Reviewer’s report

Title: Item response models for the longitudinal analysis of health-related quality of life in cancer clinical trials

Version: 0 Date: 02 Jan 2017

Reviewer: Tianmeng Lyu

Reviewer's report:

This paper reviewed three families of IRT models and made recommendations about model selection after some conceptual discussions. It also included simulation studies to compare IRT models and classically used LMM models in terms of the ability to detect the random part of the mixed models. Please see the following comments.

1. Among the simulation scenarios presented in Table 5, β₁ = 1, 0.3 or -0.3, but more simulation scenarios could be added, such as β₁ = -1 or any value between 1 and 0.3 for a more complete comparison if the authors wanted to make conclusions about how the results changed when β₁ was closer to 0 as they did in line 35, page 11. Besides, in Table 5, the numbers of σ₁² values and the values themselves were different for different β₁ values and this is not common when we design simulation studies. The authors should explain the reason why doing so.

2. It may be helpful for better understanding if the last paragraph of the simulation results section could be reorganized and elaborated. For example, "the LMM detected the random slope for a greater variance of this one whatever the β₁ value" is confusing.

3. The simulation results section only listed the observed results without discussing the practical importance of the simulation results, for example, the authors may discuss the suggestions for data analysis that can be learned from the simulation studies. Adding such discussion may be helpful to make the contribution of this part clearer.

4. Overall the paper is clearly organized. But the logic doesn't flow well in some parts of the paper. For example, in the last paragraph of page 2, it seems that the sentence "The use of the LMM for ...." should closely follow the sentence which explains why LMM is not appropriate for HRQoL analysis instead of following the sentence "These models allow to take into..." which aims to present the advantages of the LMM models.

5. In line 32 page 8, the first "r" stands for "ratio of probabilities" while the second "r" stands for "the number of random parts". Usually we don't use the same letter to represent two different things.
6. Language should be polished and grammar could be improved. For example, line 7 page 3, "… LMM is not appropriated" should be "… LMM is not appropriate"; line 54 page 3, "in the result section" should be deleted; line 36 page 6, "will be consider" should be "will be considered"; etc. And the authors should avoid using too many "indeed".

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

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**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Yes

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