How to Calculate Cohen's d in SPSS: A Step-by-Step Guide

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Cohen's d is a measure used to determine the effect size of a difference between two groups in a study. To calculate Cohen's d in SPSS, you will first need to obtain the mean and standard deviation of the two groups you are comparing. Next, you will use the formula d = (M1 - M2) / SDpooled, where M1 and M2 are the means of the two groups and SDpooled is the pooled standard deviation calculated using the formula √. SPSS has a built-in function to calculate Cohen's d, which can be accessed by selecting "Analyze" and then "Compare Means" from the menu bar. From there, you can select the two variables you want to compare and SPSS will automatically calculate and display the Cohen's d value.

In statistics, we often use to determine if there is a statistically significant difference between the mean of two groups.

However, while a p-value can tell us whether or not there is a statistically significant difference between two groups, an effect size can tell us how large this difference actually is.

One of the most common measurements of effect size is **Cohen's d**, which is calculated as:

Cohen's d = $(x1 - x2) / \sqrt{(s12 + s22)} / 2$

where:

x1 , x2: mean of sample 1 and sample 2, respectively
s12, s22: variance of sample 1 and sample 2, respectively

Using this formula, here is how we interpret Cohen's d:

A *d* of **0.5** indicates that the two group means differ by 0.5 standard deviations.
A *d* of **1** indicates that the group means differ by 1 standard deviation.
A *d* of **2** indicates that the group means differ by 2 standard deviations.

And so on.

Here's another way to interpret cohen's d: An effect size of 0.5 means the value of the average person in group 1 is 0.5 standard deviations above the average person in group 2.

We often use the following rule of thumb when interpreting Cohen's d:

A value of **0.2** represents a small effect size.
A value of **0.5** represents a medium effect size.
A value of **0.8** represents a large effect size.

The easiest way to calculate Cohen's d in SPSS is to use **Analyze** > **Compare Means and Proportions** > **Independent-Samples T Test**.

Example: How to Calculate Cohen's d in SPSS

Suppose a botanist wants to know if two different fertilizers lead to different average plant growth (in inches).

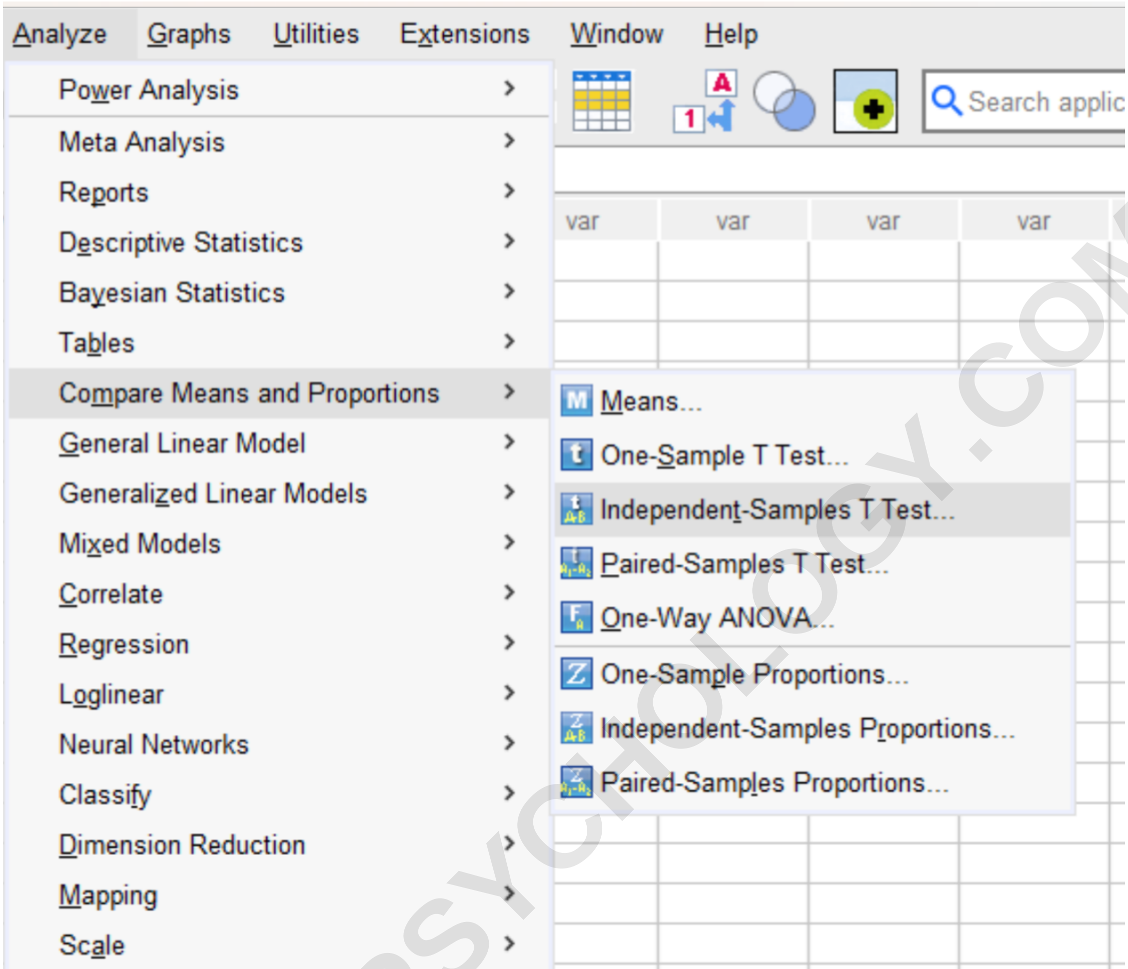
She decides to apply the first fertilizer to 12 randomly selected plants and the second fertilizer to another 12 randomly selected plants.

