

PSYC*6380: Minor Assignment 7 (Confirmatory Factor Analyses)

Due: Monday, March 14th, 2022 @ 11:59pm

Part 1:

Background:

After watching Scott make so many creative but perhaps mean jokes about Bob the Builder in class today, a researcher became interested in predicting a person's likelihood of engaging in this kind of dark humour. To do this, the researcher developed a 12-item measure to assess "mean joke propensity" (operationalized via the tendency to engage in non-normative thinking, the tendency to value fun in life, and the tendency to disregard the feelings of others). The researcher then pilot tested this measure using a sample of 250 participants. The 12 items that the researcher included in the measure are presented below:

- 1 – I tend to think “outside” the box.*
- 2 – I like coming up with new and creative ideas.*
- 3 – Normal everyday situations really bore me.*
- 4 – I try not to take life too seriously.*
- 5 – Life is meant to be enjoyed.*
- 6 – Having fun is really important to me.*
- 7 – I don't think it's a big deal if my actions inconvenience or annoy others.*
- 8 – Sometimes my actions hurt others; but that's okay.*
- 9 – I don't get too wrapped up in how my deeds affect other people.*

All items were rated on a nine-point Likert-type scale (1 = “*Strongly Disagree*”, 9 = “*Strongly Agree*”). Your task for today is to load the data file that contains participants' responses to the measure; and assess the factor structure of “mean joke propensity” using a series of confirmatory factor analyses.

Filename: “*cfaAssignmentData.csv*”

Structure: Comma-separated values

Missing Data Code(s): N/A (no values are missing in this file)

Your Task:

Use the techniques we covered in today's class (and draw on material from our first class on using *R* to load and clean data) to load your data and run a series of confirmatory factor analyses on the "mean joke propensity" measure.

Once you've done this, please answer the following questions about the results. Unless otherwise indicated, you do not need to provide full-sentence answers; just the numbers the questions request are fine:

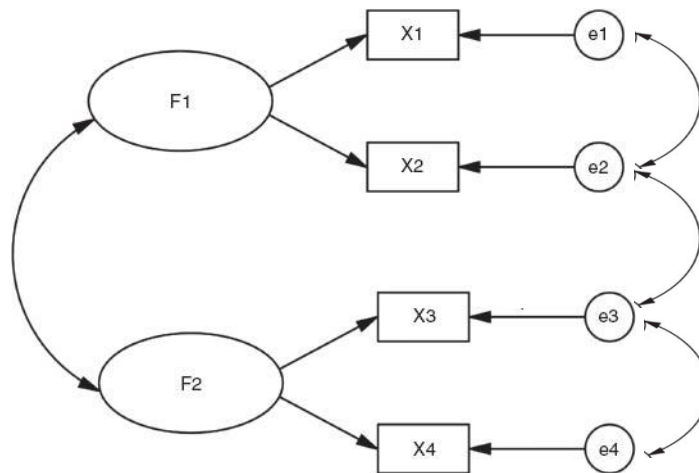
1. Run a confirmatory factor analysis that tests the viability of a **one-factor solution** (i.e., all items load onto a single overarching factor that represents "mean joke propensity"). Please report relevant fit indices, including: 1) the chi-square value (i.e., χ^2); 2) the comparative fit index (i.e., *CFI*); 3) the root mean square of approximation (i.e., *RMSEA*); and, 4) the standardized root mean residual (i.e., *SRMR*). **(1 mark)**. How well did this one-factor model fit the observed scores? **(0.5 marks)**.
2. Run a second confirmatory factor analysis that tests the viability of a **three-factor solution**, which assumes that "non-normative thinking" (Items 1-3), "focus on having fun" (Items 4-6), and "disregard for others" (Items 7-9) each comprise a separate factor. Please report relevant fit indices, including: 1) the chi-square value (i.e., χ^2); 2) the comparative fit index (i.e., *CFI*); 3) the root mean square of approximation (i.e., *RMSEA*); and, 4) the standardized root mean residual (i.e., *SRMR*). **(1 mark)**. How well did this three-factor model fit the observed scores? **(0.5 marks)**.
3. Test the significance of the difference between the one- and three-factor models you tested in q1 and q2. Please report the full results of the chi-square difference test, including: 1) the delta chi-square value (i.e., $\Delta\chi^2$); 2) its associated degrees of freedom; and, 3) its associated *p*-value. **(0.5 marks)**. Was there a significant difference in fit between the one-factor and three-factor models (and if so, which model fit the data more closely)? **(0.5 marks)**.
4. Please report the **standardized factor loadings** for each of the nine items onto the proposed factor(s) for both the one-factor and three-factor models you tested in q1 and q2. **(1 mark)**.

Part 2:

Background:

In order to help the researcher better understand how confirmatory factor analyses work, please answer the following conceptual questions in a short answer (i.e., 1-2 sentences) format:

1. In our class today, Scott said that exploratory factor analysis (EFA) is a more inductive approach to factor models; whereas confirmatory factor analysis (CFA) is more deductive. What did he mean by this? How are EFAs and CFAs approached differently; and what is the role that theory plays in each type of factor analysis? **(1 mark)**.
2. Imagine that you were presented with the following CFA model:



- a. How many distinct sample moments are available in this model? **(0.25 marks)**.
 - b. How many parameters are being estimated in this model? **(0.25 marks)**.
 - c. What are the degrees of freedom for this model? **(0.25 marks)**.
 - d. How would you classify this model (i.e., over-identified, just-identified, or under-identified)? What implications does this have for your CFA? **(0.25 marks)**.
3. What could you do with the model proposed in q2 to help improve model identification? Please suggest at least two changes you could make to the model that would increase its degrees of freedom and help make it testable. **(1 mark)**.

Please provide your full *R* script with your submission and leave comments in your script (i.e., using “#”) explaining what each command you wrote does. **(1 mark for including a full script; 1 mark for including appropriate commenting)**.

Good Luck!