

Assignment 2

SEM 1: Confirmatory Factor Analysis

Please hand in a .pdf file containing your report and the .csv file that has been generated. The deadline of this assignment is Tuesday April 14 15:00.

Assignment

Conceptual Questions

Question 1 (3 points) Are the following statements true or false (0.5 point per question)?

- When comparing two models, the *simpler* model is the model in which there are *more* degrees of freedom.
- If a χ^2 difference test between two nested models is *significant*, we would prefer to select the *simpler* model.
- If the AIC is lower for model A than for model B, then so is the BIC.
- We would always prefer the model with the lowest *RMSEA*.
- A low incremental fit index implies that the baseline model fits the data poorly.
- The typical χ^2 test is actually a model comparison test between your model and the saturated model.

Practical Questions

Download the file `data.csv` from canvas, which I obtained from https://openpsychometrics.org/_rawdata/. You can load the data in R as follows:

```
FullData <- na.omit(read.csv("data.csv"))
```

Next, run the following code in R (replace `...` with your student number, or your birthday (YYYYMMDD) if you do not have a student number):

```
studentNumber <- ...  
set.seed(studentNumber)  
Data <- FullData[sample(1:nrow(FullData), 500), ]  
write.csv(Data, paste0("conspiracyData_", studentNumber, ".csv"), row.names = FALSE)
```

This code created an object `Data`, which is also stored as a csv file in your working directory. If you do not use R, let someone run this code for you and send you the csv file (do use your own student number). This dataset contains your personal $n = 500$ subset of a larger dataset in which the Generic Conspiracist Beliefs Scale (GCB, ?) was administered. This scale aims to measure “government malfeasance” (GM), “extraterrestrial cover-up” (ET), “malevolent global conspiracies” (MG), “personal wellbeing” (PW), and “control of information” (CI). The items are shown in the table at the end of this document.

Question 2 (1 point) Without fitting the model to data yet, give the number of degrees of freedom for the 5-factor model for these items. ■

Question 3 (1 point) The paper reports RMSEA = 0.06 in a confirmatory factor analysis. Taking this value as prior guess for the true RMSEA score, what are the sample sizes required to reject the test for not-close fit of RMSEA > 0.08 and the test of close fit of RMSEA < 0.05 with a power of 0.80 and $\alpha = 0.05$? ■

Question 4 (2 points) Fit the theoretical 5-factor model to your dataset (1 point) and judge the fit (1 point; max 50 words). ■

Question 5 (2 point) Perform *two* model modification to your model to improve fit, and report your findings in a table including model comparison statistics (1 point). The table should have three entries: the original model, the first modified model, and the final modified model. Make sure that the first modified model is nested in the original model, and the second modified model is nested in the first modified model. Report *why* you choose this model modification (you may use any strategy you like as long as you have a good reasoning for it). ■

Question 6 (1 points) Using any software or method you like, make clear and interpretable path diagrams for both your original model and your modified model. The path diagrams should make visual comparison between your two models easy. You may choose to either include or omit parameter estimates in the path diagram if you wish. You will be graded on the correctness of the path diagram and its clarity. ■

Item	Item description	Factor
Q1	The government is involved in the murder of innocent citizens and/or well-known public figures, and keeps this a secret	GM
Q2	The power held by heads of state is second to that of small unknown groups who really control world politics	MG
Q3	Secret organizations communicate with extraterrestrials, but keep this fact from the public	ET
Q4	The spread of certain viruses and/or diseases is the result of the deliberate, concealed efforts of some organization	PW
Q5	Groups of scientists manipulate, fabricate, or suppress evidence in order to deceive the public	CI
Q6	The government permits or perpetrates acts of terrorism on its own soil, disguising its involvement	GM
Q7	A small, secret group of people is responsible for making all major world decisions, such as going to war	MG
Q8	Evidence of alien contact is being concealed from the public	ET
Q9	Technology with mind-control capacities is used on people without their knowledge	PW
Q10	New and advanced technology which would harm current industry is being suppressed	CI
Q11	The government uses people as patsies to hide its involvement in criminal activity	GM
Q12	Certain significant events have been the result of the activity of a small group who secretly manipulate world events	MG
Q13	Some UFO sightings and rumors are planned or staged in order to distract the public from real alien contact	ET
Q14	Experiments involving new drugs or technologies are routinely carried out on the public without their knowledge or consent	PW
Q15	A lot of important information is deliberately concealed from the public out of self-interest	CI

References

- Brotherton, R., French, C. C., & Pickering, A. D. (2013). Measuring belief in conspiracy theories: The generic conspiracist beliefs scale. *Frontiers in psychology, 4*, 279.