Reviewer’s report

Title: Impact of Adiposity on Cardiac Structure in Adult Life: the Childhood Determinants of Adult Health (CDAH) Study

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Reviewer: Anthony Staines

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Impact of Adiposity on Cardiac Structure in Adult Life: the Childhood Determinants of Adult Health (CDAH) Study

I have been asked to review the statistical issues in this paper. I am not an expert on longitudinal data analysis, but I have some experience with it, and I quite familiar with the methods used in this field. I have experience with anthropometry, but not with cardiac investigations.

General comments

The analysis is a follow up to what seems to be a large cross-sectional survey of child health. The overall presentation of the paper is hard to follow. I accept that these are complex studies, and not particularly easy to present, but this paper is still very hard to follow.

A quote from the paper cited by the authors is apposite “To achieve robust conclusions, more than one analytical approach should be adopted, with the results compared and inconsistencies investigated, thus carrying out sensitivity analyses in the broader sense”(1). This has not been done here. A deeper analysis is needed, looking at several possible models for what is going on here, and taking account, in particular, of the variation in age at first measurement.

Overall I think you need to redo this work, think much more carefully about your message, and how it is to be presented. I think this is really worth doing. I entirely take your point that the question is important, and that your work represents a great opportunity to answer the question in a new way. However, I can’t understand what you are doing well enough to see what the answer is.

Specific comments

Abstract

The abstract should make clear that this is a study of measurement on two occasions – once in childhood aged 9, 12 or 15, and once in adult life, aged 26 to 36.

Methods

The authors write “In order to provide a graphical illustration of the associations
between adiposity measures and LVMI, separate categorical variables describing pattern of change between childhood and adulthood in adiposity status were created for each of BMI, waist circumference, fatmass and skinfold thickness. Those in the highest quartile (age and sex specific) were defined as overweight/obese. The resulting categories of change were: (1) normal weight as child and normal weight as adult; (2) overweight/obese as child and normal weight as adult; (3) normal weight as child and overweight/obese as adult; (4) overweight/obese as child and overweight/obese as adult. We present means on the LVMI outcome for each adiposity change category”.

This is very confusing. There are quite standard ways of defining overweight/obesity in terms of BMI for adults and children. I can see no justification for redefining these well understood terms. Please stop using the term overweight/obese to refer to the highest quartile of 4 different measures, and use a more neutral and less confusing term, like top quartile. When analysing change it would make more sense to use quartiles of change, not of initial and starting position. As all your measures are continuous why not just use graphs of the raw data? These would be unambiguous.

Modelling approach – it is hard to make sense of your description of your models. Presumably these are linear regression models, with normal errors. How are the included variables defined? How did you define the change variables – directly, in terms of quantiles, or what? An equation, or two, would be worth several hundred words here. How do you account for the fact that the measurements at the two time points are on the same people? How do you account for the fact that some people were measured before and others during puberty? How did you assess goodness of fit of the models? Why and how did you select the variables you chose to include? Did you use any other methods of model criticism? All of this needs to be described to the same level of detail as the Echoardiographic measures.

You describe a variable named fatmass as one of your measures of adiposity in Table 3 – I'm no sure what this is, nor am I sure how you calculated it. Is it the percentile of body fat derived from the skinfold thickness?

Results

You ought to report all 4 adiposity variables, and the 4 change variables too.

Table 3 is problematic. I'm not sure what, exactly, your various measures of adiposity are. For example you report coefficients of 0.46 for Childhood BMI and 0.30 for change in BMI for males, as the effects on LVM. Does this mean that LVM goes up by 0.46g for every unit change in childhood and adult BMI, and by a further 0.3 g for every unit difference between childhood BMI and adult BMI? I think presenting predicted values would make more sense here.

I think you need to present more basic results. Your graphical presentation is quite insufficient. The key point you are making, I think, is that bigger children have bigger hearts as adults. How does heart size relate to change in size over time? How does it relate to the age at first measurement? Is there an indication
that there is any difference in this relationship for pre-pubertal and pubertal children?

Conclusions

For me, as a non-cardiovascular epidemiologist, the two really striking things about your results are the huge differences between males and females, and the lack of consistency in the trends shown in your Figure 1. You don’t seem to consider the former very much. I wonder what an outcome variable of LVMI would look like for males and females, with BMI as the explanatory variable? I accept that there were very few obese/overweight children in the original sample, which makes the trends unreliable, but I am struck by the varying patterns between the first two groups (normal child/normal adult) and (normal child/obese,overweight adult), across your four adiposity measures.

References


Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

'I declare that I have no competing interests'