Reviewer’s report

Title: Sample Size Determination for Mediation Analysis of Longitudinal Data

Version: 0 Date: 08 Aug 2017

Reviewer: Lijuan Peggy Wang

Reviewer's report:

Review of BMRM-D-17-00173

This manuscript studies sample size determination for mediation analysis of longitudinal data. The research topic is important and the software could be useful to researchers. I have some comments/suggestions for the authors to consider.

Major comments:

*The model studied in the manuscript is a special type of lower-level mediation model. There are other types of widely used longitudinal mediations models (see Chapter 8 of the MacKinnon mediation book). It would be helpful if the authors could clarify why they focused on the specific mediation model, not others, for longitudinal mediation analysis.

*The 1-1-1 multilevel model should be explained further. I was confused by the description of the X variable in the simple scenario on Page 5 of the main text. It sounds like that X (e.g., group assignment) is a time-invariant subject level variable but Figure 2 shows that X is a time-varying variable. The first full sentence on Page 5 was also not very clear. It would be helpful if the authors could clarify which variables are time invariant and which ones are time varying and further explain the longitudinal mediation effect specified in the model.

*Beta_c, Beta_b, Beta_a, and Beta_c' are fixed-effects coefficients only. I think they could also be random to be more general. The limitation should be mentioned in the discussion section.

*ICC in multilevel modeling is traditionally defined in a different way (e.g., see page 15 of Hox, 2010). Traditionally, for calculating an ICC, the model should be an intercept only with random effects in the intercept and the calculation should be based on (between-subject variance/ total variance). It would be helpful if the authors could clarify how ICC is calculated in the current paper.

*How to bootstrap the multilevel data to obtain bootstrap samples could be further explained in more detail.

*For the simulation study design, ICC was manipulated with different levels. Were the ICC levels for Y and M? Do they share the same ICC value for a given condition? How about ICVCs for X? Is X time varying in the simulation study?

*It was counter-intuitive to me that a larger ICC value was found to be associated with lower statistical power for detecting the mediation effect. For repeated measures ANOVA or repeated measures t test, a higher correlation between repeated measures is associated with higher statistical power. So explanations about the current finding would be helpful.


Minor comments:

*Line 43 of Page 1 of the main text, the authors can cite the following paper to show the persistence of underpowered studies in psychological research. Maxwell, S. E. (2004). The persistence of underpowered studies in psychological research: causes, consequences, and
remedies. Psychological methods, 9(2), 147.*Line 56 of Page 3 of the main text, change 'defined two ways' to 'defined by two ways' Line 30 of Page 4 of the main text, change '(e.g., measures)' to '(e.g., repeated measures)'*

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

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**Does the work include the necessary controls?**
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