Author's response to reviews

Title: A novel school-based intervention to improve nutrition knowledge in children: Cluster Randomised Controlled Trial

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Author's response to reviews: see over
Dear BioMed Central Editorial Team,

RE: REVISED VERSION manuscript MS: 2130084261254560

We thank you for giving us the opportunity to resubmit our manuscript entitled “A novel school-based intervention to improve nutrition knowledge in children: cluster randomised controlled trial” to BMC Public Health as an original article.

We have responded to all the points made by the three reviewers, reformatted the article to comply with the journal style and have uploaded the revised manuscript. Please note the key message of the manuscript remains unchanged, but the reviewers’ comments have helped us to improve the paper further. Our responses to the reviewers’ comments are included with this letter.

Thank you for your interest in our work and we look forward to hearing from you.

Sincerely,

Rajalakshmi Lakshman (on behalf of all authors)

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Reviewer 1
MINOR ESSENTIAL REVISIONS
The conclusion in the abstract holds the suggestion that the Top Grub' card game is effective. Some positive results might have been found, but to be able to conclude on the effectiveness of Top Grub more research is needed. Therefore this sentence needs to be rephrased.

Response
In spite of the headline results remaining significant after re-analysis (total score increased by 1.1 in intervention schools and 0.3 in control school), we have rephrased this sentence in the abstract removing the word 'effective'. We have also changed the results in the abstract based on the 'school-level' reanalysis suggested by Reviewer 4.

Reviewer 2
DISCRETIONARY REVISIONS
Comment 1 (Introduction):
See last sentence of the third paragraph in the introduction: “In order to achieve this it would be useful to increase knowledge of nutritional content of commonly consumed foods and understand food labeling”. What is the purpose of mentioning the importance of understanding food labeling in reaching the key targets to improve the nation’s diet? Is this relevant for the content of the article? This was not part of the intervention?

Response
We have removed mention of food labelling.

Comment 2 (Method section: recruitment and randomization of schools):
In the author's response to the fourth comment of the first revision, arguments for matching the schools for deprivation and size are raised. I should also integrate the argument in the article as it will add to the foundation of the research.

Response
We have added the following sentence to the methods section

‘We matched the schools for deprivation and size as we felt that both these variables could have an effect on effectiveness of the intervention on the primary outcome, nutrition knowledge. In England, children who qualify for free school meals are from lower socio-economic backgrounds and other studies have used percentage of children eligible for free school meals as a proxy for deprivation.’

MINOR ESSENTIAL REVISIONS
Comment 3 (Method section – Delivery of the intervention):
The first paragraph describes the procedure for the questionnaires and is in my opinion not part of the intervention delivery (see also comment 9).

Response
We have moved this sentence to the section on ‘questionnaire development’

Comment 4 (Method section – Development of the nutrition knowledge questionnaire):
What is the reason for only assessing knowledge about recommended portions of fruit and vegetables and not about recommended portions of the other nutrition components included in the intervention? Can the author comment on this?
Response
The curriculum did not cover recommendations for other nutrients; hence knowledge about these was not assessed.

Comment 5 (Method section – Secondary outcomes)
“We also asked whether they would try to eat a healthy diet”. Can the author clarify which scale has been used to assess this item?

Response
We have added the following sentence to the text
We also asked about whether they would try to eat a healthy diet with the options of –yes/ no/ maybe/ don’t know/ already eat a healthy diet.

Comment 6 (Method section – Secondary outcomes)
As a reader you can assume that the attitudes towards healthy eating have been assessed in the knowledge questionnaire (pre – post). However, this is not explicitly stated in the article and it is advisable to add this in the questionnaire section.

Response
We have added the following sentence to the questionnaire section (secondary outcomes)

In addition to knowledge, we sought to assess attitudes to healthy eating, at baseline and follow-up, using three questions…..

