Reviewer's report

Title: Educational health inequalities in 18,000 Norwegian couples. The Nord-Trondelag Health Study

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Reviewer: Niels Schenk

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Based on an impressive dataset that covers a large part of the Norwegian population, this study assesses educational health inequalities. The authors use a fairly novel approach using multilevel methods that allow for the separation of educational inequalities into estimates of within and between-couple inequalities. I have a few suggestions for revising the paper.

Major Compulsory Revisions

The authors are unclear on what the estimates of within and between-couple parameters actually entail. In the abstract they summarize the result of their within-couple estimate as “one year increase in education as compared to ones partner”. On page 8 they write “one year increase in education was …” without the reference to an individual’s partner. As far as I can see (the formulas on page 6 contain unreadable symbols), the authors estimate how a one year difference in education from the overall couple mean is associated with the dependent variables used, while holding the overall mean constant. This is slightly different from an interpretation that refers to the difference in education with the partner.

A related problem with interpretation of the within and between effects is that they are used in comparison to traditional estimates of individual educational gradients. However, when comparing the within-couple estimate with the traditional estimate, the authors should realize that these are two different things. The within-couple estimate refers to differences in education from the couples’ mean, the traditional estimate does not. The authors do not merely properly account for educational resemblance in couples (as stated on page 11), they estimate something qualitatively different. Stating that “the individual educational gradient may be overestimated in traditional models” on page 10 may be problematic for this reason. Of course it may be true that this gradient is overestimated but in my view the authors are not sufficiently clear on the difference between the quantities they estimate and the estimate they compare it to.

Minor Essential Revisions

The formulas presented on page 6 do not include a description of the random effects estimated. Perhaps this is not problematic but in my view the authors should at least be clear what is exactly estimated (and what is left out of the
On page 6 the authors state that education was used as a continuous measure. Is this a recoded version of the trichotomy presented in table 1, or an actual continuous measure of the number of years respondents went to school?

On page 8 the authors present figure 1 but do not (or hardly) discuss it. In my view it would be more interesting to see figures of the models estimated in table 2. The authors now seem to estimate and plot individual educational gradients that they themselves criticize.

On page 11 the authors state that “women were more affected by the co-partners”. This is of course very interesting but not something the models directly estimate. The authors estimate how an individual's difference from a couple mean is associated with the dependent variable. Of course the couple's mean includes the partner’s score but it is not the partner’s score itself that is used to estimate the discussed coefficient.

Related to the comment above: the authors state on page 9 that there was an interaction between sex and education when predicting anxiety scores. I would like to see how much difference there was between men and women, instead of only know that there was a difference.

The text contains many typos and constructions of sentences that seem odd if not incorrect.

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

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

**Declaration of competing interests:**

I declare that I have no competing interests