UNIVERSITY OF CANBERRA

Survey Research and Design in Psychology

Lecture 10 - Summary and conclusions

Dr Ananthan Ambikairajah

University of Canberra

What we have covered

UNIVERSITY OF CANBERRA

- Survey research and design (lectures 1 & 2)
- Univariate and bivariate descriptives and graphs (lectures 3 & 4)
- Psychometrics (lectures 5 & 6)
- Multiple linear regression (lectures 7 & 8)
- Power and effect sizes (lecture 9)

Lecture 1 - Survey research

UNIVERSITY OF CANBERRA

- What is a survey?
  - A standardised stimulus designed to convert fuzzy psychological phenomenon into hard data
- Why do we do research?
  - To help us gather information, or test and build theories

Pros and cons of survey research

UNIVERSITY OF CANBERRA

- Pros:
  - Ecological validity
  - Cost efficiency
  - Can obtain lots of data
- Cons:
  - Low compliance
  - Reliance on self-report

- Self-administered surveys are:
  - Cheaper
  - Suffer less from demand characteristics
  - Allow us to access a representative sample
  - Anonymous
  - . . . but they suffer from non-response, and it is difficult to adjust for factors such as cultural differences and special needs
- Survey design is an art and a science

Types of questions

UNIVERSITY OF CANBERRA

- Objective versus subjective
  - Objective - verifiable true answer
  - Subjective - perspective of respondent
- Open versus closed
  - Open - empty space for answer
  - Closed - pre-set response options

Level of measurement

UNIVERSITY OF CANBERRA

- Nominal: Arbitrary numerical labels, could be in any order
- Ordinal: Ordered numerical labels, intervals may not be equal
- Interval: Ordered numerical labels, equal intervals
- Ratio: Continuous, meaningful 0

Sampling

UNIVERSITY OF CANBERRA

- Sampling requires an understanding of your target population, sampling frame, and sample
- We can use probability sampling methods (random), including simple, systematic, or stratified
- Or we can use non-probability sampling, including convenience, purposive, and snowball sampling

Biases

UNIVERSITY OF CANBERRA

- Sampling biases - Sample doesn't represent target population
- Non-sampling biases - Measurement tool issues (reliability and validity)
  - Response biases
  - Acquiescence, Order effects
  - Demand characteristics
  - Self-serving bias, Social desirability, Hawthorne effect

Lecture 3 - Descriptives and graphing

UNIVERSITY OF CANBERRA

- What is the central tendency?
  - Frequencies, Percentages
  - Mode, Median, Mean
- What is the variability?
  - Min, Max, Range, Quartiles
  - Standard Deviation, Variance

Graphing univariate data

UNIVERSITY OF CANBERRA

- Nominal/Ordinal data
  - Bar graph or pie chart
- Interval/ratio data
  - Histogram, stem & leaf plot, box plot

Correlation and covariation

- The world is made of covariations.
- Covariations are the building blocks of more complex multivariate relationships.
- Correlation is a standardised measure of the covariance (extent to which two phenomenon co-relate)
- Correlation does not prove causation

Purpose of correlation

- What is the relationship/association/shared variance/co-relation between two variables?
- To what extent do two variables covary/depend on one another/explain one another?

Types of correlation

UNIVERSITY OF CANBERRA

- Nominal X nominal: Chi-Square with Phi (ϕ) or Cramer's V
- Ordinal X ordinal: Spearman's rank or Kendall's Tau (τ) b
- Dichotomous X interval/ratio: Point bi-serial r_{pb}
- Interval/ratio X interval/ratio: Product-moment/Pearson's r

The steps we take

UNIVERSITY OF CANBERRA

- Choose the type of correlation and graph (based on level of measurement)
- Check assumptions (e.g. linearity, outliers)
- Report effect size, direction, significance, and percent of shared variation
- Be wary of limitations (correlation $\neq$ causation)

- Factor analysis:
  - Summarizes correlations amongst items
  - Common clusters form factors

The steps we take

- Check the assumptions
- Choose extraction method and rotation
- Determine the number of factors (based on an examination of Eigen Values, Scree plot, percentage of variance explained)
- Select items (based on factor loadings)
- Name and describe factors
- Examine correlations amongst factors
- Analyse internal reliability
- Compute composite scores to use factors as subscales

The steps we take

- Ask yourself: What is the concept that I am trying to measure?
- Brainstorm possible indicators of the concept, define it, draft measurement items
- Pre-test and pilot-test them, examine the psychometric properties, and redraft/re-test

Measurement error

UNIVERSITY OF CANBERRA

- Measurement error = Deviation of measure from true score
- Sources = Non-sampling (e.g., paradigm, respondent bias, researcher bias) or Sampling (e.g., non-representativeness)
- Minimise measurement error by using:
  - Well-designed measures
  - Representative samples and maximising response rate
  - Reducing demand effects
  - Ensuring administrative accuracy – entering data

Reliability and validity

UNIVERSITY OF CANBERRA

- Reliability is about consistency of:
  - Items within the measure
  - The measure over time
- Validity is about whether the measure actually measures what it is intended to measure

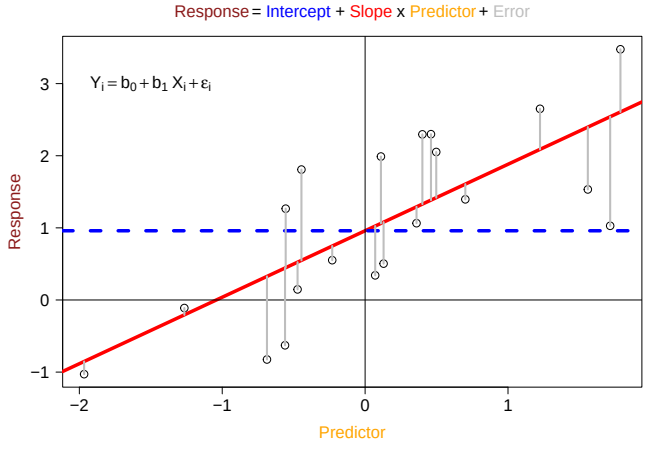
The steps we take

- Develop model and hypotheses
- Check assumptions
- Choose type
- Interpret output
- Develop a regression equation (if needed)

Linear regression

UNIVERSITY OF CANBERRA

- Best-fitting straight line for a scatterplot of two variables



Multiple linear regression

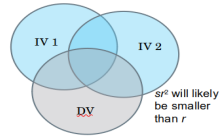
UNIVERSITY OF CANBERRA

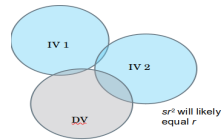
- Using multiple independent variables to predict a single dependent variable
- Overall fit and coefficients
- Three types: standard, hierarchical, stepwise

Semi-partial correlations in multiple linear regression

UNIVERSITY OF CANBERRA

- Semi-partial correlations (sr) can be used to get sr^2
- sr^2 indicates the percentage of variance in the dependent variable which is uniquely explained by an independent variable
- We can compare each sr^2 with the r^2 (or sr with the r), and if they differ, think about why this might be the case. If it stays the same, there may be no overlap between predictors. If it drops substantially, then there is possibly a strong relationship between predictors.





Interactions

UNIVERSITY OF CANBERRA

- In multiple linear regression independent variables may interact to:
  - Have no effect
  - Increase the independent variable's effect on the dependent variable
  - Decrease the independent variable's effect on the dependent variable
- Model interactions using hierarchical multiple linear regression:
  - Step 1: Enter independent variables
  - Step 2: Enter cross-product of independent variables
  - Examine change in R^2

Analysis of change

UNIVERSITY OF CANBERRA

- Analysis of changes over time can be assessed either by:
  - Standard regression:
    - Calculate difference scores (post-score minus pre-score) and use as a dependent variable
    - Doesn't tell you how much additional variance is accounted for by independent variables (over and above the baseline dependent variable)
  - Hierarchical multiple linear regression:
    - Step 1: "partial out" baseline scores
    - Step 2: enter other independent variables to help predict variance in changes over time

Significance testing

- Logic – At what point do you reject the null hypothesis?
- History – Started in 1920s & became very popular through 2nd half of 20th century
- Criticisms – Binary, dependent on sample size, effect size, and critical α
- Practical significance
  - Is an effect noticeable? Is it valued? How does it compare with benchmarks?

Effect sizes

UNIVERSITY OF CANBERRA

- Effect size - standardised difference or strength of relationship
- Inferential tests should be accompanied by effect sizes and confidence intervals
- Common bivariate effect sizes include:
  - Cohen's d
  - Correlation r

What is going wrong in psychology?

UNIVERSITY OF CANBERRA

- Publication bias: Tendency for studies with statistically significant findings to be published more often
- Replication crisis
- Academic integrity issues (e.g. Retraction Watch)

Tying it all together

UNIVERSITY OF CANBERRA

- What kind of researcher do you want to be?

Tying it all together

UNIVERSITY OF CANBERRA

- Think about what you have learnt in this class:
  - When you're reading (e.g. articles in journals, news sites, shared on social media)
  - When you're working (preparing summaries/reports, evaluating a program, making graphs or infographics)
  - When you need to prove a point (literature search)
  - When you're filling in a survey or poll, or interpreting the results of them
  - When making important decisions (what does the evidence say I should do?)

Thank you

UNIVERSITY OF CANBERRA

- Thank you and good luck!

Contributions to this course

UNIVERSITY OF CANBERRA

Dr James Neill

Dr Samantha Stanley

Dr Jeroen van Boxtel