Author's response to reviews

Title: Associations of BMI and waist circumference with: energy intake and percentage energy from macronutrients, in a cohort of Australian Children

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Author's response to reviews: see over
To whom it may concern,

Please find attached a point-by-point response to the concerns raised by Reviewers for the following manuscript:

**Manuscript number:** 7846494084434610

**Title:** “Associations of BMI and waist circumference with: energy intake and percentage energy from macronutrients, in a cohort of Australian Children”

**Authors:** Sarah A Elliott, Helen Truby, Amanda Lee, Catherine Harper, Rebecca Abbott, Peter SW Davies

We look forward to hearing from you.

Yours sincerely,

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Reviewer(s)' Comments to the Author:

Reviewers Report # 1: Jean Bernard Ruidavets

1. **Reviewers Comment**

   Firstly the lack of physical activity assessment. I don’t understand how the relationship between obesity and diet can be studied without taking into account energy expenditure due to physical activity.

2. **Authors Response**

   The focus of this paper is the important issue of the relationship between energy intake and energy from macronutrients with BMI and WC in a cohort of Australian children. We acknowledge the fact that variations in physical activity may also influence those parameters, however that is not the focus of this particular paper. Numerous papers have appeared in the literature that have a similar focus [1-5]. We acknowledge this comment in our discussion.

2. **Reviewers Comment**

   Secondly, considering within-subject variability in studies of diet, one-day record seems to be insufficient to estimate macronutrient intakes accurately and to rank subjects correctly according to their nutrient intakes. In that case to remove under-reporters and over-reporters of energy intake is only a stopgap solution.

2. **Authors Response**

   Dietary intakes and food habits were assess by 24h food and drink records, similarly to the 2003 Physical Activity and Nutrition Levels in Western Australian Children and Adolescents Report, which was adapted from the 1995 National Nutrition Survey. The Authors acknowledge that although a 24h food and drink record is not always representative of an
individual’s intake because of day-to-day variability, it is a valid measure of the diet of a group or population and is a common method used in large nutrition surveys. We have attempted to maximise the accuracy of our data by screening the energy intake data for non-plausible results using the method described by McCrory et al., [6] and have now acknowledged the limitations with using a 24h food and drink record in the discussion.

3. **Reviewers Comment**

   No information concerning participation rate and its influence on the data has been reported. What is the true participation rate? Schools with less than 25 students, special schools and schools classified as ‘very remote’ were excluded. A percentage of subjects refused to participate. Some records were not considered because of missing data …

3. **Authors Response**

   The Authors have added into the results section a more detailed description of the participants that responded to the HKQ survey and completed a 24h food and drink record.

4. **Reviewers Comment**

   It is not clear how the sampling design has been taken into account in statistical analyses.

4. **Authors Response**

   The data arising from the survey were weighted because the sampling did not achieve an equal probability of inclusion of all children in the target population. Firstly, because the number of classes varied by school, as did the number of classes selected from a given school. Secondly, not all selected children responded, leading to a potential response bias. A more detailed description of the sampling method has been reported in the Healthy Kids Queensland Survey 2006 – Summary Report. The Authors have included a summarised description of how the sampling design has been take into account in the statistical analysis section of the manuscript.
5. **Reviewers Comment**

   Height; if two measurements differed by 5 mm or more, a third measurement was taken and the mean of the two closest measures were included in analysis. For the following example: 100, 101 and 102 cm which measures are the closest?

5. **Authors Response**

   The sentence has been amended to say, “Height was measured twice to two decimal places, and the mean of the two measurements were recorded. If the two measurements differed by more than 5 mm, height was measured again until two measurements which did not differ by more than 5 mm were recorded”.

6. **Reviewers Comment**

   In the methodology section, statistical analysis is not clearly stated and it is difficult to understand what has actually been done.

6. **Authors Response**

   This paragraph has now been amended to clearly state the statistical methods used and for the reader to understand the statistical analysis carried out.

7. **Reviewers Comment**

   The authors performed post-hoc tests, but the statistics (methods) used are not given.

7. **Authors Response**

   This paragraph has now been amended to clearly state the statistical post hoc methods used.
8. Reviewers Comment

Some variables can be expressed as a linear combination of other ones. How can the model fit when the following variables: protein, fat and polysaccharide expressed as % of energy intake, were introduced together?

8. Authors Response

The analysis used, i.e. multiple regression, allows the contribution of each macronutrient (expressed as a percentage of total energy) to be related to our outcome measure BMI and WC independently of each other. If the correlation between the independent variables is too high, the model rejects the addition of that independent variable.

9. Reviewers Comment

Table 2 and table 3 could be merged.

9. Authors Response

The Authors agree with the reviewers comment and have amended the tables accordingly.

10. Reviewers Comment

In table 5 reference mark ‘star’ is useless.

10. Authors Response

The author agrees with the reviewers comment. Footnotes for this table have been amended.
11. **Reviewers Comment**

In discussion, a paragraph should specify the study limitations and the potential biases.

