Author’s response to reviews

Title: Effects of a physical education intervention on cognitive function in young children: randomized controlled pilot study.

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Responses to Reviewer Comments and Summary of Changes Made, BMC Pediatrics MS 2697304325219426. Note that all changes to revised manuscript are underlined

Referee 1

Abstract
1. Recommended describing the intervention more clearly, and omitting last sentence.
Our response: Now done—see revised Abstract.

Introduction
1. P4 line 13, clarify ‘Effect sizes and information to calculate sample size and ensure adequate power’.
Our response: Now clarified as requested, see p4 of revised abstract.

Methods
1. Participants—recommended clarifying the number of children available.
Our response: Now done, see revised Methods p.5 (and see similar point made by referee 2).

2. Suggested that the statement that the study involved two phases was repetitive and could be deleted.
Our response: Agreed, we deleted the section referred to here.

3. Measures—requested a slightly more expanded description of the cognitive tests, and noted that not testing the reliability of CAS was a limitation since reliability had been established in only a single study.
Our response: We have expanded the description of the cognitive tests as requested (see revised Methods p5-6).

4. Intervention-referee sought greater clarity over why the control group also received one extra hour per week of PE, and whether the additional hour was also taught by PE specialists.
Our Response: The rationale for the extra hour of PE in the control group, and the intervention and control PE delivery have been expanded and hopefully clarified in the revised manuscript (see p7-8).

5. Accelerometers-referee suggested greater justification of the use of 1 minute epochs for accelerometry, and the choice of accelerometry cutpoints used for sedentary behaviour.
Our response- we have clarified these points (briefly and with reference to a review) in the revised manuscript, as requested (p9).

Results
1. P10 12 and 5 minutes MVPA did not correspond with table 1
Our response-now clarified (p12) and cross-reference made to the data being referred to in new table 2.

2. Recommended inclusion of between group differences and/or 95% CI.
Our response- we agree that these are useful and have provided them for the significant differences which were observed (see table 4—was table 3 in the original manuscript). For the non significant differences this would entail a very unwieldy table given the number of outcome measures, and also we felt it would be overstating the importance of what was an explanatory study.

Discussion
3. P12 first paragraph. Requested an expansion of the issue of the reliability of the CAS, notably whether a single study of reliability of CAS was sufficient, and whether there were important differences between the study which tested reliability of the CAS and the present study.
Our response-point taken and made in revised Limitations section of Discussion on p15.

4. P12 second paragraph- noted typographical error over number of participants in the Davis et al study (n 92 or n 100).
Our response—we have now corrected this typographical error earlier in the manuscript (and in fact edited out this particular text).

5. P12 3rd paragraph. Recommended breaking up what was a very long initial sentence.
Our response-point taken, now done, and this text now on p13.

6. P12, requested that we expand on what effect size might be of biological
significance.

Our response- we agree that this is useful (same point made by reviewer 2) and have now clarified that what we meant here was the ability to detect differences which were real (beyond the limits of imprecision in the measures)-see revised p13, last two lines.

4. A number of improvements to / corrections to the tables and Figures were suggested: many corrections / clarifications to table 1; changing terminology in table 2 to avoid confusion; addition of change data to table 3 rather than just p values; explanation of loss of data/participants to be added to the figure.

Our response- These are all helpful suggestions and all have been made-see revised Tables and Figure. Note also that table 1 has been split into two tables to aid clarity, and other tables renumbered.

Referee 2

Main Point 1. Suggested that the Discussion focus more on the issue of the cognitive tests (and potential importance of associations between cognition and physical activity) and less on the physical education aspect of the study.

Our response: Point taken, and revised Discussion has reduced emphasis on the PE lesson and more on the wider implications of the study, e.g. for public health/physical activity promotion. See start of revised Discussion on p13.

A number of specific revisions were recommended by the reviewer. We have made all of these and a summary of changes is listed below, by page and paragraph.

P3 para 2. Have now noted that the issue of physical activity-cognition relationships matter across a wider age range (see Introduction p3 and Discussion p13).

P4 para 1. We have noted that the duration spent at specified intensity of physical activity during PE might matter-see revised p4.

P5 para 4. We have now clarified that cognitive tests were carried out individually (p5).

P6 para 1. We have now clarified why the ANT and CANTAB were administered on 3 separate occasions (now p5 and p7) and checked the text for consistency with table 2, as suggested.

P6 para 2. We have clarified that it was the local council PE specialists who developed the PE programme (and they were responsible for all schools in the local council area, ie both control and intervention schools), now on p7.

P7 para 1. We have clarified that object control skills were emphasised only in the control group (now p8).

P7 para 2. We have clarified that PE lessons were observed, but not using any
formal method to quantify physical activity intensity as the point of the observation was simply to keep compliance from teachers and pupils high/identify any problems with compliance-see revised manuscript bottom of p8 and top of p9.

P9 para 1. Sentence on prior work by Davis et al was repetitive and is now omitted as recommended.

Results
Initial section of Results-was P9 para 2. We have made reference to Figure 1 here as recommended, and have clarified differences between the two groups here-see 2nd paragraph on p11.

P11 para 1. Inclusion of the ANT subscale ‘Reaction Time’ when it was not reliable-point taken and we have now deleted this from Results and have added a caveat to the Discussion Limitations section about significant changes which favour the intervention when the numbers are small and reliability of the measure is poor (see p15).

P12 para 3. We have now added a brief sentence on limitations of the Davis et al study along the lines suggested, and have clarified that ‘the intervention’ refers to the PE intervention in the present study-now on p14.

P13 para 2. We have acknowledged limitations in our study along the lines suggested-our direct observation and other methods used did not lend themselves to a needs assessment and we were unable to carry out qualitative studies with stakeholders; limitations in the ability to provide PE lessons of fairly high and sustained physical activity intensity affected the present study. See Methods p8 where we clarify the purpose of the direct observation of PE sessions , and also p16 where we make the distinction between what our pilot intervention could do and what future more translational studies would have to do. We also acknowledge inadequate information on baseline PE, including information on nature/intensity of physical activity of PE sessions (p16).

P13 para 3. ‘Biological significance’ criticised- see same point made by reviewer no. 1. We have now deleted this term and expanded on what we meant by: referring instead to the ability to detect specified effect sizes, and to detecting differences which could not have arisen simply due to measurement imprecision (see revised p13).

Variety of typographical errors have been corrected as recommended throughout text, tables, figure and references.

Figure 1 typographical errors corrected, 10 week intervention noted, response rates /attrition added (see same comment from reviewer 1), and cognitive tests added in same order.

Table 1. Clarified this as recommended, and corrected typographical errors. For clarity this has also been divided into revised tables 1 and 2.
Table 3. Typographical errors corrected here and throughout the text.