Author's response to reviews

Title: Self-rated literacy level does not explain educational differences in health and disease

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Author's response to reviews: see over
Dear editors,

Thank you for the opportunity to resubmit a revised version of our paper entitled ‘Self-rated literacy level does not explain educational differences in health and disease’. We based the revision on the very useful and constructive comments of the reviewers. Below we provide an itemized response to their comments and explain how we addressed them in our paper.

Yours sincerely,

Mirjam Fransen

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Reviewer 1

Major Compulsory Revision:

1. From the literature reviewed by the authors (citations 5 to 14) it appears that literacy in health (most of the time measured using the Rapid Estimate of Adult Literacy in Medicine) is a relevant measure for explaining health inequalities. The authors, however, use a much stricter measure of literacy, i.e. confidence in reading written English. The relevance of that measure is not suggested by the literature reviewed. I suggest the authors to make clear that their study is about literacy and not health literacy, and to give arguments and references explaining why “literacy has increasingly been considered as a mediating variable in socioeconomic inequalities in health”.

We agree that we only measured literacy and not health literacy, and therefore already used the term ‘self-rated literacy’ throughout the manuscript. We now more explicitly explain in the introduction that health literacy has several definitions, thereby using recent work of Sorensen et al (2012). Some definitions are closely related to literacy, others refer to a much broader construct than literacy in which reading skills are only one component (introduction page 2-3)
Most studies that we refer to in the introduction indeed use the REALM as a literacy measure. The REALM assesses to what extent individuals are able to read words from medical information materials, and does not assess broader health literacy skills either. The most important difference between the REALM and our literacy measure is that our measure assesses subjective reading skills (How confident do you feel with reading written English?) in stead of objective reading skills. Another difference is that medical related words are used in the REALM, while in our test individuals are not specifically asked how confident they feel with reading medical words. However, until now there is no prove that the REALM or other tests that measure reading skills in a medical context (e.g. the Short Assessment of Health Literacy) have any additional value regarding general prose and document literacy measures. The REALM was modelled on the Wide Range Achievement Test (WRAT), a standardized literacy test that assesses the pronunciation of a list of words that the respondent reads aloud. It highly correlates with other standard general reading tests (Pearson 0.95 with SORT-R)\(^1\) It is unknown to what extent measures for reading skills in health-related information are domain-specific. We translated, adapted and validated the SAHL in the Netherlands and concluded that adding health-related content to literacy tests seem to serve face validity rather than construct validity (unpublished results). In that respect, our measure is not stricter and could be considered as a subjective equivalent of the REALM.

We added the following reference for the statement that literacy has a central role in socioeconomic inequities in health: ‘In 2007, the WHO identified literacy as having a central role in socioeconomic inequities in health (WHO, 2007)’. We changed the term ‘mediating variable’ into central role, since ‘mediating’ could cause confusion (see under comment 3). We also referred to various conceptual models that propose the effect of socioeconomic status on literacy or health literacy (Sorensen, 2012).

2. An ordinal variable is treated as numeric variables in ANOVA analysis without any justification. I suggest the authors to use appropriate techniques of analyses.

Self-rated literacy indeed should not be considered as a numerical variable. We do not know for certain if the difference between the self-rated literacy category 1 and 2 is as much as the difference between e.g. category 2 and 3 or between 3 and 4. We should use a test that does not assume that the data follows the normal distribution. In this case, the Kruskal
Wallis test is generally considered an appropriate equivalent for ANOVA. We therefore performed Kruskal Wallis and found that there were no significant differences in median between educational groups, the median is 4 in all groups. This is not surprising since self-rated literacy has a very small scale and most people indeed scored 4 (very confident in reading English). However, we think this test is not very informative. It for example does not show that the 92% in the high educated group is very confident in reading written English, while this is only 76% in the low educated group. We are specifically interested in the remaining 24%. This information is lost when we only look at the median per group. Therefore we used crosstabs and performed chi-square test that showed significant differences per educational group. (table 3). If the reviewer has suggestions for another test or prefers Kruskal Wallis after all, we would be eager to attend to his comments.

3. Other statistical techniques such as path analysis or structural equations would be more appropriate to study the mediating effect of literacy.
We used the epidemiological/sociological method of Baron and Kenny, but are aware that path analysis or structural equation modelling are also often used to assess the role of other variables in an association. After careful consideration and consultation of statistical experts (Prof Zwinderman, Head of Department of Biostatistics, AMC; Dr W. Busschers, statistical expert Department of Public Health, AMC; Drs Verdam, Department of Medical Psychology), we decided not to use path analysis or SEM for the following reasons:
1. According to our statistical experts there is no consensus on what mediation analyses exactly is, or which techniques should be used.
2. Path analyses or SEM would specifically be useful in a long prospective cohort study on causal relations between education and health literacy, but would not add useful information to the logistic regression analyses in our cross-sectional survey. Both techniques are appropriate, since they have the same interpretation problems in a cross-sectional design with only one measurement point.

We are aware that the term ‘mediating’ could cause confusion, we therefore deleted this term throughout the manuscript. In the analyses we now explicitly described that the aim of our analysis is to assess to what extent educational level is related to health, independently
of health literacy. In other words ‘Does literacy play a role in the association between educational level and health?’

