Author's response to reviews

Title: The risk of obesity by assessing infant growth against the UK-WHO charts compared to the UK90 reference: findings from the Born in Bradford birth cohort study

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Author's response to reviews: see over
We thank the reviewers for providing these comments. The revisions are highlighted in red so that the reviewers can easily see where changes were made.

REVIEWER 1.

The only discretionary thing I would like to suggest is that the author’s look at the latest National Diet and Nutrition Survey report (NDNS) on DoH website. If you look at the results 4.1b and the description of what was done 4.2.2.2. in a separate pdf - you will see that for the youngest children they have used the new UK-WHO charts and found very high levels of obesity which drop right back in the older children where these charts are not available. Not only that they have actually applied the wrong cut offs to the new charts - 85th & 95th centile instead of 91st and 98th. This is a perfect example of misinterpretation of the new charts. This is in the public domain so might well be worth including in your paper. This is a great example of misinterpretation using the UK-WHO charts – which has been added to the first paragraph of the discussion.

REVIEWER 2

Minor essential revisions.
1) The analytical methods used are appropriate, but the description is a bit too brief. To a reader familiar with multi-level modelling it is quickly clear that that is what has been done. To anyone else this may not be at all clear (other than from the appropriate reference [21]). I think they need to spell out a bit more clearly the advantages of this analysis.

More information, including the model equation, has been added to the methods section.
2) They do not enter into a discussion of whether the 'discovery' of more worrisome BMI gain trajectories with the UK-WHO standards is a genuine reflection of a worrying trend in the studied population or that the UK-WHO standards are inappropriate for the study children. Their data may not allow an opinion, but I think it could be addressed a little more clearly.

Any differences in growth or obesity risk using the UK-WHO compared to using the UK90 are entirely because of differences between the charts (i.e., source sample, statistical design). The presented differences in obesity risk cannot be because of any change within the population, because in all analyses we only use anthropometric data from one sample at one point in time (2008-2009). This is, in fact, a strength of the study design. We have added this information into the first paragraph of the discussion.

Discretionary Revisions.
Much of the philosophy about growth references versus standards was addressed some 30 years ago, and I think this should be quoted (Goldstein H and Tanner JM, Ecological considerations in the creation and the use of child growth standards; Lancet: 315, 582-585).

Now cited in the second paragraph of the introduction.

REVIEWER 3.
Discretionary Revisions.
1) Consider adding “UK90” to your title. For instance, “The risk of obesity by assessing infant growth with the UK-WHO and UK90 charts: findings from the Born in Bradford birth cohort study.
Done.
2) Page 8, second paragraph: The risk of overweight and obesity is explained by ethnic group. You could also describe it by sex differences as well. You don’t necessarily need a table for this.
We did look at this by sex, but because the results were the same for boys and girls, the main table presents figures for boys and girls combined. There were, however, ethnic group differences – which is why we show risk statistics stratified by ethnic group. We have slightly changed the text in the last paragraph of the methods so that the rationale for the data we present is clearer. We think that the finding that difference in obesity risk using the UK-WHO compared to the UK90 emerges at different ages for different ethnic groups is important and we would like to keep Table 2 in the paper to illustrate this.

Minor Essential Revisions.
3) Clarify your objectives in the abstract. Mention the specific population and that you will be stratifying by ethnic group and gender.
Done.
4) It is not clear why the authors say that “the new charts do not allow a focused prevention effort for targeting programmes at infants most at risk of becoming obese.” This is mentioned in the conclusions section. If breast-feeding is ideal then comparing bottle-fed infants to the ideal will indicate risk of future obesity since the literature suggests that bottle fed infants are more likely to become obese/overweight children/adults.
Prevention programmes typically target infants with a BMI above a given centile. Our finding is that the use of a given centile on the UK-WHO charts will identify many more infants (as being overweight or obese) compared to the same centile on the UK90 reference. The UK-WHO charts will “not allow a focused prevention effort” because they will identify many more infants (as being overweight or obese). A focused prevention effort would target a smaller number of infants NOT a much larger number. We have tried to clarify what we mean in the text.
5) Page 8, last sentence in paragraph under “z-scores”: “These plots are shown here instead of those of the growth curves…” It is not clear what plots you mean. Do you mean “points”? We mean the plots that we describe in the previous sentence. These two sentences have been combined using a semi-colon – so that the interpretation is more obvious.
6) Page 9, first sentence of results section. Explain “consistently”. Do you mean at birth or on average over the 12 months?
We meant - consistently over the age range being studied. The text has been changed to clarify this.
7) Page 11, third line, this may be clearer: “Further, the UK-WHO charts were significantly more likely to classify infants in “rapid” and “extremely rapid” (i.e. …..) infant weight and BMI gain (relative risks …..) groups.
This sentence has been edited for clarity.

Major Compulsory Revisions.
Throughout the manuscript there is a reference to “normal” UK infants as those infants in the study sample or in the UK90 reference. This assumes that the UK90 reference is the truth. Normal weight and height for infants could also be argued to be the new growth standards (UK-WHO) because they are all breast-fed, which yields the ideal growth. You should either better define “normal” as you are using it or take out the word. For example, on page 3, first line of the conclusions in the abstract, you could say “The change to the UK-WHO charts means that UK infants once considered of normal weight and height measurements may now be classified as at risk of being on a trajectory toward childhood obesity.”

We use the term “normal” to refer to our study sample, which was not selected on the basis of any defining characteristics. The comparison of their growth to the UK-WHO is therefore a demonstration of the growth of normal UK infants against the new charts. In the second sentence of the abstract and in the first sentence of the discussion we describe what is meant by the use of “normal” in this context. The fact that a growth reference describes the growth of a normal source sample of infants is a separate matter, which we address in the second paragraph of the introduction. It would be wrong to state that the UK-WHO charts depict normal growth – they depict OPTIMAL growth of a source sample of infants who are in most ways NOT normal. We hope that this explanation alleviates any concerns about our chosen terminology, which we don’t believe could be improved.