The following dataset in SPSS shows the growth for the plants in each group:

	Fertilizer	Growth	var	var
1	One	8		
2	One	9		
3	One	11		
4	One	11		
5	One	12		
6	One	14		
7	One	15		
8	One	16		
9	One	16		
10	One	18		
11	One	20		
12	One	21		
13	Two	7		
14	Two	9		
15	Two	10		
16	Two	10		
17	Two	11		
18	Two	11		
19	Two	12		
20	Two	14		
21	Two	14		
22	Two	16		
23	Two	20		
24	Two	23		
25				

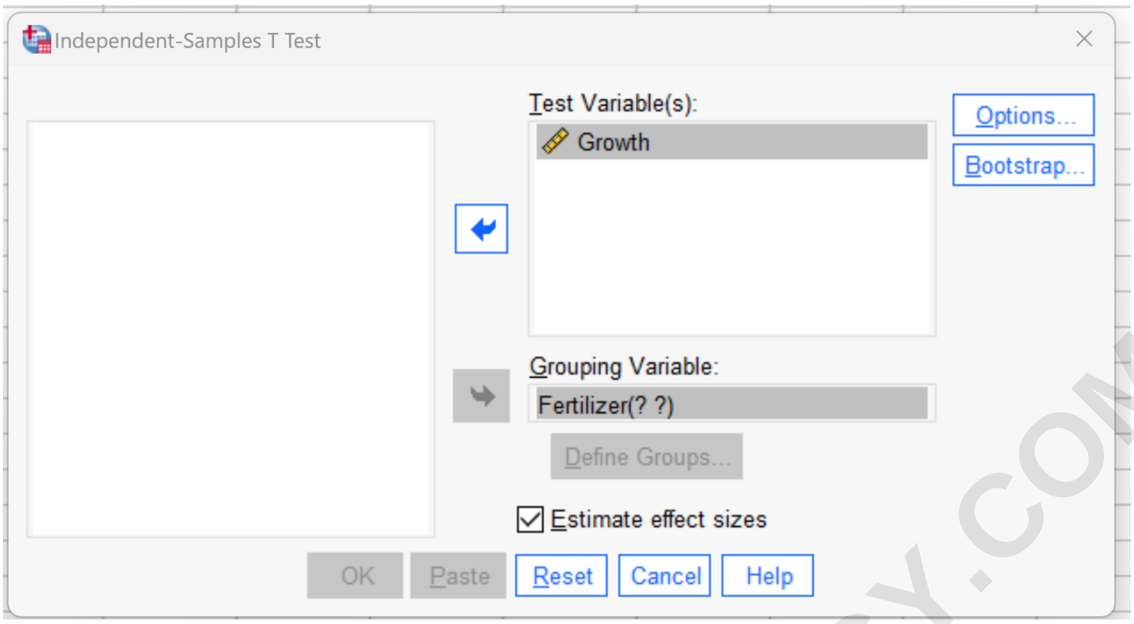
Suppose that the botanist would like to calculate Cohen's d to determine the effect size of the difference between average growth rate between the two fertilizers.

