

1

Research Methods II

**SAMPLE SIZE, STATISTICAL POWER,
LOG ASSESSMENT AND MODULE
WRAP-UP**

2

Module Summary

- ▶ Qualitative Research: Design, methods, analysis
 - ▶ Interviews, focus groups, Thematic analysis, IPA, etc.
- ▶ Quantitative Research:
 - ▶ Experimental vs. non experimental, Variables, Psychological tests
 - ▶ Types of data: categorical vs continuous, descriptive and inferential statistics
- ▶ Online Research
- ▶ Ethics

3

Sample Size

- ▶ When running research, ideally we would want to collect data from all relevant participants.
- ▶ However, this is not realistically possible.
- ▶ Thus, a random sample of individuals representing the population as a whole is captured.
- ▶ Sample size is important for getting accurate, statistically significant results and running a successful study.

Sample Size

4

- ▶ Can be estimated and can be based upon numbers used in previous empirical research that involves a similar design to yours.
- ▶ However, certain values must be considered:
- ▶ We need to specify the following quantities during the **design stage of research**:

Sample Size

5

- ▶ POWER
 - ▶ Chance of detecting a statistically significant effect (if there).
 - ▶ Must be at least .7, but ideally .8+
- ▶ SIGNIFICANCE LEVEL
 - ▶ Usually 0.05 (point where we reject the null)
- ▶ SMALLEST EFFECT OF INTEREST
 - ▶ Magnitude of the effect that is clinically important – i.e., the difference (can be expressed as the Standardised Difference)
- ▶ Variability:
 - ▶ Variance in the observations (e.g., Standard Deviation)

Sample Size

6

- ▶ Power
 - ▶ Significance
 - ▶ Effect (to a certain degree)
- } Easy to determine
- ▶ Providing estimate of variance before any data has been collected is the difficult task.

Methods for calculating sample size

7

- ▶ General formulae
- ▶ Quick formulae
- ▶ Special tables
 - ▶ Cohen (1992): Provides a paper and table that provides the minimum number of N for a variety of tests
- ▶ Computer packages
 - ▶ E.g., G*Power

Calculating Sample Size

8

▶ 1) ALTMAN'S NOMOGRAM

- ▶ Requires calculation of the standardised difference and join values on the left to the power we have specified on the right
- ▶ *The required sample size is indicated at the points at which the resulting line and sample axis meet*

▶ Independent Samples T-test:

$$\frac{\delta}{\sigma}$$

Where δ (Delta): is the smallest difference in means

σ (Sigma): assumed equal standard deviation of the observations in each of the 2 groups

Power Statement

9

- ▶ With applied research in particular, you will more than likely need to include a **power statement** as part of your study protocol or in the method section of a report to show that you considered the sample size during the designing stages of your study
- ▶ A typical statement could be:
 - ▶ "84 patients in each group were required to have a 90% chance of detecting a difference in means of 2.5 days (SD = 5 days) at the 5% level of significance using an Independent samples t-test."

Effect Size

10

- ▶ The **REAL** effect in the population
- ▶ Whether the manipulation of an IV has created a sizeable difference between our samples on some measure
 - ▶ The further the difference between the two means, the larger the effect size

Effect Size

11

- ▶ The popular measures of effect size are Cohen's *d* and eta squared (η^2)/partial eta squared.
- ▶ In Psychology we typically use partial eta squared, which is what SPSS provides us with in the very last column of our inferential statistics box when conducting more complex analyses (such as ANOVA).
 - ▶ As long as we have remembered to tick Display 'Estimates of effect size' in the Options Dialogue box!

Effect Size

12

- ▶ However, SPSS does not provide effect size statistics for t-tests (within or between subjects)
- ▶ However, you can use information from SPSS to calculate the effect size statistic either by hand or by using online effect size calculators:
 - ▶ Consult your SPSS books for formula to calculate effect size
 - ▶ <http://www.uccs.edu/~lbecker/>

Reflective Log Assessment

13

- ▶ 1,000 word reflective log detailing participation in studies you have taken part in over the course of the semester.
- ▶ You are expected to consider the design of these studies, the ethical issues that may be related to them, and to reflect upon your own experiences of taking part.

Remember that your credits are not associated with this module; you are required to complete a specified amount of credits/hours of research participation in order to utilise the research environment for your final year dissertation.

- Run through of Proforma and Log Document on Moodle.....
