# 519 as dmr – no 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

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 / Building in JISC online

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  
Doing it in JISC   
Workshop – use JISC to create a short survey/ get ready to launch

## 4. Linear regression / Data collection

Behind the correlation – a simple linear regression  
prediction –beta weights / slopes and constants/intercepts  
Workshop – repeat analyses of earlier datasets using lm  
Homework – complete own data collection

## 5. Data analysis / Preparing a presentation

Downloading the data  
Preprocessing survey data – basic reformatting and scoring in tidyverse  
data cleaning – typical issues  
reporting analyses orally  
good and bad presentation techniques

## 6. Group presentations

## 7. Collecting multiple predictor variables

Revisit LR and look at patterns in residual variance. Are there missing predictors?  
Adding a predictor to a LR  
Predictors measured on different scales – B weights and CIs  
Workshop – do some MRs using prepared datasets  
Homework – add predictors to existing survey and edit

## 8. Power analysis / Data collection

How many responses do you need? Alpha and Beta and power  
G\*Power (or R equivalent) for correlations   
Workshop – finalise JIS survey and launch; conduct power analyses based on effects in first run  
Homework – data collection

## 9. Multilevel models / Data collection

Letting subgroups have different slopes in a regression  
Letting subgroups have different intercepts  
Letting both slope and intercept vary  
Letting everyone have different slopes and intercepts  
Workshop – use lme4 to model different data sets  
Homework – execute and interpret MLM problems

## 10. Data analysis / Planning a report

Analyse own survey using MR  
Try some MLM  
Reporting MR and multilevel models  
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,