Structural Equation Modeling

P.05 - Model Fit and Fit Indices

November 06, 2022

Lab Description

For this practical you will need the following package: `lavaan` and `semPlot`.

You can install and load this package using the following code:

```
# Install packages.
install.packages(c("lavaan", "semPlot"))

# Load the packages.
library(lavaan)
library(semPlot)
```

Exercise 1

a. Import the dataset `ELEMM1.csv` that is available in the course folder for *Lecture 4* on Canvas.

b. In *Practical 4*, you estimated the model in Figure 1 (see below), using the Satorra-Bentler estimator and obtained a value for the *MFTS*.

- Re-estimate this model and now request that the modification indices are also printed in the output.
- Evaluate the fit of this model using fit indices. *Tip: check the arguments `fit.measures` and `modindices` in `lavaan`. Also check the functions `fitmeasures()` and `modificationIndices()` in `lavaan`.*

c. Do you see possibilities to improve the fit of the model? Which one(s)? What would be your strategy for improving the fit of this model?

d. Implement the model improvements and test if the improved model is significant using the Likelihood Ratio Test (LRT).

- *Note: strictly speaking, the standard LRT is not correct when the Robust Maximum Likelihood is used because the scaled χ^2 values are not χ^2 distributed. However, for the sake of the exercise we will proceed this way despite of this limitation.*

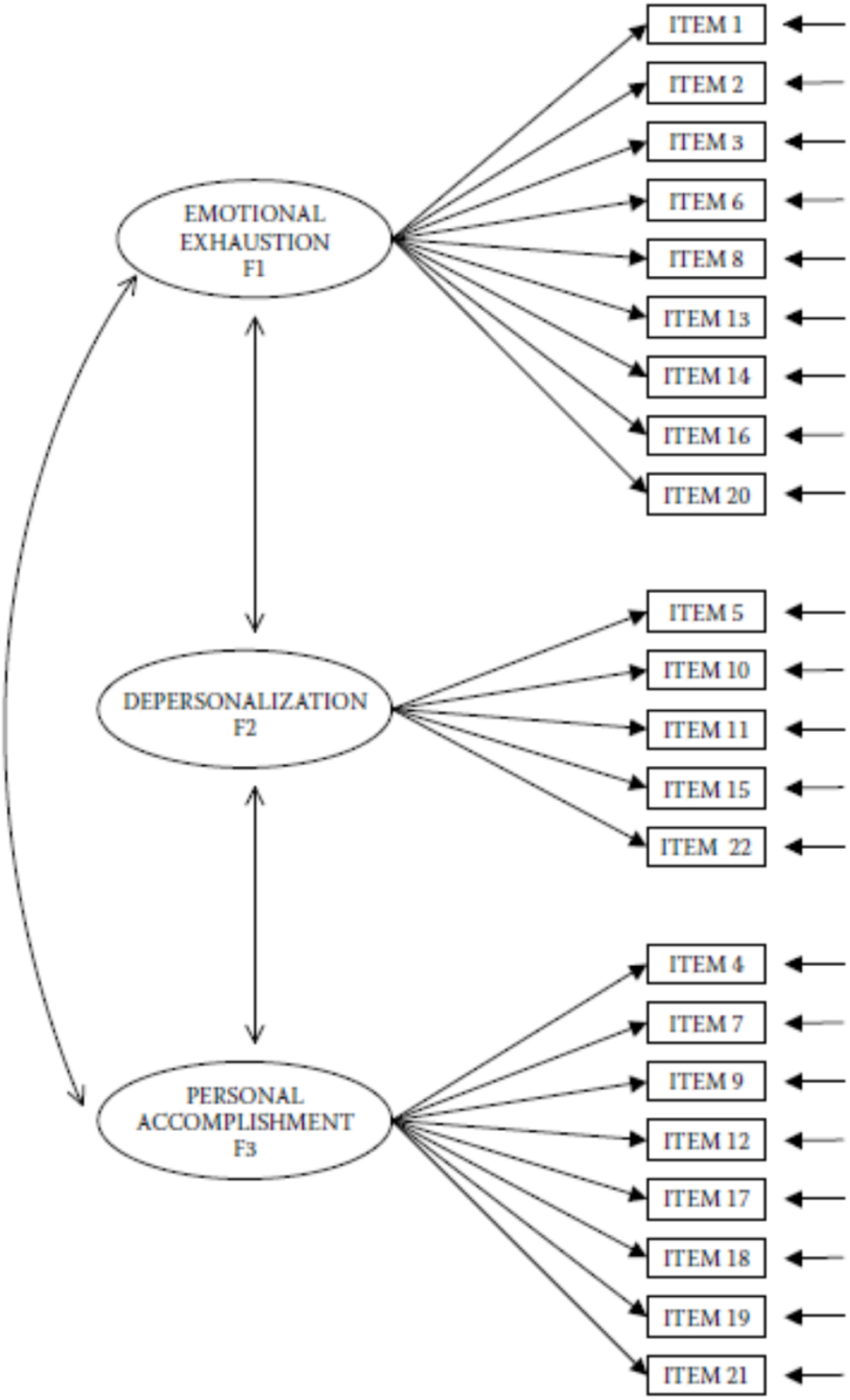
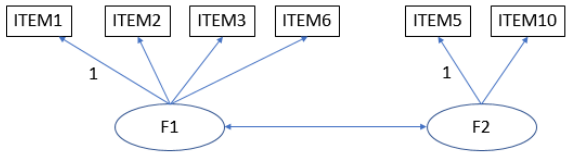


Figure 1: Hypothesized CFA model of factorial structure for the *Maslach Burnout Inventory* (MBI).

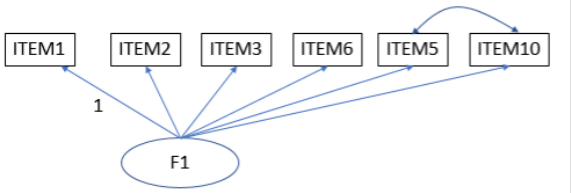
Exercise 2

a. Estimate and visualize each of the following four models in Figure 2 using the dataset from the previous exercise.

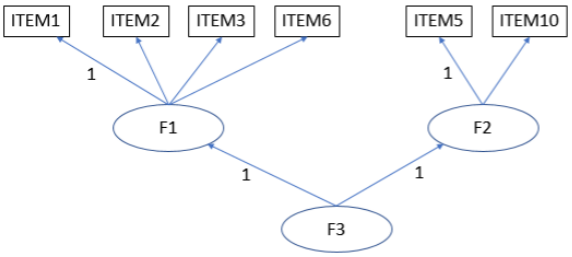
b. What do they have in common?



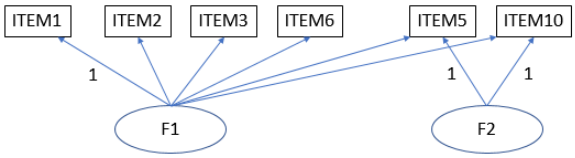
(a) First model.



(b) Second model.



(c) Third model.



(d) Fourth model.

Figure 2: Four models that have something in common.