Reviewer's report

Title: The impact of education on risk factors and the occurrence of multimorbidity in the EPIC-Heidelberg cohort

Version: 1 Date: 3 July 2008

Reviewer: C Schooling

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Major Compulsory Revisions

The design of this study should be clarified.

1. Did the authors use logistic regression to examine the association of education with multi-morbidity about 9 years later? Please could the authors explain why they did this in preference to a prospective analysis using a Cox proportional hazard model. I recognize that time on study might be meaningless as a timescale in their situation, but they could use attained age as the timescale with adjustment for baseline age.

2. Why did the authors exclude anyone below the age of 50? Do they think that the associations between education and multimorbidity change with age, and if so why? Do they get the same results if they include the younger people?

3. The Results provide analysis stratified by smoking status and by obesity status. However the reason for this analysis is not given, nor is this analysis described in the methods. Do the authors think a priori that the association of education with multimorbidity would vary with smoking status or obesity and if so why? In addition, the interaction p-values provide no evidence that the effect of education on morbidity varies with smoking status or obesity, so Table 5 should be removed, and all reference to it.

4. There does seem to be evidence of different effects of by age-group, so instead of Table 5, there should be a Table showing age-stratified results

Minor Essential Revisions

1. (lines 86-9) The last paragraph at the end of the introduction should also state the authors intend to examine the mediating role of health behaviour in the association between socio-economic position and multi-morbidity.

2. (lines 121-3) Please could they clarify the definition of metabolic disease.

3. (lines 126-30) Please could they clarify the categorization of education. The problem is that the distribution of education in their sample is different in men and women, most likely because of historic attitudes to men and women. More men (33%) have 'high' education than women (20%), so it is not clear whether education represents the same thing in men and women. Can they re-group
education, so that there are approximately equal proportions of men and women with low, medium and high education?

4. (line 142) Was BMI treated as a continuous or categorical covariate? Given that BMI may have a U shaped relation with morbidity, categorical might be better.

5. (line 151) Please could they explain how they obtained the p-values for interactions in the Statistical analysis section.

6. (line 146) Please provide a referenced justification for analyzing men and women separately, or analyze them together. There appears to be no evidence of different effects by sex, so sex-specific analysis is difficult to interpret.

7. (line 176-181 and lines 184-5) Please consider removing this text. Slight differences between groups are to be expected on any stratification.

8. (line 197-199) Please clarify what they are saying about alcohol and diet. Do they mean that alcohol and diet were unrelated to multimorbidity or do alcohol and diet not modify the associations of education with multimorbidity?

9. (lines 201-216) Please consider removal.

10. (lines 251-254) Is it correct that they found effect modification in the relation of education to multi-morbidity by smoking status? Because the p-values reported for these interactions (lines 208-9) are quite large. When this is straightened out please review lines 253-6.

11. Please keep the discussion focused on the topic of education and multimorbidity, e.g. remove lines 282-3.

12. (lines 301-304) Is it correct that they found that the relation between education and multimorbidity differed by sex, given the p-values on line 183? If not, these lines should be removed.

13. (line 332) Higher rather than increasing BMI

14. (line 334) Please can they show evidence in the results for ‘gender specific pathways differentially influencing the association between education and multimorbidity’ or remove this statement.

Discretionary Revisions

1) Table 3 does not really seem necessary

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published
**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests' below