

Prifysgol Cymru
Y Ddinas Dewi Sant
University of Wales
Trinity Saint David

Learning to Love SPSS!

Dr Kate Williams
Kate.L.Williams@uwtsd.ac.uk

Trawsnewid Addysg; Trawsnewid Bywydau
Transforming Education; Transforming Lives

What can we remember from last time?

Null Hypothesis

$P = < 0.05$

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The Scientific Method

Highly structured, sequential series of steps for conducting a scientific research study

1. Understand the problem area
2. Identify the research question
3. Formulate one or more hypotheses
4. Plan the research methodology
5. Collect the data
6. Analyse the data with statistical tools
7. Interpret the results & discuss
8. Derive conclusions from the results

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$P = < 0.05$

- What does this mean?
- 'holy grail'?
- The probability of the results occurring due to chance is less than 5%
 - They've occurred for a reason = **"SIGNIFICANT"**
 - Independent variable has manipulated the dependent
- $0.05 = 5\%$

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Is **SIGNIFICANCE** enough?

- Not really.
- Only tells you that there is a difference or relationship
- Not HOW BIG that difference or relationship is
- Effect Size
 - Magnitude of the difference or relationship

Which 'stats' for which research design?

- Draw it!



Two basic questions that statistics can answer....

- Is there a relationship?
 - Height and weight
 - Gender and IQ
 - Experience and success
 - Cholesterol and blood pressure
- Is there a difference?
 - Caffeine on cycle performance
 - Exercise on mental health
 - Diet and body fat
 - Childhood and physical literacy

Statistical Tests: Levels of Data

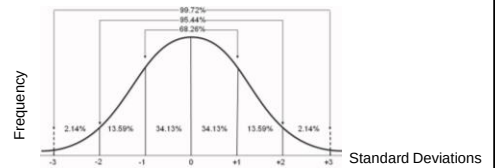
- Nominal Data
 - Non-numerical measures labelled by name (e.g. gender, ethnicity..)
 - Frequency count
- Ordinal Data
 - Ranked measures
 - Sit on a scale (0-5, likert scales)
- Interval Data
 - Numerical measures of quantities where zero does not indicate complete absence of the measure (e.g. temperature)
- Ratio Data
 - Highest order of data
 - Numerical measures of quantities for which zero indicates absence of the measure (e.g. height, weight, distance, time, age)

Statistical Tests: Parametric & Non-Parametric Statistics

- All statistical tests fall in to two broad categories
- Parametric
 - Category of statistical test used for sets of Interval & Ratio data
- Non-Parametric
 - Category of statistical tests used for Nominal and Ordinal Data
 - As well as Interval and Ratio data that does not meet the assumptions required

Statistical Tests: Normal Distribution

- Bell shaped frequency plot for which the mean, median and mode are coincident and centrally located



Statistical Tests: Normal Distribution

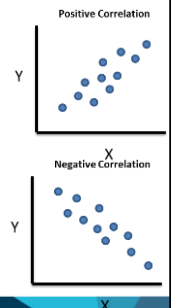
- Skewness
 - Horizontal shift in a normal curve
- Kurtosis
 - Vertical shift in a normal curve



Statistical Tests: Types of Analysis

Finding relationships among variables

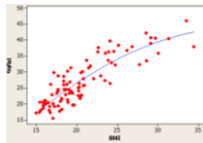
- **Correlation**
 - A measure of the relationship among two or more variables
 - Do they change together in a predictable fashion
 - Strength of correlation
 - -1.0 to +1.0
 - The further away from 0.0 the stronger the correlation
 - Use Pearson's Product Moment Correlation Coefficient
 - **BUT** no cause & effect



Statistical Tests: Types of Analysis

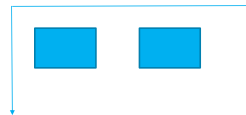
Finding relationships among variables

- Regression
 - A statistical method for predicting one variable based on the value of another variable
 - Used when there is a significant, strong correlation
 - E.g. skinfold calliper scores predict your body fat %



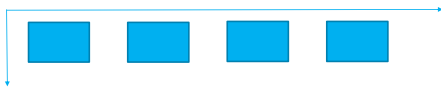
Statistical Tests: Types of Analysis

- If you have one group, tested on two occasions
 - Pre and post intervention
- 'one group pretest – posttest design'
- Dependent T Test is the statistic you would use



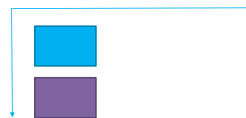
Statistical Tests: Types of Analysis

- If you have one group, tested on more than two occasions
 - Baseline, Pre and post intervention
- 'Time series design'
- One way repeated measures ANOVA is the statistic you would use



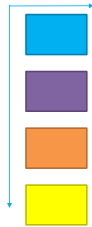
Statistical Tests: Types of Analysis

- If you have two groups, tested on one occasion
 - Comparison of two groups
- 'static group comparison design'
- Independent T Test is the statistic you would use



Statistical Tests: Types of Analysis

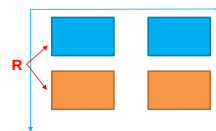
- If you have more than two groups, tested on one occasion
 - Comparison of three + groups
- 'static group comparison design'
- Between groups one way ANOVA is the statistic you would use



Statistical Tests: Types of Analysis

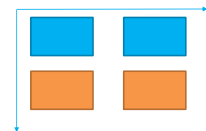
Pretest-post test design

- Two groups, tested twice
- Randomisation of groups



Non-equivalent control group design

- Two groups, tested twice
- NO randomisation



Mixed between within ANOVA

Now lets have a go at SPSS

