

Level of Significance

- Need to set the criterion for p (i.e. the standard for rejecting the H₀)
- Lowering the level of significance (i.e. p=0.01 instead of 0.05) reduces the chance of a Type I error.
- Instead of being 95% confident any differences between groups that we detect with our statistical tests are not due to chance, we can be 99% confident.

Variance of the Data

- Power increases as variance is reduced, when variability *within* groups is large, differences *between groups* will be less obvious variance can be reduced by increasing sample size or using homogeneous groups of participants.

Effect Size

- Effect size is a measure of the degree to which the null hypothesis is false (e.g. H₀ = no difference in BMI scores between Group A and Group B)
- So, a p-value can tell us there is a *significant difference* in the means of two groups, the ES tells us *how big the difference is*.
- To normalise data from different studies into one common term, we can use an ES index such as *Cohen's d*. this is calculated by subtracting the mean score of Group A from the mean score of Group B and dividing that by the pooled standard deviation of both groups.

$$d = \frac{m_1 - m_2}{\sqrt{\frac{SD_1^2 + SD_2^2}{2}}}$$

- The larger the effect size the greater the difference between the two groups
- ES closer to 0: show little effect
- ES around 0.5: show medium effect
- ES closer to 1.0: show a large effect of an intervention
- It is possible to get a Cohen's d >1.0 this would be a very large effect indeed)

Sample Size

- Influence of sample size on power of a test is critical. *The larger the sample, the greater the statistical power.*
- Smaller samples are less likely to represent the wider population and therefore true differences between groups are less likely to be recognised.
- N<30 – power is substantially reduced.

Other factors influencing sample size:

- Finding and recruiting eligible participants can be challenging
- Eligible participants might not consent to be in the study
- Clinicians may forget to enrol eligible participants
- Participants may drop out of the study
- Need to recruit ~20% more people than needed in the sample to allow for attrition.