Reviewer’s report

Title: All-cause mortality in the Aberdeen 1921 birth cohort

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Reviewer: Elizabeth Breeze

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All-cause mortality in the Aberdeen 1921 cohort

The main message of this manuscript is that men are more likely to die than women at older ages and may indicate slower biological ageing among women as the mortality differentials are not due to differentials in illness or cognitive function. There is a potentially interesting message here but I have concerns about the statistical methods used.

Major compulsory revisions

1 If I understand correctly, a sequence of models was run successively adding variables but the numbers in the model differed because of differing numbers with values for a variable. This means that any differences in parameters between models could result from a mixture of confounding and changes in the population base. Comparisons across models should only be made with the same individuals in each model. As UCO was only available for 82 individuals the base for the models with UCO were presumably smaller than this, considerably reducing ones power to detect risk factors.

My suggestion would be to create a parsimonious model with the variables for which at least 180 have values and then as a separate exercise (and all the modelling would have to be done afresh) creating one for the small number who also had the AVLT, BD, DS and UCO.

2 There are conflicting statements. On page 7 the analysis section refers to entering those with least missing data first and on page 8 there is reference to backward elimination without specification of the criterion used for elimination. It can be legitimate to do both but clarification is needed.

3 Did all the health status and mental ability variables have a distribution sufficiently close to normal to include them in a hazard regression analysis as continuous and untransformed?

4 The multivariate results (p8) at present do not allow of a clear interpretation. If the final models only contained 80 people or fewer (although, admittedly more person years), did this subset have sufficient variation in some of the other variables like smoking or depression for there to be scope for a significant association with mortality? Although smokers mortality rates were statistically significantly higher than never-smokers they may have been unimportant in the modelling if they are a rare group and so been eliminated in fuller models.
5 Potentially, there is an interesting message if the gender differences are not accounted for by a variety of other factors but I am not convinced that the sample size allows one to be sure of this.

Minor essential revisions
1. Background p 3 para 1 last sentence. Suggest reword: â## .. beyond 75, so that fewer would be able to benefit from any protective effects of the higher IQs â## (It is not the protective effect of high IQ that would be less but the smaller numbers of those with high IQs meaning that the population impact of the protective effect is less).

2. Source of sample. It is not clear how the 354 people in the analysis came from. There were 234 at wave 1 and we are told that 47 were recruited at wave 2 and 16 at wave 3.

3. Methods: Were the 5 with unknown vital status at the time of moving away excluded from the analyses?

4. Why was UCO was entered into the multivariate models if it was not significantly associated at the univariate level â## did the authors anticipate negative confounding with age?

5. Results: What was the age range? They were all 75 or 76 in 1997 but were some older at the time of measurement (see q on sample above). How many person years were involved in the Cox proportional hazards models

6. Table 1 â## mean and sd inappropriate if the variables are skewed. The sd for alcohol is larger than the mean. No values given for blood pressure.

7. Page 5 second line of measures. â##mentalâ## not â##metalâ##

8. Page 5 line 10 â## is this first attendance in adulthood or first of the waves mentioned under sample .

9. The variables given in Table 1 do not match up with those in Table 2 (e.g. living alone and smoking not in Table 1 and the components of crowding but not the index itself)

Discretionary revisions
1. P3. The reasons for all-cause mortality had falling by less among the 75+ than among younger ages could include the cumulative insults we experience to our bodies over the lifetime.

2. P9 para 2 reference 17 refers to a sample from one family practice â## was it definitely representative of the Dutch population?

3. P11 second para could be more succinct. Could replace first three sentences by â##One advantage of a narrow and older age cohort is that key predictors of mortality can be considered as measures of biological age or a sign of the bodyâ##s vulnerability to death sooner rather than laterâ##
4. Conclusions: Suggest omitting the sentence about mortality being common beyond 76 years of age.

Page 10 last para. Some good points made about the limitations.

**What next?:** Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

**Level of interest:** An article of limited interest

**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