

Testing for Normality using SPSS Statistics when you have only one independent variable.

[Laerd Statistics](#) [Login](#)[Cookies & Privacy](#)

[Take the Tour](#) [Plans & Pricing](#) [SIGN UP](#)

Testing for Normality using SPSS Statistics

Introduction

An assessment of the normality of data is a prerequisite for many statistical tests because normal data is an underlying assumption in parametric testing. There are two main methods of assessing normality: graphically and numerically.

This "quick start" guide will help you to determine whether your data is normal, and therefore, that this assumption is met in your data for statistical tests. The approaches can be divided into two main themes: relying on statistical tests or visual inspection. Statistical tests have the advantage of making an objective judgement of normality, but are disadvantaged by sometimes not being sensitive enough at low sample sizes or overly sensitive to large sample sizes. As such, some statisticians prefer to use their experience to make a subjective judgement about the data from plots/graphs. Graphical interpretation has the advantage of allowing good judgement to assess normality in situations when numerical tests might be over or under sensitive, but graphical methods do lack objectivity. If you do not have a great deal of experience interpreting normality graphically, it is probably best to rely on the numerical methods.

If you want to be guided through the testing for normality procedure in SPSS Statistics for the specific statistical test you are using to analyse your data, we provide comprehensive guides in our enhanced content. For each statistical test where you need to test for normality, we show you, step-by-step, the procedure in SPSS Statistics, as well as how to deal with situations where your data fails the assumption of normality (e.g., where you can try to "transform" your data to make it "normal"; something we also show you how to do using SPSS Statistics). You can learn about our enhanced content in general here or how we help with assumptions here. However, in this "quick start" guide, we take you through the basics of testing for normality in SPSS Statistics.

SPSS Statistics

Methods of assessing normality

SPSS Statistics allows you to test all of these procedures within **Explore...** command. The **Explore...** command can be used in isolation if you are testing normality in one group or splitting your dataset into one or more groups. For example, if you have a group of participants and you need to know if their height is normally distributed, everything can be done within the **Explore...** command. If you split your group into males and females (i.e., you have a categorical independent variable), you can test for normality of height within both the male group and the female group using just the **Explore...** command. This applies even if you have more than two groups. However, if you have 2 or more categorical, independent variables, the **Explore...** command on its own is not enough and you will have to use the **Split File...** command also.

Get access to all the enhanced SPSS guides in Laerd Statistics



“ I want to congratulate the staff for providing such a clear and precise educational site. I am a PhD student and just completed three back to back graduate statistic courses. The information was invaluable and the SPSS guides were so much easier to follow than any other book or website. ”

Katherine, USA

“ Thank you VERY much for putting this site together! I have found it to be invaluable in my dissertation statistics and can't believe how much I've come to rely on so quickly. ”

Allen, USA

[TAKE THE TOUR](#)

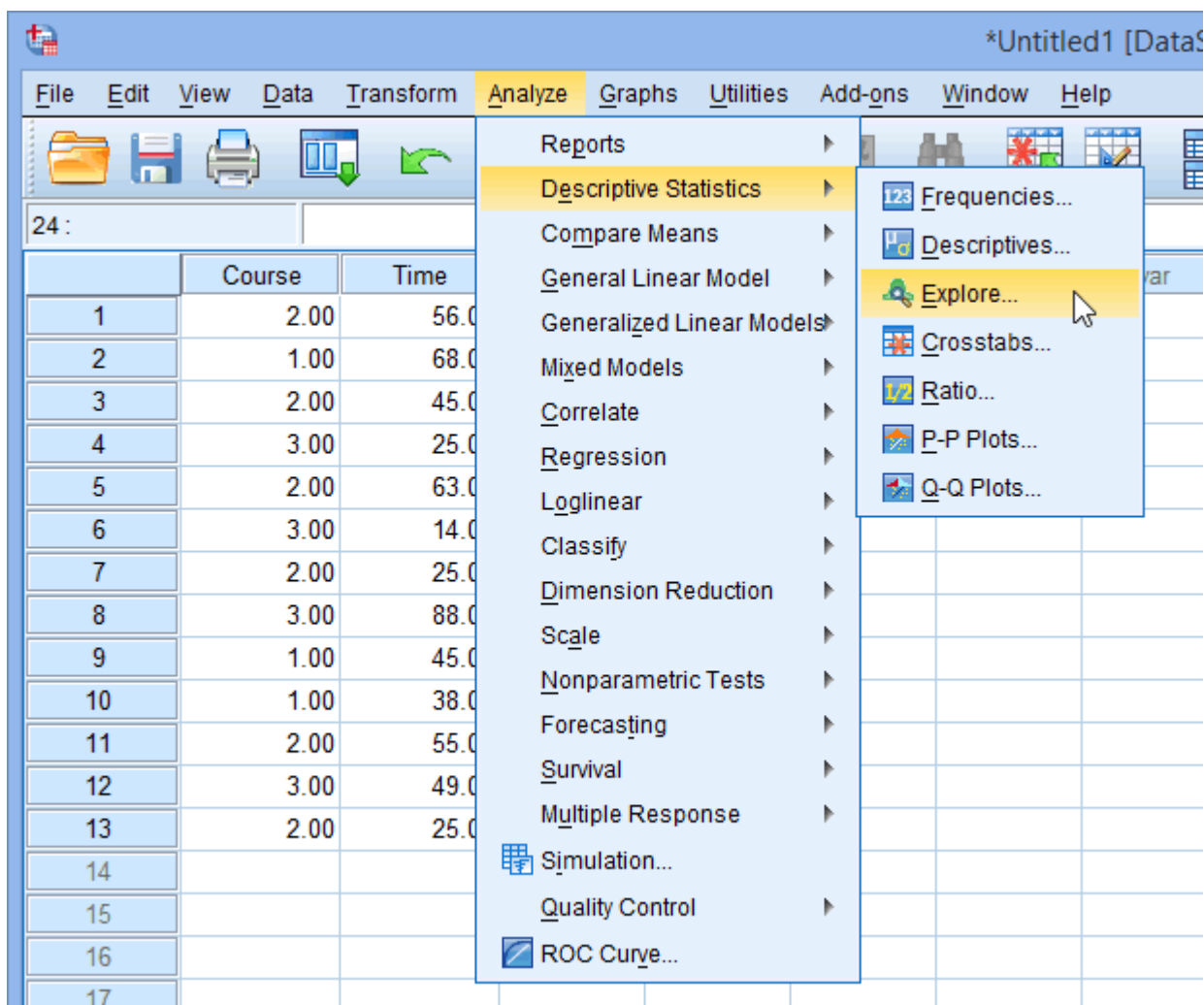
[PLANS & PRICING](#)

[SPSS Statistics](#)

Procedure for none or one grouping variable

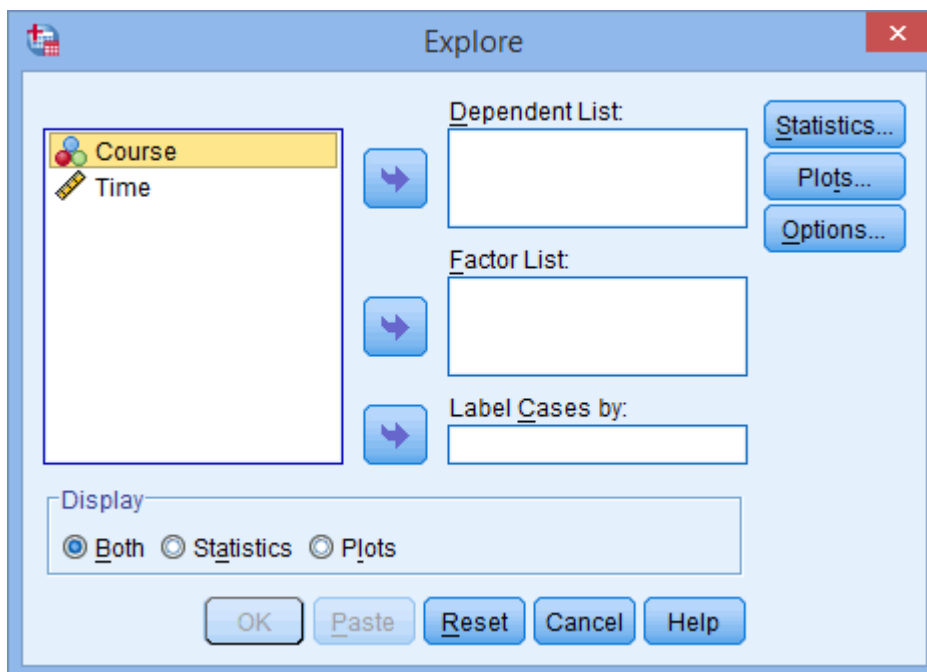
The following example comes from our guide on how to perform a one-way ANOVA in SPSS Statistics.

- Click **Analyze > Descriptive Statistics > Explore...** on the top menu, as shown below:




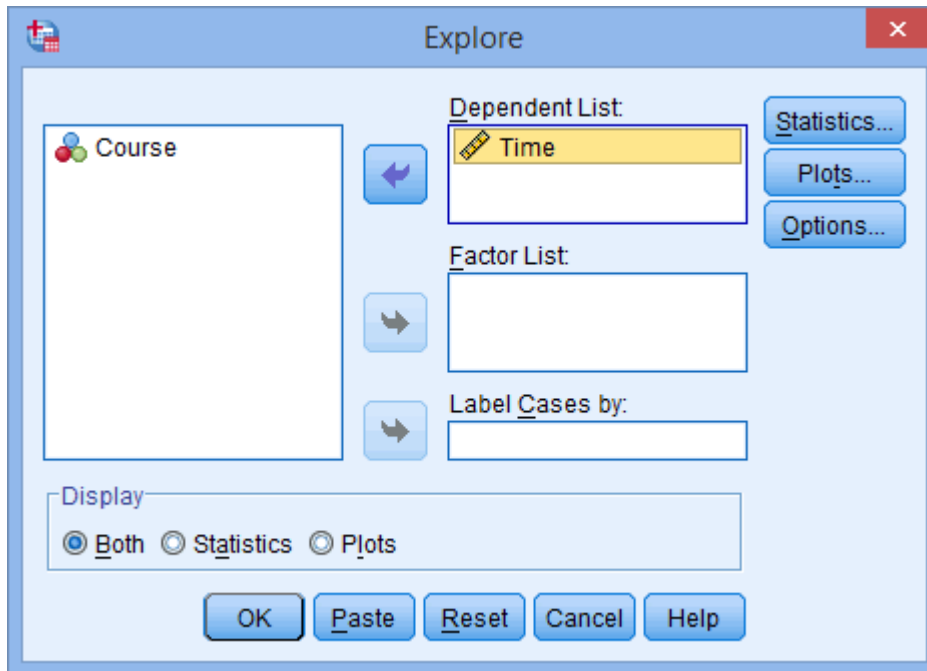
Published with written permission from SPSS Statistics, IBM Corporation.

- You will be presented with the **Explore** dialogue box, as shown below:




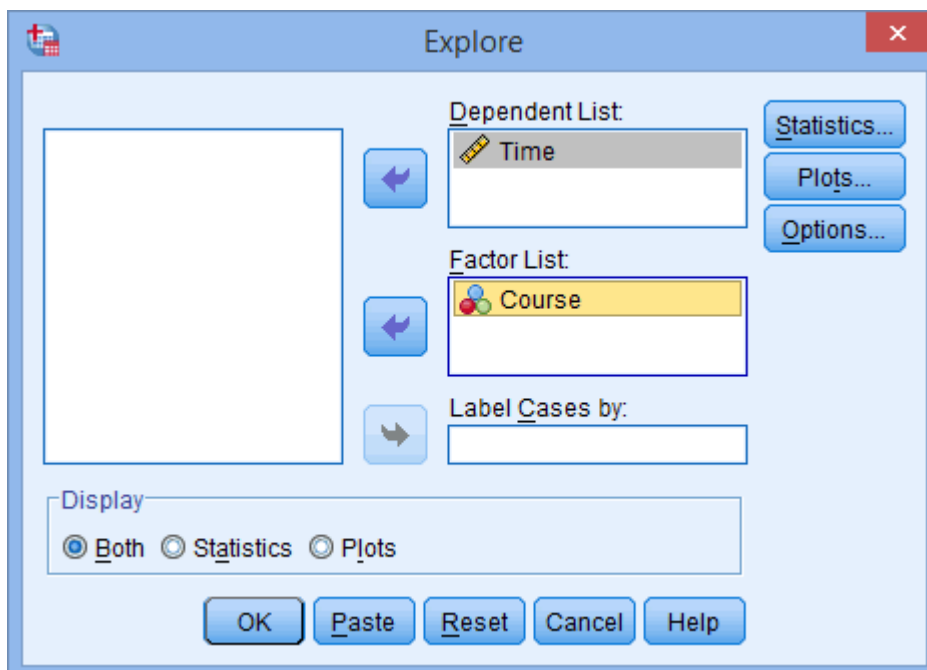
Published with written permission from SPSS Statistics, IBM Corporation.

- Transfer the variable that needs to be tested for normality into the Dependent List: box by either drag-and-dropping or using the  button. In this example, we transfer the Time variable into the Dependent List: box. You will then be presented with the following screen:



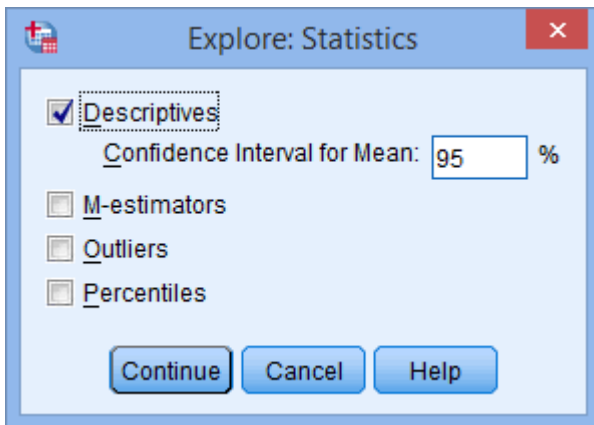
Published with written permission from SPSS Statistics, IBM Corporation.

- [Optional] If you need to establish if your variable is normally distributed for each level of your independent variable, you need to add your independent variable to the Factor List: box by either drag-and-dropping or using the  button. In this example, we transfer the Course variable into the Factor List: box. You will be presented with the following screen:



Published with written permission from SPSS Statistics, IBM Corporation.

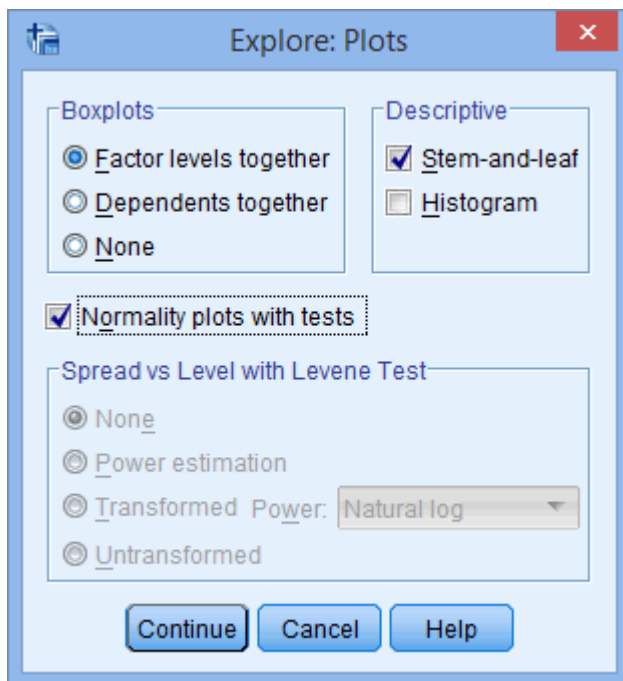
- Click the **Statistics...** button. You will be presented with the **Explore: Statistics** dialogue box, as shown below:



Published with written permission from SPSS Statistics, IBM Corporation.

Leave the above options unchanged and click the **Continue** button.

- Click the **Plots...** button. Change the options so that you are presented with the following screen:



Published with written permission from SPSS Statistics, IBM Corporation.

- Click the **Continue** button.
- Click the **OK** button.

Join the 10,000s of students, academics and professionals who rely on Laerd Statistics. **TAKE THE TOUR PLANS & PRICING**

SPSS Statistics

Output

SPSS Statistics outputs many table and graphs with this procedure. One of the reasons for this is that the **Explore...** command is not used solely for the testing of normality, but in describing data in many different ways. When testing for normality, we are mainly interested in the **Tests of Normality** table and the **Normal Q-Q Plots**, our numerical and graphical methods to test for the normality of data, respectively.

Shapiro-Wilk Test of Normality

Tests of Normality							
Course		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Time	Beginner	.177	10	.200 [*]	.964	10	.827
	Intermediate	.166	10	.200 [*]	.969	10	.882
	Advanced	.151	10	.200 [*]	.965	10	.837

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Published with written permission from SPSS Statistics, IBM Corporation.

The above table presents the results from two well-known tests of normality, namely the Kolmogorov-Smirnov Test and the Shapiro-Wilk Test. The Shapiro-Wilk Test is more appropriate for small sample sizes (< 50 samples), but can also handle sample sizes as large as 2000. For this reason, we will use the Shapiro-Wilk test as our numerical means of assessing normality.

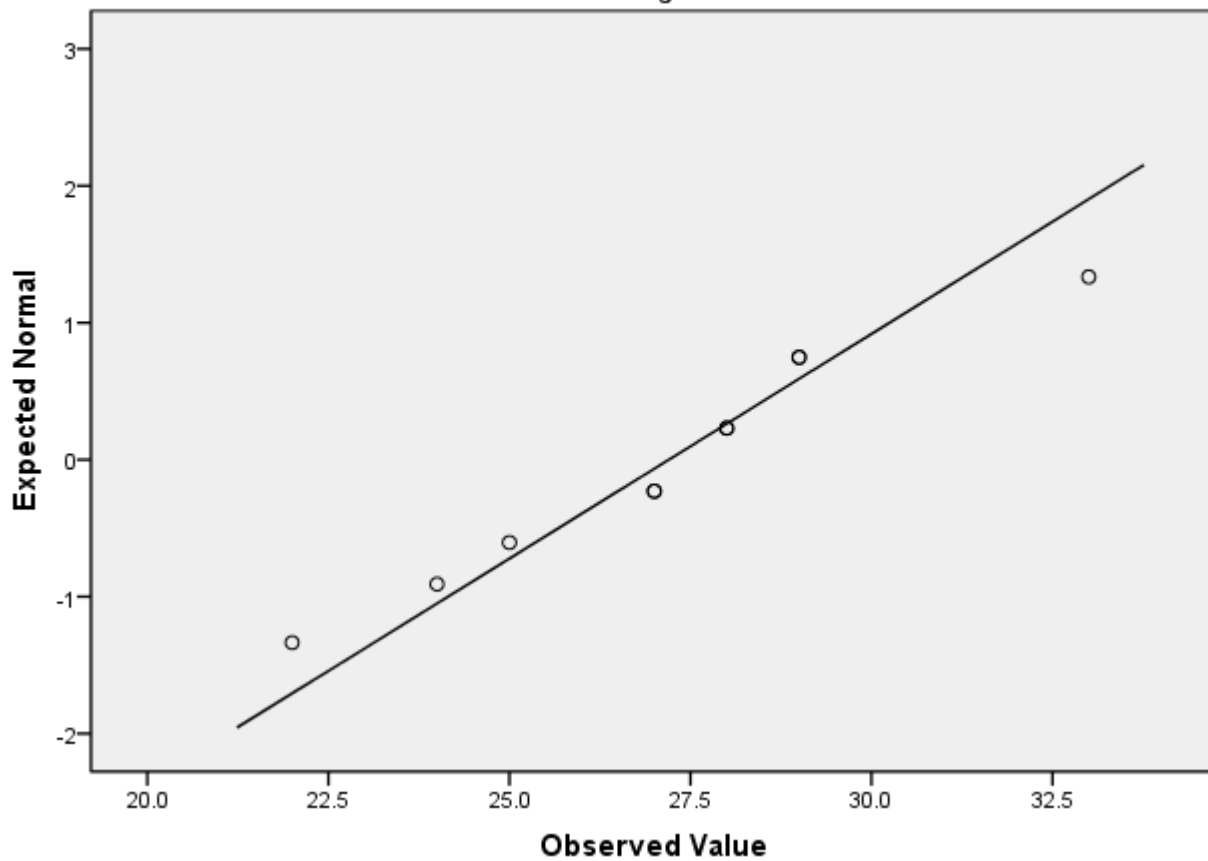
We can see from the above table that for the "Beginner", "Intermediate" and "Advanced" Course Group the dependent variable, "Time", was normally distributed. How do we know this? If the **Sig.** value of the Shapiro-Wilk Test is greater than 0.05, the data is normal. If it is below 0.05, the data significantly deviate from a normal distribution.

If you need to use skewness and kurtosis values to determine normality, rather the Shapiro-Wilk test, you will find these in our enhanced testing for normality guide. You can learn more about our enhanced content [here](#).

Normal Q-Q Plot

In order to determine normality graphically, we can use the output of a normal Q-Q Plot. If the data are normally distributed, the data points will be close to the diagonal line. If the data points stray from the line in an obvious non-linear fashion, the data are not normally distributed. As we can see from the normal Q-Q plot below, the data is normally distributed. If you are at all unsure of being able to correctly interpret the graph, rely on the numerical methods instead because it can take a fair bit of experience to correctly judge the normality of data based on plots.

Normal Q-Q Plot of Time
for Course= Beginner



Published with written permission from SPSS Statistics, IBM Corporation.

If you need to know what Normal Q-Q Plots look like when distributions are not normal (e.g., negatively skewed), you will find these in our enhanced testing for normality guide. You can learn more about our enhanced content [here](#).

1 2

[next »](#)

[Home](#) [About Us](#) [Contact Us](#) [Terms & Conditions](#) [Privacy & Cookies](#) © 2018 Lund Research Ltd