

Why should I use a paired t test?

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To perform this test, select **Stat > Basic Statistics > Paired t**.

Use this analysis to:

- Determine whether the mean of the differences between two paired samples (target value)
- Calculate a range of values that is likely to include the population mean of the

For example, suppose managers at a fitness facility want to determine whether their program is effective. Because the "before" and "after" samples measure the same subjects, a paired t-test is the most appropriate analysis.

The paired t-test calculates the difference within each before-and-after pair of measurements, determines the mean of these changes, and reports whether this mean of the differences is statistically significant.

A paired t-test can be more powerful than a 2-sample t-test because the latter includes variation occurring from the independence of the observations. A paired t-test does not include this variation because the paired observations are dependent. Also, a paired t-test does not require the samples to have equal variance. Therefore, if you can logically address your research question with a paired design, it may be advantageous to do so, in conjunction with a paired t-test, to increase statistical power.

The paired t-test also works well when the assumption of normality is violated, but only if the underlying distribution is symmetric, unimodal, and continuous. If the values are highly skewed, it might be appropriate to use a nonparametric procedure, such as a 1-sample sign test.

For Paired t, the hypotheses are:

Null hypothesis

$$H_0: \mu_d = \mu_0$$

The population mean of the differences (μ_d) equals the hypothesized mean of the differences (μ_0).

Alternative hypothesis

Choose one:

$$H_1: \mu_d \neq \mu_0$$

The population mean of the differences (μ_d) does not equal the hypothesized mean of the differences (μ_0).

$$H_1: \mu_d > \mu_0$$

The population mean of the differences (μ_d) is greater than the hypothesized mean of the differences (μ_0).

$$H_1: \mu_d < \mu_0$$

The population mean of the differences (μ_d) is less than the hypothesized mean of the differences (μ_0).

Why use an equivalence test

How are dependent and independent samples different?

What is the standard error of the mean?

What is a t-value?

What is a Z-test?

What is a Z-value?

< Hypothesis tests
Tests of means
Types of t-tests
Why use 1-sample t
Why use 1-sample Z
Why use 2-sample t
Why use paired t