

ANALYZING DATA IN SPSS 13.0 USING NONPARAMETRIC TESTS

Tips before you begin:

- Make sure your data set is open before attempting to run any analyses.
 - During analyses, right click on terms or buttons in the dialog boxes to learn about their functions.
 - The **Help** button in the dialog boxes maybe clicked at any time during analyses for more information on that particular procedure.
 - Click the **Reset** button to clear the dialog box and begin a fresh analysis.
 - Click the **Cancel** button to exit that dialog box without saving changes.
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Choose a Procedure:

- [Chi-Square Test](#)
 - [Binomial Test](#)
 - [Runs Test](#)
 - [One-Sample Kolmogorov-Smirnov Test](#)
 - [Two-Independent-Samples Tests](#)
 - [Tests for Several Independent Samples](#)
 - [Two-Related-Samples Tests](#)
 - [Tests for Several Related Samples](#)
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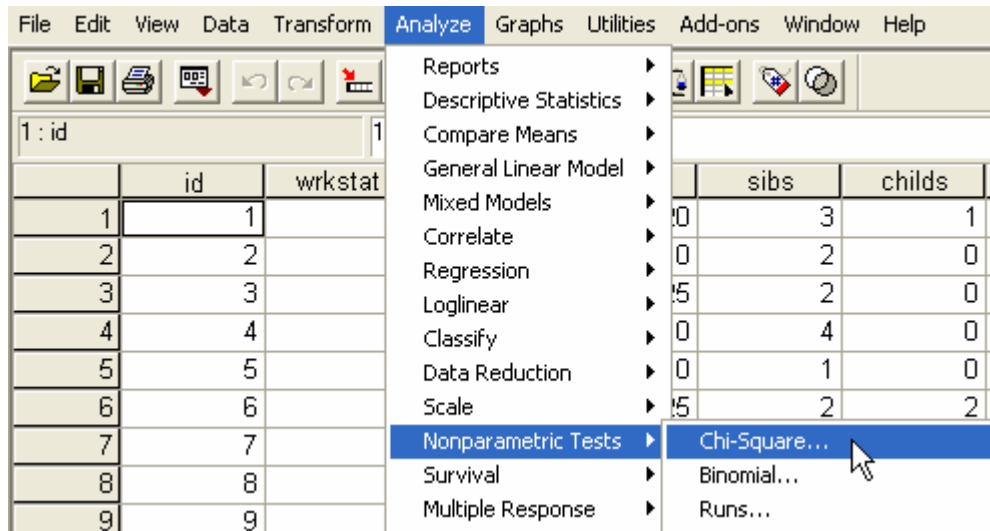
CHI-SQUARE TEST

The chi square test is used to test a distribution observed in the field against another distribution determined by a null hypothesis. Typically, the hypothesis tested with chi square is whether or not two different samples are different enough in some characteristic or aspect of their behavior that we can generalize from our samples that the populations from which our samples are drawn are also different in the behavior or characteristic. This goodness-of-fit test compares the observed and expected frequencies in each category to test either that all categories contain the same proportion of values or that each category contains a user-specified proportion of values.

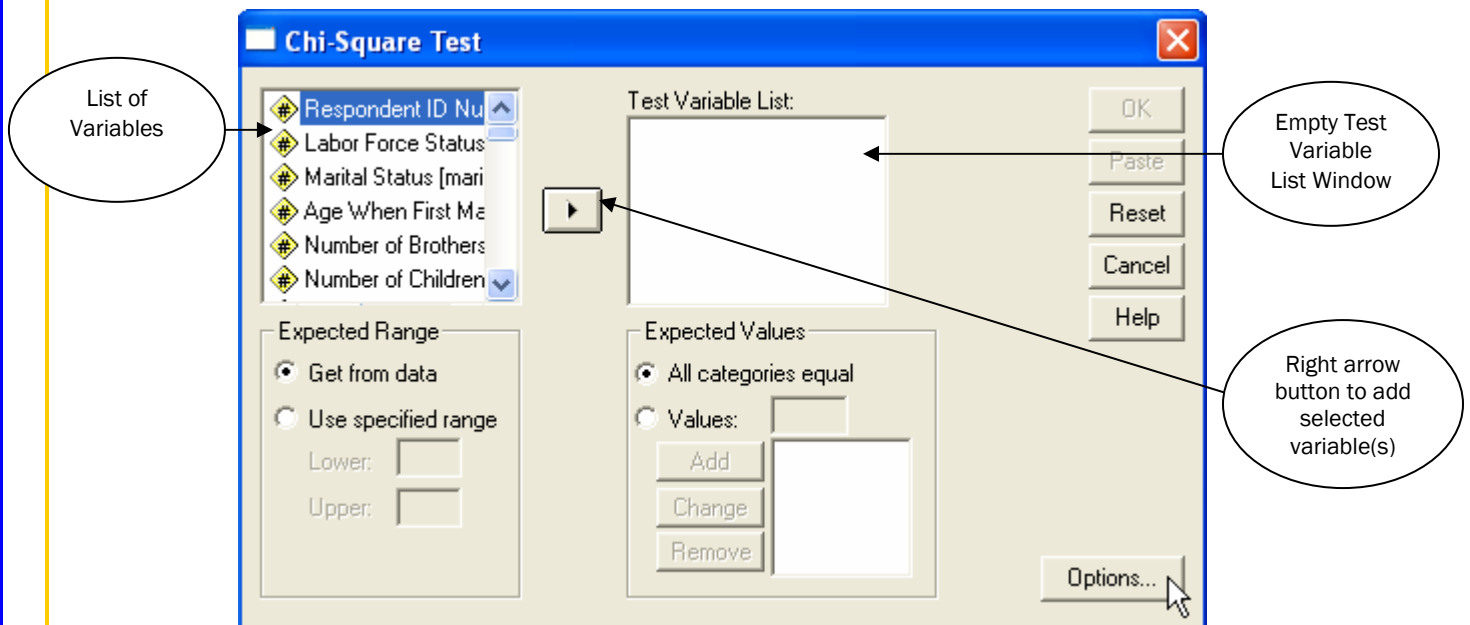
Examples. The chi-square test could be used to determine if a basket of fruit contains equal proportions of apples, bananas, oranges, and peaches. You could also test to see if a basket of fruit contains 10% apples, 20% bananas, 50% oranges, and 20% peaches.