MAJOR COMPULSORY REVISIONS
Comment 7 (Introduction):
The introduction does not reflect a solid theoretical basis. In particular, the influence of nutrition education/nutrition knowledge in establishing a healthy diet is not sound enough. In addition, the introduction seems to implicitly accept that knowledge will lead to behavioral changes while previous research has shown that only improving knowledge will not be sufficient. Can the author comment on this and/or revise the introduction?

Response
We have made it explicit in the introduction that

Nutritional education is important, though not sufficient to empower individuals to improve their diet.

Comment 8 (Introduction):
See last sentence of the third paragraph in the introduction: “In order to achieve this it would be useful to increase knowledge of nutritional content of commonly consumed foods and understand food labeling”. Can the author support this aspect by more recent evidence and in particularly in 9-11 years old children? The reference which is currently mentioned is quite general and not the most relevant in describing the role of nutrition knowledge in establishing healthy food behaviors in the age group of the article.

Response
We could not find evidence specifically among 9-11 year old children that increasing knowledge would change behaviour and as mentioned before, we have rephrased
the sentence. We have also added an entire section to the discussion (see response to comment 10).

In order to achieve this it **may** be useful to increase knowledge of the nutritional content of commonly consumed foods.

Comment 9 (Method section – Development of the nutrition knowledge questionnaire) It is in my opinion advisable to broaden this part of the method section and to not only restrict it to the development of the questionnaire. This means that it is advisable to include the procedure of distributing the questionnaire in this section (see comment 3) and to describe the entire content of the questionnaire (see comment 6).

Response
We have added the sentence about questionnaire distribution to this section and uploaded the questionnaire as an additional file so that it can be accessed by readers who are more interested in these details.

Comment 10 (Discussion)
In my opinion, the discussion still needs to be improved. The focus is now put on the prevention of overweight and different (multi component!) school based interventions are discussed. However, the current intervention is implemented at the classroom level and was aimed at increasing nutrition knowledge and these areas are not thoroughly/directly discussed. Can the author comment on this and/or revise the discussion?

Response
We have added a section in the discussion describing the studies evaluating nutrition education programmes.

**Comparison with other school-based nutrition education programmes**
There are no studies similar to ours and only a few studies incorporating nutrition education as a single component………

**Reviewer 4**

**MAJOR COMPULSORY REVISIONS**
(1) Strategies of data analysis are dictated by the study design and measurement scales. In this study, the experimental unit (or sampling unit) is “school” not “student” – since randomization was among schools (students were not randomized to intervention or control). Comparison of mean levels should use an error term computed from school responses (SD and number). Individual student responses are nested within schools, if authors include “student” in the statistical analysis. Although student responses (intial and 9w) cannot be linked (mentioned by a referee and the authors), school (mean) responses can obviously be paired or linked for comparisons within study groups. As currently described, methods of data analysis avoid the issue of the study design experimental unit, hence, current results could be based on an inappropriate analysis. Statistical methods (page 7 and 8) need to better explain how mean levels of “intervention” and “control” were compared (with and without covariate adjustment). Current results might need revision.

Response
We have redone the analysis using ‘school’ as unit of analysis. We have added the following to the methods section and the results have been changed accordingly.

School-level mean scores at follow-up were compared between the intervention and control schools using linear regression (inversely weighted by the standard error of the school-level mean score), including mean baseline school score, deprivation and school size as covariates.

MINOR ESSENTIAL REVISIONS
(2) A table of school mean levels at baseline and 9 weeks would be informative to readers. This table could also provide school covariate descriptors (this follows comment (1)).

Response
An additional table has been added (Table 2).

(3) It is not clear what variation the SD in Table 1 describes. Is this “among schools” or “among students” or something else?

Response
The SD describes the variation in school-level mean scores between schools. We have amended the title of Table 1 to clarify this.

(4) The model used for covariate adjustment is correct, such a procedure can alter study group mean levels and alter the error term used for comparing adjusted means (usually both are achieved). The authors make no mention of the statistical appropriateness of the regression model used for the “adjusted analysis” (I assume it was a main-effect-only linear regression type model). The covariate influence within the 2 groups should be very similar.

The reviewer is correct that the model only includes main effects.