How to Run a Correlation Test in SPSS: A Step-by-Step Guide

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January 7, 2026

RECOMMENDED CITATION

mohammed looti (2026). *How to Run a Correlation Test in SPSS: A Step-by-Step Guide*. PSYCHOLOGICAL SCALES. Retrieved from https://scales.arabpsychology.com/?p=124856

Executing a correlation test within the Statistical Package for the Social Sciences (SPSS) is a fundamental procedure for examining the linear relationship between two quantitative variables. This process begins with meticulous data preparation, ensuring variables are correctly defined and imported. Once the data is ready, users must navigate the analytical menus to select the appropriate measure of association, such as the widely used Pearson correlation coefficient for normally distributed interval or ratio data, or alternative non-parametric measures like Spearman's rho. The software then generates a correlation coefficient, which quantifies the strength and direction of the relationship, alongside an associated significance value. This p-value is crucial for determining if the observed relationship is statistically significant, allowing researchers to draw robust conclusions about the underlying population.

The Statistical Foundation of Correlation Analysis

In the realm of inferential statistics, calculating the correlation between variables is only the first step. To assert that a relationship observed in a sample genuinely exists in the larger population, we must conduct a formal hypothesis test. This is typically done using the Pearson correlation coefficient, denoted as r, which quantifies the strength of a linear relationship. While r provides a magnitude, the correlation test determines the probability that this observed magnitude occurred by random chance alone, assuming no actual relationship exists.

This testing procedure involves converting the correlation coefficient into a test statistic, often a t-score, which allows us to determine the corresponding probability or p-value. The quality and reliability of the data are paramount; assumptions such as the data being continuous and approximately normally distributed must be met when applying the standard Pearson method. Failing to meet these assumptions often necessitates the use of alternative, non-parametric methods such as Spearman's Rank-Order Correlation.

Formulating the Null and Alternative Hypotheses

All statistical tests rely on defining a set of competing hypotheses. The goal of the correlation test is specifically to challenge the assumption that there is no relationship between the variables under study. These hypotheses, concerning the population correlation coefficient (ρ), are formalized as follows:

H0 (The Null Hypothesis): The population correlation coefficient (ρ) is equal to zero (ρ = 0). This implies that the correlation between the two variables **is not** statistically significant.
HA (The Alternative Hypothesis): The population correlation coefficient (ρ) is not equal to zero (ρ ? 0). This implies that the correlation between the two variables **is** statistically significant.

The decision to reject the null hypothesis hinges entirely on the calculated p-value. If the p-value is less than the predetermined significance level (alpha, typically set at α = .05), we possess sufficient evidence to reject H0, concluding that a statistically meaningful relationship exists between the two variables in the population.

Navigating SPSS for Correlation Analysis

SPSS provides an intuitive graphical interface for running these tests efficiently. The standard path for calculating a bivariate correlation--meaning the correlation between exactly two variables--is remarkably straightforward and easily accessible through the main analysis menu. Users must access the statistical tools using the following navigational sequence: **Analyze** > **Correlate** > **Bivariate**. This menu specifically allows for the selection of different correlation types (Pearson, Spearman, or Kendall's tau-b) and provides necessary options for managing missing data and selecting hypothesis tests.

Example: Step-by-Step Correlation Test in SPSS

Data Setup and Variable Selection

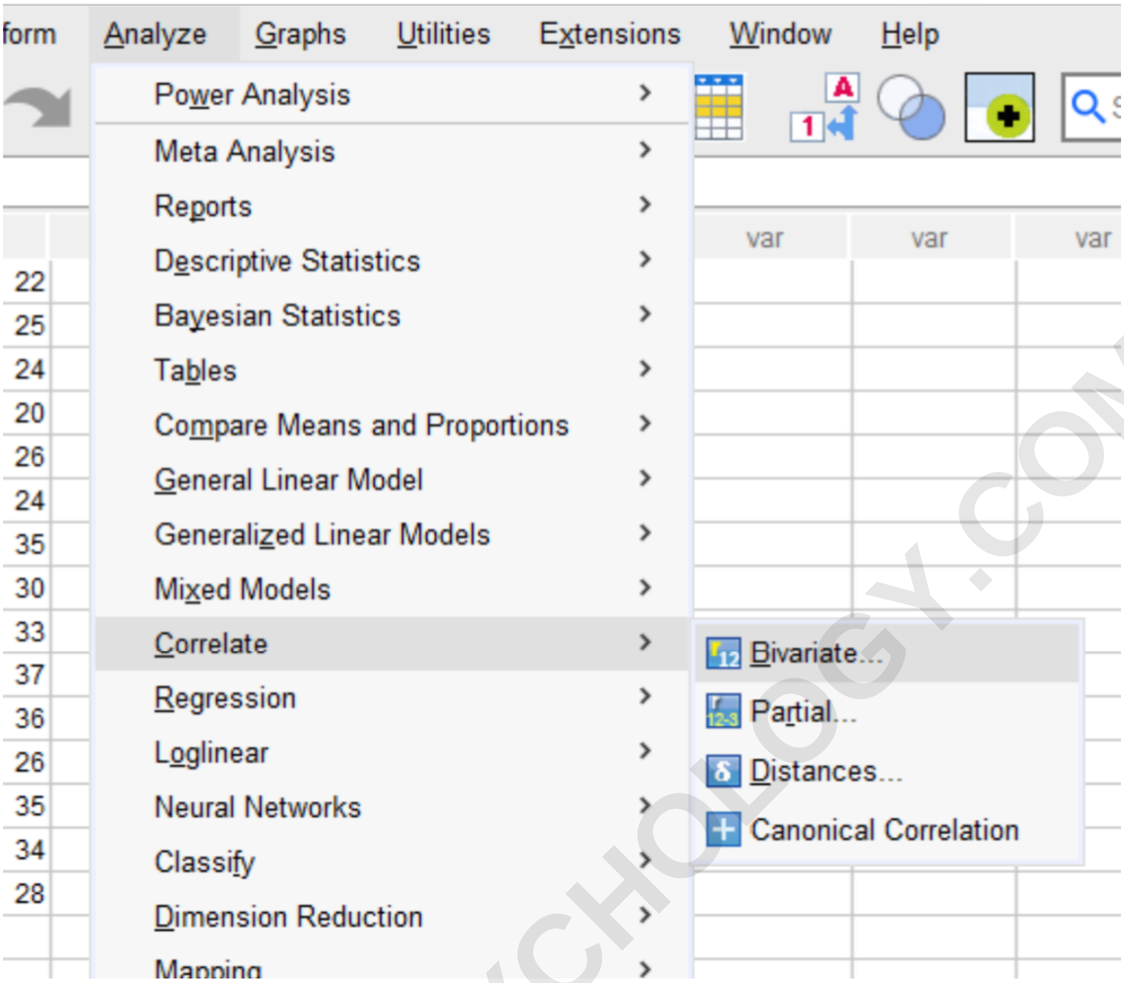
To illustrate the procedure, let us assume we are working with an existing SPSS dataset containing two quantitative variables, labeled simply as **X** and **Y**. Our objective is to calculate the Pearson correlation coefficient between these variables and, critically, execute a correlation test to ascertain if the observed relationship achieves statistical significance. The Data View window, displaying the values for our two variables, is shown below, demonstrating the paired nature of the observations:

	X	Y	var	var
1	4	22		
2	6	25		
3	7	24		
4	7	20		
5	8	26		
6	10	24		
7	11	35		
8	12	30		
9	14	33		
10	15	37		
11	15	36		
12	17	26		
13	19	35		
14	20	34		
15	21	28		
16				
17				
18				

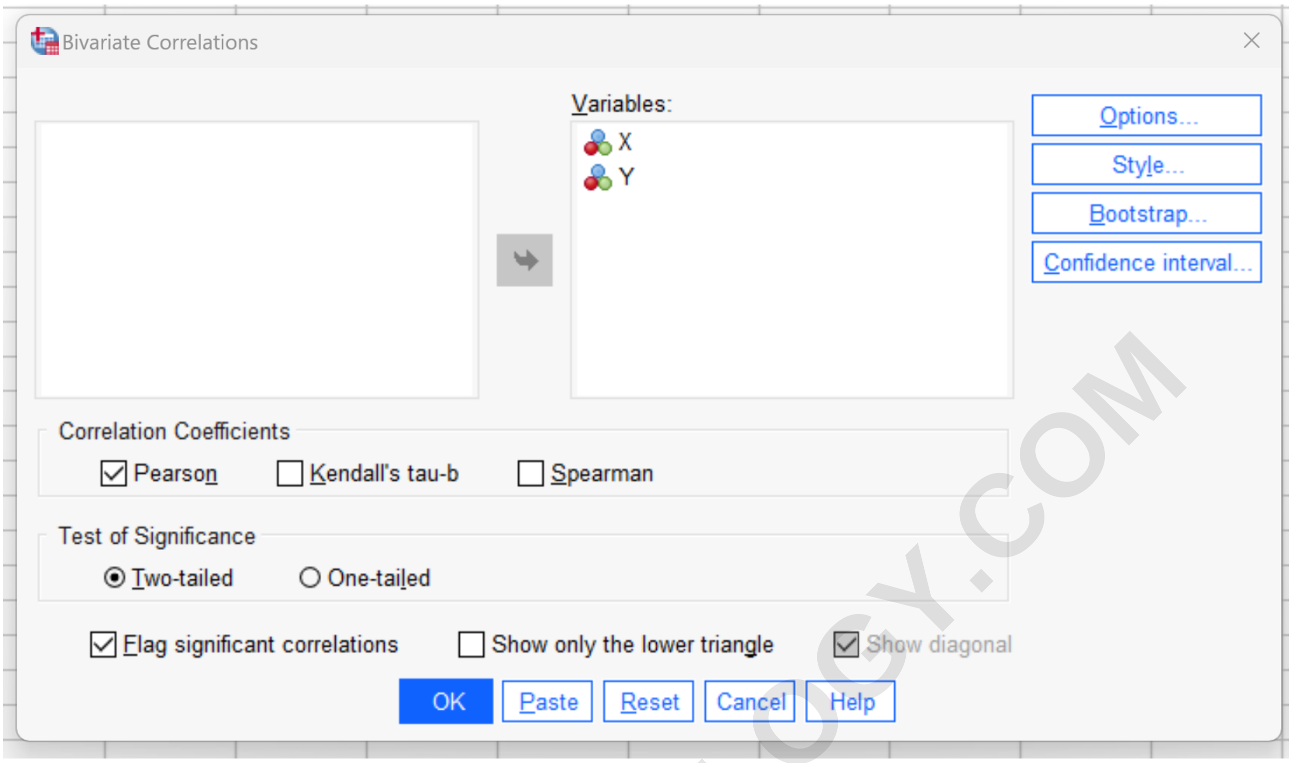
We are now prepared to launch the analysis dialog box.

Executing the Bivariate Correlation Command

The initial step involves accessing the primary statistical analysis tools in SPSS. Click on the **Analyze** tab in the top menu bar, hover over **Correlate**, and then select **Bivariate** from the ensuing submenu. This action opens the main dialog box where variables and testing options are specified, as depicted in the image:



Within the Bivariate Correlations dialog box, you must transfer the variables of interest from the left pane into the **Variables** box on the right. Select both **X** and **Y** and move them over. This step clearly identifies to SPSS which specific pair of variables to analyze for association, ensuring the test is run only on the intended data columns:



Selecting the Appropriate Coefficient and Output Options

Before proceeding, confirm the statistical method you wish to employ. Under the **Correlation Coefficients** section, ensure that the box next to **Pearson** is checked. This selection is correct if your data is continuous and meets the necessary parametric assumptions. Furthermore, examine the options for the test of significance; SPSS defaults to a two-tailed test, which is the most conservative choice and is generally appropriate unless a specific directional hypothesis has been clearly established a priori. After verifying these selections, click **OK** to instruct SPSS to run the calculations and generate the output table in the Viewer window.

Interpreting the SPSS Correlation Matrix Output

Upon execution, SPSS generates an output window displaying a correlation matrix. Since we requested the correlation between only X and Y, the matrix is straightforward, showing the coefficients and significance values in the intersecting cell. This table summarizes the findings of the statistical analysis:

Correlations

Correlations

		X	Y
X	Pearson Correlation	1	.651**
	Sig. (2-tailed)		.009
	N	15	15
Y	Pearson Correlation	.651**	1
	Sig. (2-tailed)	.009	
	N	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

The matrix provides three crucial pieces of information for the relationship between X and Y:

Pearson Correlation Coefficient (r): This value is **.651**. This coefficient quantifies the strength of the linear relationship, independent of the test of significance.
Significance (2-tailed): This is the calculated p-value, which is **.009**. This value is used to determine whether to reject the null hypothesis.
N (Sample Size): The number of data pairs used in the calculation, ensuring accuracy based on the available data points.

Drawing Conclusions on Statistical Significance

The core of the hypothesis test lies in comparing the computed p-value against our pre-established significance level (α = .05). We recall the statistical hypotheses central to the test:

H0: The correlation between the two variables **is not** statistically significant (ρ = 0).
HA: The correlation between the two variables **is** statistically significant (ρ ? 0).

Since the obtained p-value of **.009** is significantly smaller than the conventional alpha level of .05 (0.009 < 0.05), we fulfill the criteria required to reject the null hypothesis (H0). We therefore conclude that there is sufficient evidence to state that the correlation observed between variable X and variable Y is statistically significant in the population from which the sample was drawn.

Interpreting Strength and Direction

Beyond statistical significance, the magnitude and sign of the Pearson correlation coefficient (r = **.651**) inform the practical interpretation of the relationship. The positive sign (+) confirms a **positive correlation**: this indicates that as values for variable X increase, values for variable Y tend to increase in a linear fashion as well. Furthermore, a coefficient of .651 indicates a moderately strong relationship, suggesting that variability in one variable is substantially associated with variability in the other, offering valuable insights into their covariance.

Further Reading and Resources

For researchers seeking a deeper understanding of the underlying mathematical principles and rigorous application of correlational research, the following external resources are highly recommended for continued learning:

A Comprehensive Introduction to the Pearson Correlation Coefficient