

**On the interplay of motivational characteristics and academic achievement:
The role of Need for Cognition**

AERA-22-0140

Second revision letter

Reviewer #1

RC1.0: I appreciate the efforts the author team put into improving the manuscript. Many of my concerns were well addressed. I believe this paper will be a great contribution to the field.

AR1.0: We thank the reviewer for this overall positive evaluation of our revised manuscript.

RC1.1: P. 15, regarding the factor scores derived from separate measurement models, please consider providing a little bit more detailed information about this process--which includes the scoring method (regression? EAP?) as well as the model-data fit assessment for each of the measurement model (Is a one-factor model sufficient?), etc.

RC1.2: P. 15, regarding the parceling approach, it needs to be more specific about how the items are formed into parcels. How parcel-allocation variability (PAV) is avoided (or at least how it is considered if it is not avoided). See Sterba, S. K. (2019). Problems with rationales for parceling that fail to consider parcel-allocation variability. *Multivariate behavioral research*, 54(2), 264-287.

AR1.1 & AR1.2: We now add more detail about the measurement models and mention the problem of parcel allocation variability on p. 15 (additions to the text printed in italics):

“For each of the above mentioned constructs, we used *regression-based* factor scores derived from measurements models as composite measures. Specifically, we fitted four measurement models of 1) school grades estimated directly from the manifest school grades in order to have the same level of abstraction and to handle missing values for these variables as well, 2) the motivational traits in question, i.e., NFC, Hope for Success and Fear of Failure as well as domain-general and domain-specific 3) ability self-concepts and 4) interests. Separate models were fitted because an analysis of all constructs specified in one model failed to converge. *Item-based measurement models were specified except for NFC. Here a parceling approach was*

used (Little et al., 2002), where based on the item loadings derived from a one-factor solution of a principal components analysis, four parcels with about equal average item loadings per parcel were determined in an iterative procedure with 10,000 iterations that ensured a minimum difference in the average item loadings (please note that this procedure ensures computational reproducibility, but does not necessarily solves the problem of parcel allocation variability, see Sterba, 2019, an issue that we unfortunately cannot address here in more detail). All measurement models had a good to very good fit according to the criteria of Hu and Bentler (1999, see below), robust CFI $\geq .930$, robust RMSEA $\leq .065$, SRMR $\leq .057$.”

RC1.3: Figure 1A, the directional path between the change score (delta X) and the T2 score (X.2) should be delta X --> X.2, not the other way around. The current graphical presentation is not correct.

AR1.3: We apologize for this error and corrected it.

RC1.4: With regard to power analysis, I appreciate that the author team conducted and reported the post hoc power analysis in the revision, although I didn't mean to suggest that. Post hoc power analysis is not a useful practice as it does not provide more information than the obtained statistical results itself. See Hoenig, J. M., & Heisey, D. M. (2001). The abuse of power: the pervasive fallacy of power calculations for data analysis. *The American Statistician*, 55(1), 19-24.

AR1.4: We agree that post hoc power analyses is inferior to an *a priori* power analysis. Yet, given the convenience sample we used, we considered our power considerations as helpful information, especially so with regard to power analysis for SEM which is not so common in the literature, so readers might benefit from packages like *semPower* for their own (then a priori) power analyses. Still, we see the reviewer's argument and discuss this issue under limitations (p. 24):

“... *post hoc* power analyses remain inferior to *a priori* power analyses. While such analyses can be easily done for simple effect sizes such as correlations, mean differences, or explained variance, power analyses for structural equation modeling are more difficult to perform. We therefore advocate for the use of packages like the *semPower* package (Moshagen & Erdfelder, 2016) for *a priori* power analyses for structural equation modeling in future studies.”