11. **Authors Response**

The authors have added a paragraph into the discussion section detailing the specific study limitations and the potential biases with this current study. This paragraph reads, “The Authors acknowledge that although a 24h drink record is not always representative of an individual’s intake because of day-to-day variability, it is a valid measure of the diet of a group or population and is a common method used in large nutrition surveys. Moreover, we have not included a measure of physical activity in this analysis as a reliable or accepted measure of total energy expenditure or the energy cost of activity was not available in this cohort. We acknowledge the variability in physical activity levels will influence the relationships found here”.
Reviewer’s report #2: Noel A Cameron

1. Reviewers Comment

1. This is an interesting paper on a theme that is of broad concern amongst those interested in the determinants of obesity and in developing intervention methods to curtail its global increase. Thus the topic deserves greater coverage than heretofore. The lack of a clear association between macronutrient intake and overweight/obesity in children makes intervention planning more difficult although the finding from this study of a clear, albeit small, significant relationship between energy intake and indicators of overweight/obesity, across three very different age groups, is welcome. The study is well thought out and robust in the sense that those not passing McCrory stringent criteria for plausible 24 hour dietary data were excluded. The fact that this amounted to 45% of those with complete data and only 37% of the initial sample is of some concern. The fact that so many participants were excluded calls into question the general validity of the 24 hour dietary assessment tool. It is a serious flaw that the authors fail to address external validity when faced with this level of exclusion.

1. Authors Response

We are grateful to this referee for his many positive comments in relation to our manuscript/ the fact that a 24h food and drink record has limitation will be of no surprise to many, including the referee. It is one of the most significant issue in this field, in that attempting to determine what an individual eats on a habitual basis is one of the most important nutritional parameter and also one of the hardest to assess. Many researchers in the field simply acknowledge the problem and nothing more. We have at least attempted to maximise tour validity by using the method of McCroy et al., [6] to elimination implausible data.

2. Reviewers Comment

2. I think that the conclusion is weak and not well thought out. Having found no association with macronutrient intake the authors’ major suggestion is that robust longitudinal studies need to be undertaken to elucidate the relationship linking obesity and dietary data. Why? The cross-sectional study they have undertaken, even for its flaws, is certainly robust. The results are clear and consistent across three age groups covering childhood and adolescence. What would a longitudinal study design contribute apart from rates of change of intake in addition to dramatically increased costs and a long delay in getting results? If the 24 hour dietary assessment tool was the same then no greater accuracy could be expected and the reduced sample necessary for a longitudinal design would mean that the McCrory criteria might decimate the sample. I would suggest that the authors need to either use or develop an appropriate (i.e. accurate and valid) dietary intake assessment method and undertake a repeat cross-sectional study that addresses the problems of the current study.
2. **Authors Response**

While the authors acknowledge that this cross sectional study undertaken is robust, it does not allow us to speculate whether one variable (macronutrient intake) causes another (BMI and WC) to change or exist, only that the two variables are related. The relationship between BMI and WC with macronutrient intake can only be confirmed or ruled out with longitudinal research, where participants are surveyed at various points over time.

3. **Reviewers Comment**

   1. The Introduction is too long. Paragraphs 2 and 3 could be cut without affecting the content.

3. **Authors Response**

   We have shorted the introduction by about 30%. We have done this judiciously, and have not simply removed paragraph 2 and 3, as we feel that they contain some useful and important information.

4. **Reviewers Comment**

   2. It is not clear how the authors arrive at deciding they wish to explore “possible relationships of BMI and WC”. They do not, for instance, establish that the relationship between BMI, WC and body fat has been well established and that BMI and WC are important indicators of obesity and that, therefore, the relationship between BMI, WC and macronutrient intake is of some interest and importance. The final paragraph in the Discussion on page 14 should perhaps be in the Introduction to provide a basis for the study.

4. **Authors Response**

   Again, the authors agree with the reviewers comments, and have amended the manuscript accordingly. The introduction now includes a paragraph detailing why the authors wished to explore the possible relationships of BMI and WC with energy intake.
5. **Reviewers Comment**

3. The McCrory approach appears to decimate the original sample excluding 45% of those with complete data thus only 37% (1352) of the original sample (3691) actually remain. The authors have not addressed the external validity of their sample in relation to either the remaining 1108 (2460-1352) with complete data or the original sample.

5. **Authors Response**

Using the McCrory approach only 55% of those with complete 24H food and drink records remained - 57%, 56% and 52% of year 1, 5 and 10 records, respectively. While only 37% of the original population had complete, plausible data, we still feel this is a representative sample of Queensland children. The 2006 HKQ survey invited a random sample of schools throughout Queensland to participate. Schools were selected using a random cluster design to provide a representative sample of Queensland children.

6. **Reviewers Comment**

4. The authors have a tendency to repeat their introductory remarks in the Discussion paragraphs 1 and 2.

6. **Authors Response**

The manuscript has now been amended so that the introductory remarks are not being repeated in the discussion. A short, concise summary of the papers aims however, has been left in the beginning of the discussion to remind the reader of what the discussion will be conferring.
7. **Reviewers Comment**

5. The author find associations but, as they clearly report, these are small, at less than 10% of explained variance, and thus the functional significance of these findings needs to be discussed. How, for instance, would they recommend that these results are used to develop sustainable intervention to prevent or reduce childhood obesity. Higher energy intake in those with higher BMI and higher WC should trigger some sort of response.

7. **Authors Response**

The reviewer is correct, in that whilst the relationships found between BMI and WC with energy intakes are statistically highly significant, the variations accounted for is relatively small, i.e 10%. Nevertheless, a single factor that influences 10% of the variability in WC or BMI that can be modified would be of significant value in public health nutrition, in our view. Small changes, at the population level, can make big changes to outcomes and risk.

8. **Reviewers Comment**

A statistical revamp is required for external validity

8. **Authors Response**

External validity can be summarised, simple as the degree to which our conclusion would hold for others, at other times, in other places. Thus sampling is important. The HKQ Survey used a random cluster design and the data were weighted to ensure equal probability of inclusion of all children in the target population. A statistical revamp, we believe is not needed, but we do need to add those sampling design details into the text. This has been done clearly in the material and methods section of the manuscript.
References


