Intro to Stats

Independent t-tests

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- Use when:
- You are examining differences between groups
- Each participant is tested once
- Comparing two groups only

Assumptions

- Observations are independent
- Populations are normally distributed
- Populations should have equal variance
  - There is a "fix" for violations of this assumption that will be discussed in lab

Calculating

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\left(\frac{(n_1-1)\,s_1^2 + (n_2-1)s_2^2}{n_1 + n_2 - 2}\right)\left(\frac{n_1+n_2}{n_1 n_2}\right)}}$$

$\overline{X}_1$ = mean for group 1
$\overline{X}_2$ = mean for group 2
n_1 = number of participants in group 1
n_2 = number of participants in group 2
s_1^2 = variance for group 1
s_2^2 = variance for group 2

Degrees of Freedom

- Degrees of freedom (df): Describes number of scores in sample that are free to vary (without changing value of descriptive statistic).
- Needed to identify the critical value
- **df** = $(n_1 - 1) + (n_2 - 1)$ (for t-test)

An interpretation should include:

- Whether the effect/difference was significant or not
- The outcome in the study
- The different groups or categories being compared in the study
- The mean and SD for each group or category
- The t statistic and p-value, as shown in examples

Significance

- Remember: Just because means are different, it does not mean they are meaningfully different
- Need to examine significance
  - i.e., likelihood that the differences are due to chance

Effect Sizes

- A measure of the magnitude of the difference between groups

$$ES = \frac{\overline{X}_1 - \overline{X}_2}{SD}$$

- Small = .0 to .2
- Medium = .2 to .5
- Large = above .5