Minor Essential Revisions:

Introduction

4. Sentence: “Although literacy has increasingly be considered as a mediating variable in socioeconomic inequalities in health”: give references for the statement.
See under comment 1.

Methods

5. Sentence: “Computer-assisted self-interviewing...”: Is the subject of the sentence missing? The sentence does not make sense.
My apologies, I had to add that the survey contained a part with sensitive questions for which respondents were offered computer-assisted self-interviewing. I actually deleted the whole sentence now, since I don’t think it is relevant for the items that we used in our analyses.

Interview and Measures:

6. Educational level: specify the meaning of “GCSEs/O” and “5 at grades A-C”
Following the suggestion of the second reviewer I used the ISCED classification to specify educational attainment levels of our population (see method section under ‘interviews and measures’, page 4).

7. Educational level: 2 categories are defined, whereas 3 categories are used in the results.
We adapted this in the methods section (under interviews and methods, page 4).

Analysis
8. It is not clear how the variables are used in the models. How did you treat age? Literacy? Education (2 or 3 levels?), Ethnicity?

I now explicitly described how each variable was used in the model in the methods section (under analyses, page 6)

9. Ordinal regression analysis: are you using a proportional odds model? If so, did you test the proportional odds assumption?

We tested the proportional odds assumption following the SAS LOGISTIC procedure as developed by Peterson and Harrell. We found that the PO assumption was rejected for our models. However, in his book Harrell described that the extreme anticonservatism makes the procedure in many cases unreliable and that the PO assumption can better be tested graphical (Harrell: Regression Modelling Strategies; Springer 2001). Our statistical expert performed this graphical test (see below) to assess the PO assumption for the model educational level + ethnic background + age. If the distance between the dots on the same line are approximately equal to the distance between the dots on the following line for all variables in the model, the PO assumption should not be rejected. As you can see in attachment I distance does not differ that much, which could be an argument to perform a ordinal regression analyses. However, a formal test is lacking for this and the outcomes for the logistic regression model and the ordinal models hardly differ. We therefore decided to present the outcomes of the logistic regression model. If the reviewer prefers the ordinal
regression model after all, we would be eager to adapt the analyses again.
Discussion/Conclusion

10. Sentence: “the minimal contribution of self-rated...”: a dot is missing at the end of the sentence.

My apologies, the dot was added.

Reviewer 2

1. It may be useful for the reader if you would presented the study objective in a conceptual graph

We agree and added a conceptual graph to the paper (Figure 1 Study objective).

2. Literacy is used as a proxy for health literacy. This should be explained to a greater extend in the introduction. Why did the authors expect that a measure of reading skill is sufficient to investigate the role of health literacy with respect to the SES inequalities in health

We indeed link self-rated literacy to the concept of health literacy in the introduction, because health literacy offers the context for this paper. However, we explain that we only measured reading skills and that our conclusions are based on the results regarding reading skills. We make this more clear now throughout the manuscript and elaborate on how the concept of literacy (reading skills) fit into the concept of health literacy (introduction page 2-3).

The reason that we expect that this measure was sufficient to investigate the role of health literacy is that although reading skills are only one component of health literacy, they are considered as basic, functional skills that are essential for having adequate health literacy. As explained under comment 1 of reviewer 1, the REALM only assesses reading skills as well. In that respect, self-rated literacy can be considered as a subjective equivalent of the REALM. I do not think we should use reading skills as a proxy for health literacy, but we should consider it as a measure of one component of health literacy. We therefore only conclude that self-rated literacy is not able to completely explain educational differences in health and disease. Thereby we remark that reading skills are only one component of health literacy and the role of other components of health literacy should be measured in future studies. We now explain this in the discussion on page 11.
3. Abstract
The conclusion focus on instrument development. This does not have a link to the results description in the abstract.

The link between the conclusion and the results in the abstract is that the results show that literacy only minimally explained SES differences in health. We now added ‘literacy, as measured by self-rated reading skills.’

4. Educational attainment: please refer to the ISCED classification
I now refer to the ISCED classification in the methods section on page 4.

5. The statistical analysis is correct as the measures of effect the OR can directly be understood. However, the authors may have had considered other methods such as structural equation models. Please consider this remark in the reply to the reviewers.

We indeed considered other techniques and discussed this with statistical experts, see reply to the first reviewer (comment 9).

6. In the discussion and conclusion, the need for objective measures to estimate the individuals’ health literacy skills is stated, given the fact that the proxy used (reading skills) is insufficient to investigate the role of health literacy in relation to health inequalities. Other currently available instruments (REALM, NVS) are critiqued to be measures of functional skills only. I suggest the authors are somewhat more specific and suggest some other criteria/ domains a health literacy instrument should cover.

We understand and now elaborate on this in the conclusion (page 11). We thereby use the theoretical framework of Sorensen et al (2012).

8. Titles of tables should be informative. So reference should be made to the time, place, survey (and age range of participants as a subsample of the survey is used)

We adapted the titles of the tables.
Minor comment:

King’s College London, London, The Netherlands => King’ College London, London, UK

Sorry, mistake..