Author's response to reviews

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

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Author's response to reviews: see over
Submission of the 2nd revision of the manuscript MS: 2079963154204693
The impact of education on risk factors and the occurrence of multimorbidity in the EPIC-Heidelberg cohort

Dear Dr Norton,

Many thanks for the opportunity to provide a second revised version of our manuscript. We thank the reviewer for their helpful comments and suggestions. All comments of the reviewers were considered and replied in detail. All modifications are marked in the revised manuscript.

The authors have read and approved this revised manuscript, which is currently not submitted for press at any other journal.

We look forward to a more favourable consideration the revised manuscript and remain

Yours sincerely,

Gabriele Nagel
Reply to the comments of the reviewer / 2nd revision

**General comments:**
We thank the reviewer for the comments and suggestions, which we considered in the revision of the manuscript and commented in detail (see specific comments).

**Specific comments:**
1. I understand your reasoning for carrying out a cross-sectional analysis of multi-morbidity in EPIC survivors, using logistic regression, because you assessed multi-morbidity at the same calendar time point for everyone. However, people who died, most likely died at different times, so by carrying out a logistic regression for deaths, you are not making full use of the information available.

   a. If you do not want to use a Cox model for mortality, you should remove the results concerning mortality. Answer: In agreement with the reviewer we have calculated a Cox model and present now these results in table 4. We have modified the Methods section accordingly (line 154).

   b. You should explain the study design more clearly, maybe at the beginning of the statistical analysis by saying “This was a cross sectional analysis of multi-morbidity in EPIC survivors, using some information, such as lifestyle, collected in earlier data collection phases.” Answer: As suggested by the reviewer we have added information on the study design at the beginning of the statistical analysis (lines 148-151).

2. Line 157 In the methods, you explain that you examined whether associations differed by sex or age-group with a sentence beginning “Interaction was examined..” It would be better to explain your purpose here, for example by starting the sentence with “Whether the associations differed by sex or age was assessed
Answer: We have changed the sentence accordingly (line 161).

3. Line 246-251, the sentence starting “We observed..” until the sentence ending “…subjects.” Should be removed as these sentences do not describe the findings presented.
Answer: As suggested by the reviewer we have removed these sentences.

4. Line 267 “our results suggest differential associations between education and multi-morbidity by gender” is not really congruent with the results presented. Either the sentence should be removed, or made less categorical, for example replaced it by “There appeared to be some differences in the associations between education and multi-morbidity by sex, however these differences could be chance variation on stratification”
Answer: The have added the information, that the sex differences may be due to chance variation on stratification (line 296).

5. Line 329/30 The sentence starting “Gender-specific pathways ..” may be true, but does not really follow from the results presented and would be better removed.
As suggested we have removed this sentence (line 328)

**Discretionary Revisions**
1. The term ‘gender’ could be replaced by ‘sex’ throughout. Answer: Done.
2. The English could be reviewed.
Answer: The English has been reviewed by certificated language secretary.