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The following handout lists the most commonly used effect sizes, adjustments, and rules of thumb concerning sample size calculation.

Effect sizes

$d = \frac{\mu_2 - \mu_1}{\sigma}$	t-test	Cohen's d is used in 2-sample t-test settings. It is a measure of the standardized difference between means. If $d = 1$, then the means of the two groups differ by one standard deviation. small=0.02, medium=0.05, large=0.80
$\eta^2 = \frac{\sigma_m^2}{\sigma_t^2}$	ANOVA	η^2 is analogous to R^2. σ_m^2 is the estimate of the variance between group means, σ^2 is the pooled variance within a group, and σ_t^2 is the total variation: $\sigma_t^2 = \sigma_m^2 + \sigma^2$. small=0.01, medium=0.06, large=0.14
$f = \frac{\sigma_m}{\sigma}$	ANOVA	σ_m^2 is the estimate of the variance between group means, σ^2 is the pooled variance within a group. small=0.1, medium=0.25, large=0.40
$\lvert p_2 - p_1 \rvert$	χ^2 test	A χ^2 test can be used to test the difference between two proportions p_1 and p_2.

Adjustments to sample size estimates

$$\text{Design Effect} = 1 + (k-1)\rho$$ where k represents the number of individuals within a cluster and ρ is the intraclass correlation coefficient, $\rho = \sigma^2_{between}/(\sigma^2_{between} + \sigma^2_{within})$.	This formula is to estimate the design effect for a clustered study. When ρ is unknown it is often assumed to be 0.05. The design effect is then multiplied by a sample size estimate to give an adjusted sample size calculation. [1]
$$R = \frac{1+(w-1)\rho}{w} - \frac{v \cdot \rho^2}{1+(v-1)\rho}$$ where v represents the number of observations on each subject before randomization to a treatment, w is the number of observations after randomization to a treatment, and ρ represents the correlation between observations at any two time points.	When planning a study that will result in repeated measures, R is multiplied to a sample size estimate to give an adjusted sample size calculated. Typically ρ ranges from 0.60 to 0.75. Used only when comparing means of repeated measures. [1]

$n = \frac{8}{d^2}$ where $d = \frac{\mu_1 - \mu_0}{\sigma}$	2-sided one-sample t-test	Assuming $\alpha = 0.05$ and power=80%. [2]
$n = \frac{16}{d^2}$ where $d = \frac{\mu_2 - \mu_1}{\sigma}$ and $\sigma = \frac{\sigma_1 + \sigma_2}{2}$	2-sided two-sample t-test	Assuming $\alpha = 0.05$ and power=80%, this gives you the sample size required for each group. (Lehr's equation) [2]
$n = \frac{16(CV)^2}{(ln(\mu_0) - ln(\mu_1)^2}$	2-sided two-sample t-test	Where $CV = \sigma_1/\mu_1$ is the coefficient of variation. This assumes $\alpha = 0.05$ and power=80%, this gives you the sample size required for each group. [2]
$n = \frac{16 \cdot \bar{p}(1-\bar{p})}{(p_2 - p_1)^2}$ where $\bar{p} = \frac{p_1 + p_2}{2}$	2-sided two-sample proportion test	Assuming $\alpha = 0.05$ and power=80% [2]
$n = \frac{4}{(\sqrt{\theta_1} - \sqrt{\theta_2})^2}$	Poisson Regression, comparing means	The average count for group 1 is θ_1 and θ_2 for group 2. [2]

References

[1] Michael J. Campbell David Machin. *Sample Size Tables for Clinical Studies.* Wiley, Hoboken, NJ, 2009.

[2] Gerald van Belle. *Statistical Rules of Thumb.* Wiley, Hoboken, NJ, 2008.

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