Week 4

Monday, 28 January 2019 12:29

Effect sizes

- Main statistics in reports
- Communicate significance of the result
- Allow meta-analytic conclusion
- Allow power analysis
- Cohen's d
  - effect size estimator
  - prefer Hedge's g for sample < 20, unbiased Cohen's d
  - up to 4% more than actual effect size for population
  - Standardized mean differences
- Pearson's r family
  - Strength of association
  - % of variance explained
- Cohen's w
  - Association strength for categorical variables
  - Chi-squared test effect size
- Z-score
  - Number of σ above/below mean
- Statistically significant and practically insignificant is possible
- Large effect can also be implausible

Effect size	*d*	Reference
Very small	0.01	Sawilowsky, 2009
Small	0.20	Cohen, 1988
Medium	0.50	Cohen, 1988
Large	0.80	Cohen, 1988
Very large	1.20	Sawilowsky, 2009
Huge	2.0	Sawilowsky, 2009

Cohen's d

- Mean diff / std dev (compound or from second group)

- Different for within and between designs, factor of $sqrt(2 * (1 - r))$

Correlations r

- Small = 0.1, medium = 0.3, large = 0.5
- Can be converted to Cohen's d

- **Hedge's g**
  - $gstar = 1 - \left(\frac{3}{4\,(n1 + n2) - 9}\right) d$
  - Correct bias for small sample size
- **Effect size exercise**
  - Good to keep in mind that the bigger the sample size the more significant difference important to keep in sight effect size
  - Probability of superiority is nice way to imagine d effect size in action
    - $P = CDF\left(\frac{\delta}{\sqrt{(2)}}\right)$ where CDF is the cumulative distribution function of the star distribution, and δ the population Cohen's *d*
  - Rˆ2 is percentage of variance explained
    - $$r = \frac{d_s}{\sqrt{d_s^2 + \frac{N^2 - 2N}{n_1 \times n_2}}}$$
  - N = n1 + n2, ds is Cohen's d for the sample studied
  - η square
    - part of r family and used for more than two sets of observations
    - Sum to 100% and give percent of total variance accounted for by group membe
    - Hard to compare between studies as total variance differs from each study

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