stated.

R: We agree. In the revised manuscript, we omitted “the effect was and attenuated at stage two” highlighting the fact that the bigger effect was seen during stage one.

The discussion was reformulated as follows:

Extract:

The effect on fruit and vegetable intake, unhealthy snacking and waist circumference was larger during stage one of the intervention. Differences in program implementation between stage one and two can explain this. In contrast to stage two, (i) participatory workshops were performed, (ii) dose and reach were higher (iii) and more workshops with the food kiosks staff were implemented during stage one. Previous studies have shown how participatory approaches [43] and parental support are important factors for school-based health promotion [44]. The low parental response could be the consequence of the lack of parents’ recognition of their responsibility in their children’s eating behavior according with qualitative data obtained in the same population [25]. Future studies should identify the most effective strategies to involve parents in diet-oriented health promotion programs implemented in LMICs. Previous reports from high-income countries have documented the difficulty of reaching parents even after adapting interventions to their requirements [45]. The latest research suggests that there is still insufficient evidence on how to engage and reach parents in these kinds of programs.

- Page 18, the statements regarding bachelor grades are unclear.

R: in the results section, we explain:
Dose and reach are reported in Table 5. While 99% of the classes were delivered in stage one, this percentage decreased to 91% in stage two (Table 5). This decrease is explained by the fact that half of the participants reached high school; in the Ecuadorian school system, at high school, adolescents are distributed into different specializations according to their preferences, the last implies that more classrooms had to be included to involve all the sampled adolescents.

Instead of bachelor degrees we use high school in the corrected version, this explanation clarifies the statements.

- This reviewer is not understanding the necessity of including the results of the process evaluation. This item requires much explanation for what, in this reviewer’s eyes, provides little gain.

R: We understand the reviewer’s viewpoint, and have included only those data of the process evaluation to allow for a better interpretation of results. PE data will be fully reported elsewhere. Dose and Reach per intervention stage are maintained to enable interpretation of the differences in effect at stage one and at stage two to facilitate clarity and readability.

CONCLUSIONS

- The authors state: "More intensive coverage, active participation of stakeholders and involvement of researchers might enhance the effect". Is this in reference to the current study or in general? The intervention discussed seemed to involve many stakeholders.

R: The statement refers to the current study stakeholders. Nevertheless, the authors believe that this statement did not add sufficiently to the text. We have dropped the sentence, in the revised version the conclusion has been reformulated:

Extract:

Conclusions

ACTIVITAL had positive effects on dietary risk factors for NCDs, i.e. fruit and vegetable intake and the consumption of unhealthy food items during snacking. Although still below the nutritional recommendations, the combined effect of the intervention is encouraging and promising [4, 39]. It suggests that school-based interventions can address various risk factors simultaneously in adolescents from LMICs. The program strategies must be implemented at the
national level by collaboration between the academia and policy makers to assure impact at larger scale.

- "Future studies should determine the effectiveness of the intervention at large scale"---how much larger of a scale? Do authors feel that the sample was too small to show effects? To what end should a larger intervention be implemented?

R: The sentence was reformulated:

Extract

The program strategies must be implemented at the national level by collaboration between the academia and policy makers to assure impact at larger scale.

R: As we mean that the strategies must be implemented by governmental organizations rather than testing the effectiveness of the program since the sample size and power were sufficient to test the intervention effect.

Overall: many English mistakes should be corrected, "truck", "naturally sugars", "trail".

R: The English was revised by a native speaker, food tuck shops was replaced by food kiosks as this better describe the structure of local school food services.