UCDAVIS HEALTH | Clinical and Translational Science Center

Paired Sample T-test

Objective: Compare Means Between Two Dependent Samples

A researcher is interested in the effectiveness of a new drug to reduce LDL levels in men with high cholesterol. LDL levels of participants will be measured at the start of the study and after 3 months. A reduction in LDL level of 0.3 would be considered a clinically meaningful change. From pilot data, the standard deviation of the change in LDL levels is about 0.77. Power of 90% with a significance level of 5% is desired for the test.

Required Information	**Inputs**
What is the desired power for the test?	90%
At what significance level do you want to test your hypothesis?	5%
What difference do you want to be able to detect?	0.3
What is the standard deviation of the change in the response variable?	0.77
Is your hypothesis one-sided or two-sided?	Two-Sided

Effect Size will need to be calculated from the Mean Difference and Standard Deviation. This can be done by using the equation:

$$Effect\ Size\ =\ (Mean\ Difference\ )/(Standard\ Deviation\ of\ the\ Change\ in\ the\ Response\ Variable)$$

Therefore, our Effect Size is:

$$Effect\ Size\ =\ (0.3)\ /\ (0.77)\ =\ 0.3896$$

Now input these numbers into our sample size calculator available at https://sample-size.net/sample-size-study-paired-t-test/

Sample Size Calculators
for designing clinical research

UCSF Clinical & Translational Science Institute

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Calculators

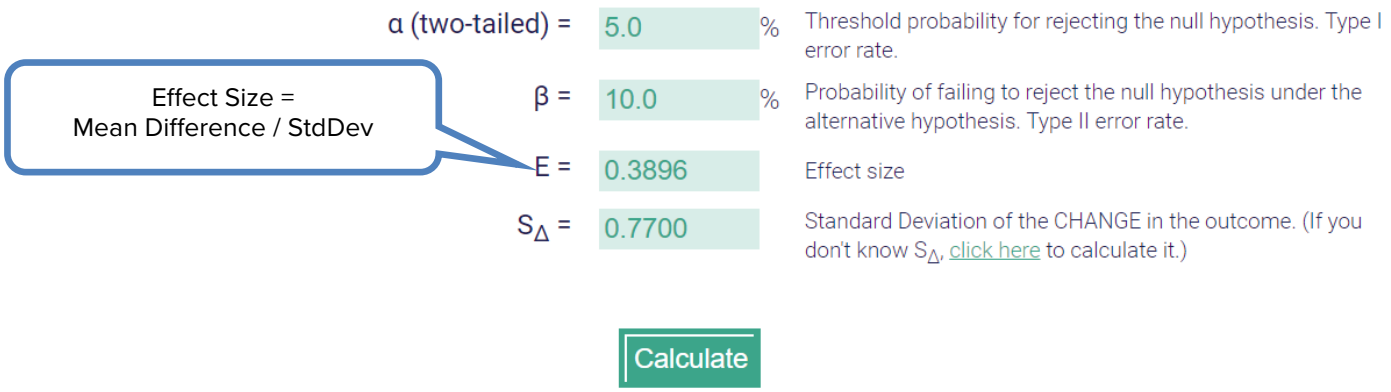
- CI for proportion
- CI for mean
- Means - effect size
- Means - sample size
- Correlation - sample size

Sample size for before-after study (Paired T-test)

Measure a continuous outcome y in each subject at the start and end of the study period. For each subject, calculate the change $\Delta = y_{end} - y_{start}$. Compare the mean value of Δ to 0. This requires the standard deviation S_Δ. The estimate of S_Δ should be based on data from other subjects who were followed for similar time periods.

Instructions: Enter parameters in the **green** cells. Answers will appear in the **blue** box below.

From the difference we want to be able to detect and standard deviation of the change in the response variable we can calculated the effect size: 0.3 / 0.77 = 0.3896



1. Calculation using the T statistic and non-centrality parameter:

A value of N = 43.0085 gives the following calculations:
NCP = Non-centrality parameter = $\sqrt{N} * E/S_\Delta$ = 3.3182.
DF = Degrees of freedom = N - 1 = 42.0085.
t_α = Inverse of the two-tailed T distribution given probability of 1-(α/2) and DF of 42.0085 = 2.0181.
Beta(t_α, DF, NCP) = 0.100010. If N was calculated correctly, this should closely approximate your selected value of β, above.
The N thus calculated is rounded up to the next highest integer to give the group size.

Group size N: **44**

A total sample size of 44 is needed.

Example using the UCSF Sample Size Calculators for Designing Clinical Research (https://sample-size.net/sample-size-study-paired-t-test/)