# 519 as dmr – with psychometrics

## 1.What is an ‘association’ between variables / correlations and correlation matrices

Explain how and why an iv can be used to predict a dv  
Categorical associations: 2 by 2 ChiSquare and Fisher Exact  
reporting ChiSq and FE  
Extend Chi Square to larger 2 dimensional cases  
Testing continuous associations with correlations  
Introduce spearmans correlations and demonstrate with interactive scattergram tool  
Workshop is to match provided data sets to provided outputs chosen to illustrate key patterns (positive, negative, flat on dv, flat on iv, random, spherical, residual) and distributional problems (two subgroups, outliers, non-normal); extend to analysis and interpretation of some generated datasets; using both chisq and spearman)

## 2. A hypothesis is deduced / Processing non-normal datasets

Behind the correlation – a simple linear regression (SR)  
prediction –beta weights / slopes and constants/intercepts  
Workshop – repeat analyses of earlier datasets as SR using lm  
When is it valid to use correlation to test a hypothesis, and when isn’t it (multiple testing and cherrypicking, corrections, non-normal data)  
When continuous data goes wrong – Pearsons correlation; compare to ChiSquare  
Problems in reducing continuous data to categories  
Brainstorm some potential associations  
Reporting correlations  
Workshop is to compare spearmans, pearsons and chisquare on provided datasets and create scattergrams using ggplot  
Homework – derive hypothesised associations from a) gut feeling b) theory

## 3. Finalizing the survey / Data collection 1

Ethics of collecting data by surveys  
Key dos and don’ts in question selection and response scales design  
Avoiding response bias, leading questions  
Writing items to measure facts, attitudes, beliefs, behaviours  
Using JISC to create a survey  
Workshop – brainstorm 20-30 items to measure something you thought of earlier and create JISC survey  
Homework – Run 1: collect data on full item set

## 4. Data analysis / Data analysis

Downloading the data  
Preprocessing survey data – basic reformatting and scoring in tidyverse  
data cleaning – typical issues  
Workshop – processing the data and scoring the scale

## 5. Internal consistency / Data collection 2

Correlation matrices using corr.test  
Chronbach’s alpha and other measures of IC  
How many responses do you need? Alpha and Beta and power  
G\*Power (or R equivalent) for correlations   
Workshop –use alpha to select best 10-12 items and edit survey; conduct power analyses Homework –run 2: short scale data collection plus OCEAN and criterion

## 6. Validity / preparing presentations

Does your scale relate to other measures – external (convergent) validity  
Does it predict what you wanted it to predict – criterion validity  
Is it confounded with other measures – discriminant (divergent) validity  
reporting analyses orally  
good and bad presentation techniques   
Workshop – correlate own scale with OCEAN and criterion

## 7. Group presentations

## 8. Collecting multiple predictor variables

Revisit SR and look at patterns in residual variance. Are there missing predictors?  
Compare with test bias  
Adding a predictor to a SR to make it MR  
Predictors measured on different scales – B weights and CIs  
Workshop – do some MRs using prepared datasets using lm  
Homework – add predictors to existing survey and edit

## 9. Reliability/ Data collection

Traits versus states  
Is your scale a stable trait or a varying state?  
Test retest reliability versus sensitivity  
Workshop – do TR using data from run 1 (long scale) and run 2 (short scale).

## 10. Data analysis / Planning a report

Analyse own survey   
Structuring a complete report as a paper  
Workshop – analysis support  
Homework – draft paper as outline with completed results section

## 11. Critiquing reports

Examine some published papers  
Different styles of presentation and clarity  
Good and bad writing practices  
Workshop – revise bad prose; correct poor results; discuss drafts within and between groups  
Homework – complete draft report

## 12. Latent variables

Revisit range of ways of measuring and evaluating associations  
What do they tell us and how can they be used scientifically  
Patterns in correlation matrices  
Introduction to Factor Analysis and data reduction  
ChiSquare as a ‘goodness of fit’ measure  
Workshop – use lavaan to fit model to a large dataset

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