

Reviewer A

This manuscript assess the effect of different body composition (BMI, FMI, FFMI) on blood pressure in 1609 participants aged 7-18 in South China. The results showed that the relation between BP and FFMI was stronger than with BMI and FMI, which suggests that FMI and FFMI should be considered as useful measurements in helping clinical or healthcare professionals interpret body mass data from children and adolescents. Overall the paper is easy to understand. Some clarifications would improve the manuscript.

Major comments

1. Legends and interpretations of Figure 1 and 2 are confusing.

Figure 1 seems to be age-specific body fat and blood pressure and shows the age trend (overlap with table 2) instead of the association between body mass and BP, but the legend of figure 1 writes “The restricted cubic spline for the association between body mass index and difference in blood pressure” which is very similar with figure 2. Also the interpretation of figure 1 in Results (line 190-191) writes “All composition indexes were found associated with SBP and DBP, after the adjustment of sex, age and residential areas (all $P < 0.001$, figure 1)”. Figure 1 can be removed because it contains the same information as table 2.

Figure 2 is also not clear. From the Statistical Analyses (line 156-157), RCS was used to examined the possible non-linear relationship between body composition and BP. The legend of Figure 2 and interpretation in Results (line 177-178) “The RCS presented in figure 2 added information on that for SBP and DBP, there were also non-linear trends with age increase” mention association of age, but there is no age information in the figure 2 (The x axis is BMI, FMI and FFMI, the y axis is difference in SBP and DBP). In addition, the explanation of Figure 2 is not clear. What does difference in SBP mean? Overall P? non-linear P? the line and two dashed lines? Please also make the numbers in x and y axis larger and clearer.

All of above is confusing and should be addressed by authors.

Thank you very much for your comments. We are sorry that the figure legends for figure 1 is not correct, and we have revised it. Please see in lines 390-400, page 20. According to your suggestion, we remove figure 1.

For the former figure 2 (now it is figure 1 since we remove figure 1 in the original submission), Difference in SBP means the difference between the reference value of SBP (SBP with mean value of BMI/FMI/FMI) and SBP with other value of BMI/FMI/FMI. The RCS model regression result yielded a overall P value reflecting whether there is a significant association between body composition index and BP in the overall level, which included both linear and non-linear estimation. To make better understanding, we specific the association as “linear association” and “non-linear association” in the revised figure1. The line represents the predicted value between body composition indexes and BP, the dashed lines mean the 95% CI (upper and lower) of the predicted value. We have added necessary interpretation in the figure legends for figure 1. Please see in lines 390-400, page 20.

We also improve the quality of figure 1 to make it clearer. Thank you again for your careful review and very helpful comments.

2. Descriptions and interpretations of quantile regression models are not clear

Quantile regression models were used to investigate the age-specific association between body composition and BP. Which quantile was used? Median, 0.25 quantile or 0.75 quantile? The authors need to describe and justify their choice for this method clearly as it is somewhat unusual. The quantile regression coefficients should also be interpreted in Results. For example, what does $B=4.38$ mean? Although body composition indexes were not significantly associated with BP in age 7-8, the B coefficients in age 7-8 are larger than B in many other age groups, the insignificance may be caused by smallest sample size of age 7-8 so under power (111 participants). This can be mentioned in discussion.

Thank you for your valuable comments. We have added relevant interpretations of the quantile regression coefficient in the manuscript, please see in the method section, lines 139-142, page 8. The data distribution and the non-linear association between exposure and outcome lead to inappropriate use of general linear regression models. In this scenario, quantile regression models were used in the current study. Specifically, the median of the outcome was set as the dependent variable.

However, different with linear regression models, the coefficient yielded by the quantile regression is abstract. It means the changes in the quantile as every unit increase/decrease of independent variables. The value of the coefficient can reflect the effect magnitude, i.e. the larger the coefficient was, the stronger the association would be.

We totally agree with you that the loss of statistical significance in the age 7-8 group was probably caused by the small sample size, and we have added some interpretation in the discussion according to your comments, which was “although body composition indexes were not significantly associated with BP in age 7-8, the insignificance association may be caused by the limited sample size.” Please see in lines 280-282, page 15.

Minor comments

1. The paper write “FMI was found to have the highest r-value of correlation with DBP in both boys ($r_s = 0.154$, $P < 0.001$) and girls ($r_s = 0.010$, $P = 0.002$) (Table 3)” in results (line 187-188). However in Table 3, FMI has the lowest r-value of correlation with DBP in girls (BMI is highest with $r_s=0.086$).

Thank you for your comments. We have revised this sentence to “FMI was found to have the highest r-value of correlation with DBP in boys ($r_s = 0.154$, $P < 0.001$), but lowest in girls ($r_s = 0.010$, $P = 0.002$) (Table 3)”. Please see in lines 180-181, page 12.

2. “representative” are mentioned several times in discussion, but no evidence is provide in the manuscript to show that the sample is representative, comparing with Chinese national survey of BP in children and adolescents may help.

Thank you for your comments. We replace some “representative” in the revised manuscript with “community-based”. Please see in line 193, page 12, and line 291, page 17. Under the well-designed multi-stage stratified sampling method, the participants were selected from the target population under the consideration of urban/rural areas, economic status, age distribution (though the youngest group still were not enough, but we tried our best to encourage residents to participate). It surely cannot be representative on the national level, but still would be to some extent representative on an area level. We appreciated your comments and would be more careful on the use of “representative”.

Reviewer B

I consider that the manuscript submitted for review meets the requirements for publication in the journal.

The subject matter is of great relevance, and the results are very useful.

I have not found any error or aspect that could be improved.

So I recommend its publication in its current form

Thank you very much for your comments.