To do so, click the **Analyze** tab, then click **Compare Means and Proportions**, then click **Independent-Samples T Test**:



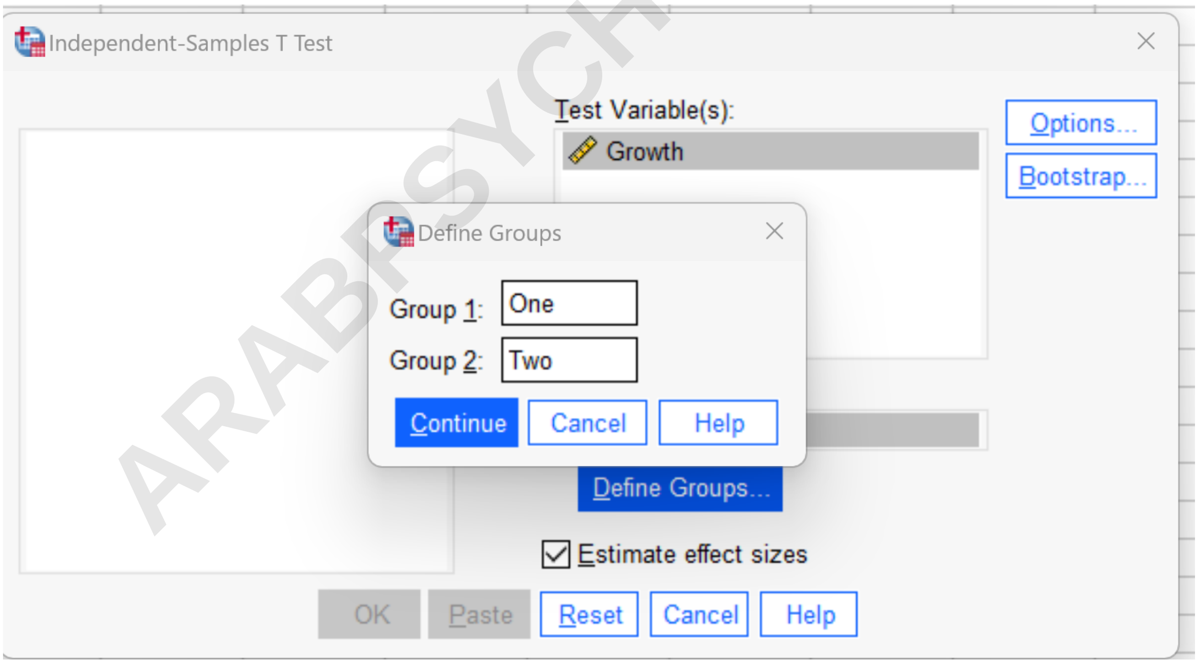
In the new window that appears, drag the **Growth** variable to the **Test Variable** panel, then drag the Fertilizer variable to the Grouping Variable panel.

Then check the box next to **Estimate effect sizes**.



Then click the **Define Groups** button.

In the new window that appears, type **One** for **Group1** and Two for **Group2**:



Then click **Continue**. Then click **OK**.

The following output will be produced:

T-Test

Group Statistics

	Fertilizer	N	Mean	Std. Deviation	Std. Error Mean
Growth	One	12	14.25	4.181	1.207
	Two	12	13.08	4.660	1.345

Independent Samples Test

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig One-Sided
Growth	Equal variances assumed	.032	.860	.646	22	.26
	Equal variances not assumed			.646	21.745	.26

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
Growth	Cohen's d	4.427	.264	-.543	1.064
	Hedges' correction	4.585	.254	-.525	1.028
	Glass's delta	4.660	.250	-.562	1.052

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control (i.e., the second) group.

The value for Cohen's d can be seen in the column named **Point Estimate** for the row named **Cohen's d**.

We can see that the value for Cohen's d is **0.264**.

We interpret this to mean that the average height of plants that received fertilizer #1 is **0.264** standard deviations greater than the average height of plants that received fertilizer #2.

Recall the rule of thumb that we mentioned earlier for interpreting Cohen's d:

A value of **0.2** represents a small effect size.
A value of **0.5** represents a medium effect size.
A value of **0.8** represents a large effect size.

Based on this rule of thumb, we would interpret this to be a small effect size.

In other words, whether or not there is a statistically significant difference in the mean plant growth between the two fertilizers, the actual difference between the group means is trivial.

The following tutorials offer additional information on effect size and Cohen's d: