

# Final Project

## *RS 755 Measurement and Psychometrics Theory – Fall 2020*

The final project is meant to be a context where you can put in place the different tools you have learned during the psychometrics class. It integrates your Latent Variable Assignment plus a data analysis and discussion section where it is expected you address the different strengths and weaknesses you find in the psychometric analysis of your instrument. The structure of the document is as follows:

### 1. Characterization of the Latent Variable.

The latent variable for which data is going to be analyzed must be properly described. Please write between 700 to 1000 words answering the following questions:

1. Definition of the latent variable: explain what is the latent variable that is going to be measured, and provide the relevant academic background required to understand this definition at an introductory level for a professional audience. Describe any internal structure of the variable that is relevant to its measurement (dimensions, aspects, factors, varieties, etc.) of any kind.
2. Relevance and intended use: Explain the relevance of measuring the latent variable of your choosing from a practice-oriented point of view. Why is it important to measure the construct? What are the intended uses of the measurement of this variable?
3. Validity challenges: describe what are valid inferences that are expected to be made from measuring this construct, and also the possible challenges or limitations involved in its measurements.

### 2. Instrument background

Whether you are proposing a new instrument or using an already existing one you are expected to provide:

1. Literature overview: An overview of the literature on measurement for the construct of your choosing and a rationale for the need or relevance for developing a new measurement instrument. (between 500 to 700 words).
2. \*Background on the instrument: A summary of the known psychometric properties of the instrument and a description of the samples used to estimate such properties. (up to 300 words, summary tables are encouraged): Please note:
  - a. THIS SECTION IS ONLY FOR THOSE OF YOU WORKING WITH ALREADY EXISTING MEASURES.
  - b. If you are adapting a previously existing instrument, feel free to include selected information about the relevant instruments involved.
3. Instrument description: A summary of your instrument including:
  - a. The goals of your instrument (as a numbered list)
  - b. A table with one row per item of your instrument where you indicate:
    - i. The goal the item addresses (just reference the corresponding number on the list of goals)
    - ii. The scale for the item
    - iii. Whether the item is reverse coded or not

### 3. Data analysis

In this section you will characterize your data and describe the analysis you'll conduct. This section includes the following:

1. Sample Characterization: A description of the sample of individuals focused on relevant individual's characteristics for your study (age, gender, ethnicity, school grade, etc.).

2. Item and test results: This section includes:
  - a. A histogram of the total scores individuals achieved on the instrument (simple sum score)
  - b. A summary highlighting the most important trends in item results: the item or items where the means were the highest or the lowest, items with very low or very high variance/standard deviation, items or groups of items where response categories were not used. This summary should come from a table that you can present directly in this section or refer to as an annex (if your instrument is very long). The table should present how many responses were obtained per response option, and the item's mean and standard deviation.
3. Psychometric analysis: The psychometric analysis of your instrument varies depending on the tools you are using (CTT, IRT, DIF). It should follow these general guidelines:
  - a. For CTT analysis: it should include a reliability analysis and an Exploratory Factor Analysis (EFA). For R-Studio users, use the package psych with `check.keys = true` as default for reliability calculations. For EFA: compare the results of two oblique rotations of your choosing. Present a table with item loadings per factor, and another table with factor (inter) correlations.
  - b. For IRT analysis: run at least two models that are suitable for your data (provide a rationale about why are these methods are adequate for your data) , and compare item characteristic and item information curves for selected items of interest. Present Test Information Curves obtained for the two models and compare model fit and marginal reliabilities. Decide on the best model for your data.
  - c. For DIF analysis: you will use the `lordif` package output: clearly identify the variable creating the compared you wish to compare, (ethnicity, gender, age, i.e. the hypothesized characteristic on which your DIF will be based). From the output identify flagged items, and present the plots for trait distribution for compared groups, and DIF for items of interest.

Suggestion: when needed, use the `write.csv` function to export R output or objects to a format that is easily editable for your document.

## 4. Conclusions

In this section, you will discuss the results of your analyses with regard to the latent variable of your interest and present conclusions based in your discussion. Issues to consider in your discussion are:

1. Whether the results of your analysis have any relation with the validity limitations you identified.
2. Any known possible limitations in the procedures you used to analyze your data.
3. If the different results you obtained in your analyses justify changes in your test: removing items, changing scales, changing the number of factors, re-phrasing items, and any other change your analyses suggest as necessary.
4. Any special precautions or limitations that should be considered when using your test and reach conclusions about respondents.

## 5. Deliverables

The deliverables for this project are:

1. A properly formatted word file addressing each of the issues described in sections 1 to 4 of this document.
2. A word file including the commands and output of the software you used to run the corresponding analyses you did. This file should use as font `consolas`, size 8 pt.