Psychometrics

  - Involves responding to range of statements, often by producing response on Likert scale (or other scales).
  - Scale typically ranges 1-5 or 1-7, from e.g., strongly agree to strongly disagree.
  - Aggregate or mean score provides index of ranking on a particular construct.
  - Scale (of multiple questions) can be used as an assessment tool.

What a researcher has to do:

- Create and evaluate the psychometric scale:
  - Identify possible concepts, i.e., what might it mean to be an introvert.
  - Create series of statements that elicit responses that are informative about these concepts.
  - Assess reliability of the scale, i.e., do statements supposed to be sensitive to a particular construct behave consistently (e.g., with each other, over repeated testing).
  - Assess validity of scale, i.e., does it actually assess the concepts as intended?
  - Assess utility of the scale, i.e., is it useful.

Practical

What you will do:

- Create a psychometric tool that evaluates a novel psychological factor (preferably a personality variable).
- Assess the reliability of this tool.
- Assess the validity of this tool (or at least review how this would be done).
- Produce a report describing the above process.
- Give verbal presentation reporting this process.

Step 1: the idea

- Have a idea!
- What sort of scale would you be interested in developing?
  - Avoid scales that only apply to specialist groups.
  - Use scale that can be developed using students as participants.
  - Scale should be novel, so search literature (google, WoS) to establish that it’s not been done before.
  - Think about what dimensions your concept might have, i.e., what factors contribute to it.
    - E.g., introversion: avoidance, self-focus, anxiety, confidence…
    - E.g., sensation-seeking: showing off, extroversion, risk-taking, fearlessness.

Step 2: create a questionnaire

- Create a series of questions that form a diagnostic of each of the dimensions you’ve identified.
  - Create simple statements (i.e., single clause statement that contain a single idea).
  - Create statements in the form that participants can express their agreement with.
  - Include scale (1-3, 1-5, 1-7).
  - How many statements? Lots to begin with, 60?
Step 3: data collection

- Initial data collection
  - Collect data for your questionnaire.
  - Purpose is to provide an initial sample of data that will allow you to assess the reliability of your questionnaire.
  - Note, you are not testing the participants but using their data to evaluate the strengths/weaknesses of your questionnaire.
  - How many participants? Hard to say, but not too many. Maybe 20?

Step 4: factor analysis

- Use factor analysis techniques to establish actual components in your scale.
  - You created a questionnaire assuming a particular factor structure.
  - Factor analysis will enable you to identify the true factor structure on the basis of your data.
  - Factor analysis with reveal clustering of your statements, and which statements do not cluster well.
  - Also use Cronbach’s alpha to investigate internal consistency of questions.
  - Use combination of above to revise your questionnaire.

Step 4: reliability analysis

Testing reliability of your revised questionnaire.
Reliability is the extent to which a test is repeatable and yields consistent scores.
- Types of reliability
  - Test-retest reliability
  - Alternate Forms
  - Split Half reliability
  - Inter-rater reliability
  - Internal consistency
- Determine approach method and assess reliability of your questionnaire (by collecting more data).

Step 5: validity analysis

- Not sure if I will actually ask you to do this – that will depend on progress / how easy it is to recruit participants.
  - Reliability involves establishing if scale is actually measuring what you think it is measuring.
  - Variety of different types of validity, and different techniques for assessing it.
  - Even if you don’t assess validity, you must consider (and discuss) how this would be done.

Types of validity

- **Face validity**
  - All that face validity means is: “Does the measure, on the face of it, seem to measure what is intended?”
- **Construct validity**
  - Does it measures what it purports to measure.
- **Criterion validity**
  - Concurrent validity: “Does the measure relate to other manifestations of the construct the device is supposed to be measuring?”
  - Predictive validity: “Does the test predict an individual’s performance in specific abilities?”
- **Convergent validity**
  - Does tests returns similar results to other tests that measure same or related constructs.
- **Discriminant validity**
  - Important to show that a measure doesn’t measure what it isn’t meant to measure - i.e. it discriminates.

Step 6: write your report

- Report on how you developed your scale.
  - Read examples of papers developing scales.
  - Use same or similar format.
  - Report should clearly describe development of scale and report statistics associated with each stage of the development.
  - Remember, this is not an assessment of your concept but a report on the development of the scale.
  - Reference: