

Wilcoxon Signed Rank Test

Purpose: Wilcoxon Signed Rank Test is a nonparametric alternative for paired sample t -test. It is for comparing data from paired (or matched) sample.

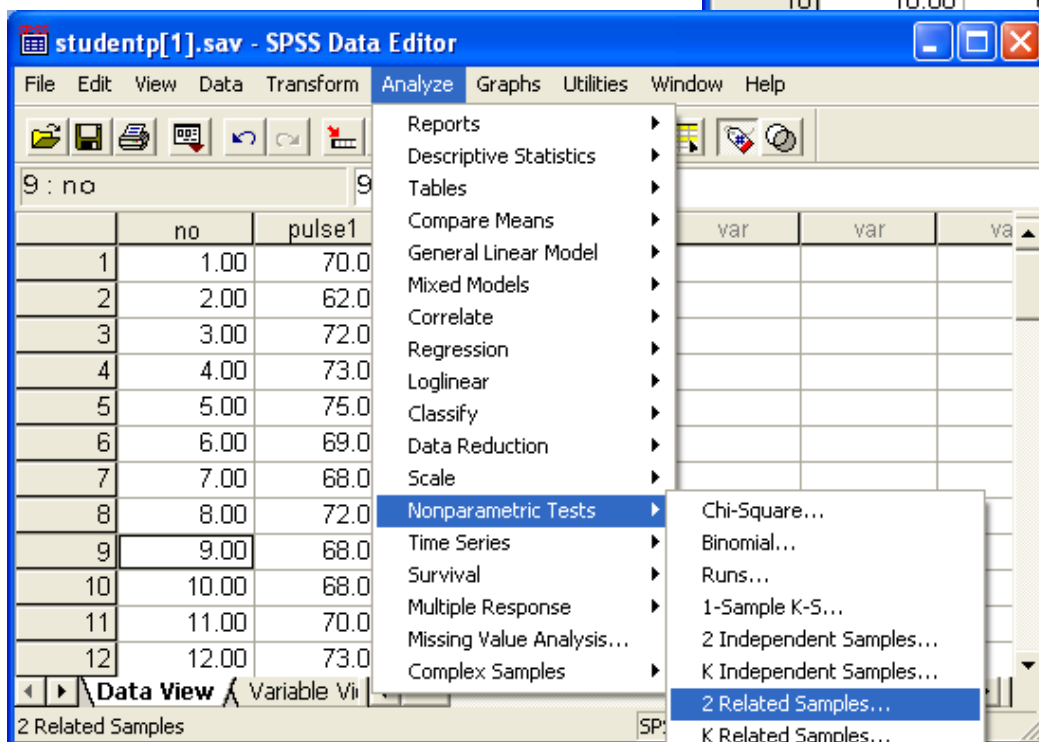
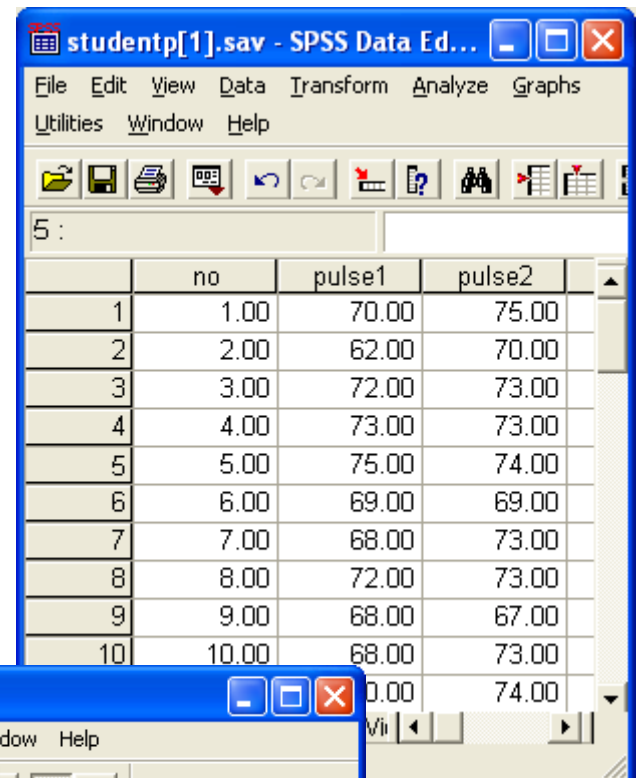
Example: Examining the difference between two pulse rates measured before and after certain treatment applied on a group subjects.

Data: Paired pulse rate measurements from the same subject, one measured before treatment (pulse1) and one measured after the treatment (pulse2). A random of paired measurements was collected. Data can be found at <http://www.cc.ysu.edu/~ghchang/stat/studentp.sav> .

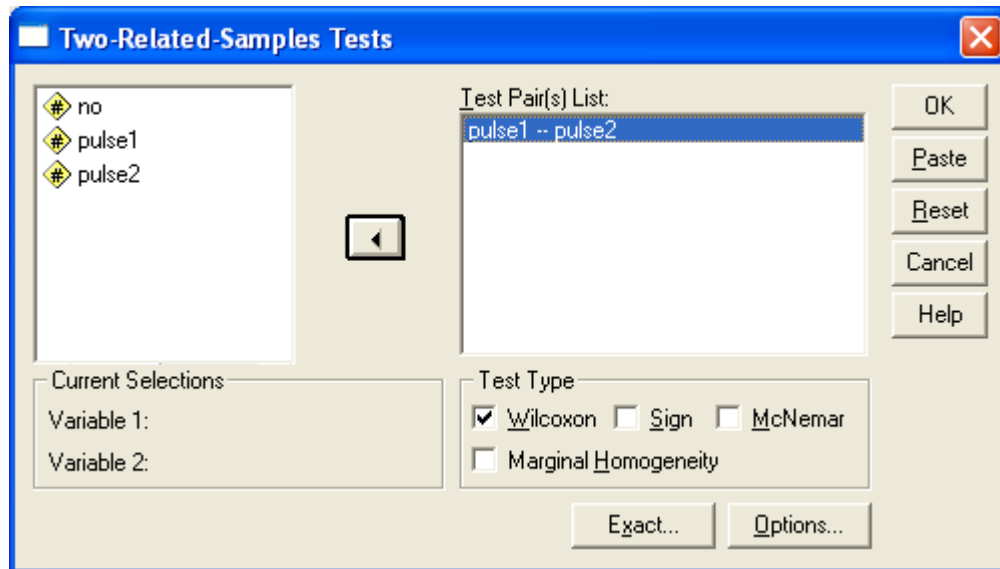
Subject ID	1	2	3	4	5	6	7	8	9	10	11	12	...
Pulse1(before)	70	62	72	73	75	69	68	72	68	68	70	73	...
Pulse2(after)	75	70	73	73	74	69	73	73	67	73	74	75	...

To perform Wilcoxon Signed Rank Test for the data above:

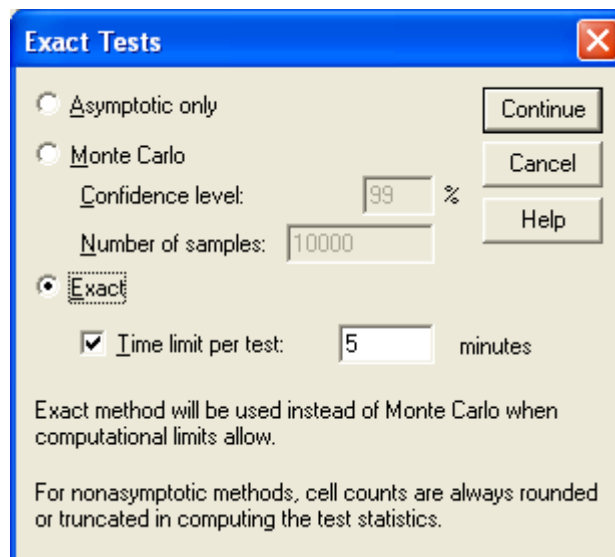
1. **Create data file:** Enter the data in SPSS, with the variable “no”, that is ID variable, takes up the first column, “pulse1” takes up one column, and another variable “pulse2” takes up another column.
2. **To perform the Wilcoxon Signed Rank Test,** first click through the menu selections **Analyze / Nonparametric Tests / 2 Related Samples...** as in the following picture, and the Two Related-Samples Tests dialog box will appear on the screen.



Click the variable “**pulse1**” and click the second variable “**pulse2**” as the pair of variable to be compared, and click the **select button (button with a little black triangle)** to select the paired difference to be used for the signed rank test. Check the **Wilcoxon** box in the **Test Type** region.



If the Exact test is needed, click on **Exact** button in the Two-Related Samples Tests dialog box, and the following Exact Tests dialog box will appear. Check the **Exact** bullet and enter the amount of time allowed for computing the exact sampling distribution of the test statistic. Then, click Continue and click OK in the Two-Related-Samples dialog box, SPSS will generate the test results in the SPSS output window.



Interpret SPSS Output: The statistics for the test are in the following table.

For Two-sided test: The two-sided test p-value for **Asymptotic 2-tailed** test is **.002** and for the **Exact 2-tailed** is **0.001**.

For one-sided test: The first table below shows that the negative mean rank is less than the positive mean rank. This suggests that the pulse rate measure from after is likely higher than the measure from before the treatment was applied. For asymptotic test, the p-value would be half of the p-value from two-tailed test and would be **0.001** in supporting that **the pulse rate after treatment is higher than the pulse rate before treatment**. For the exact test result, the p-value would be **0.0005**.

NPar Tests

Wilcoxon Signed Ranks Test

Pulse rates **after** are likely mostly higher than **before**.

		N	Mean Rank	Sum of Ranks
pulse2 - pulse1	Negative Ranks	3 ^a	5.00	15.00
	Positive Ranks	15 ^b	10.40	156.00
	Ties	4 ^c		
	Total	22		

- a. pulse2 < pulse1
- b. pulse2 > pulse1
- c. pulse2 = pulse1

Test Statistics^b

	pulse2 - pulse1
Z	-3.089 ^a
Asymp. Sig. (2-tailed)	.002
Exact Sig. (2-tailed)	.001
Exact Sig. (1-tailed)	.001
Point Probability	.000

p-values

- a. Based on negative ranks.
- b. Wilcoxon Signed Ranks Test