Procedure

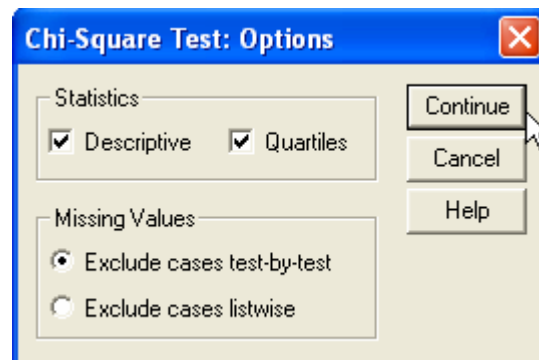
1. On the menu bar of the SPSS Data Editor window, click **Analyze > Nonparametric Tests > Chi-Square...**



2. Select one or more variables that you want to test by clicking on the variable labels in the Chi-Square Test dialog box. To select multiple variables, hold down the Ctrl key and choose the variables you want. Click on the arrow button to add selected variables to the Test Variable List window. You may also specify the expected values and expected range in this dialog box.



3. Click on the **Options...** button to select quartiles, descriptive statistics, and to control the treatment of missing values. Click on the **Continue** button.



- Click the **OK** button in the Chi-Square Test dialog box to run the analysis. The output will be displayed in a separate SPSS Viewer window.

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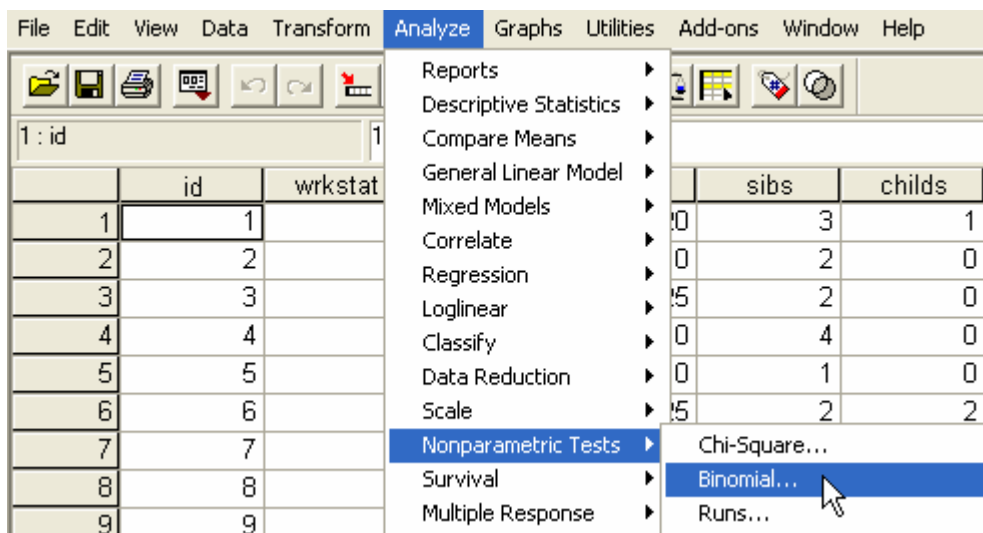
BINOMIAL TEST

The binomial test is an exact test of the statistical significance of deviations from a theoretically expected distribution of observations into two categories based on a specified probability parameter. By default, the probability parameter for both groups is 0.5. To change the probabilities, a test proportion may be entered for the first group. The probability for the second group will be 1 minus the specified probability for the first group.

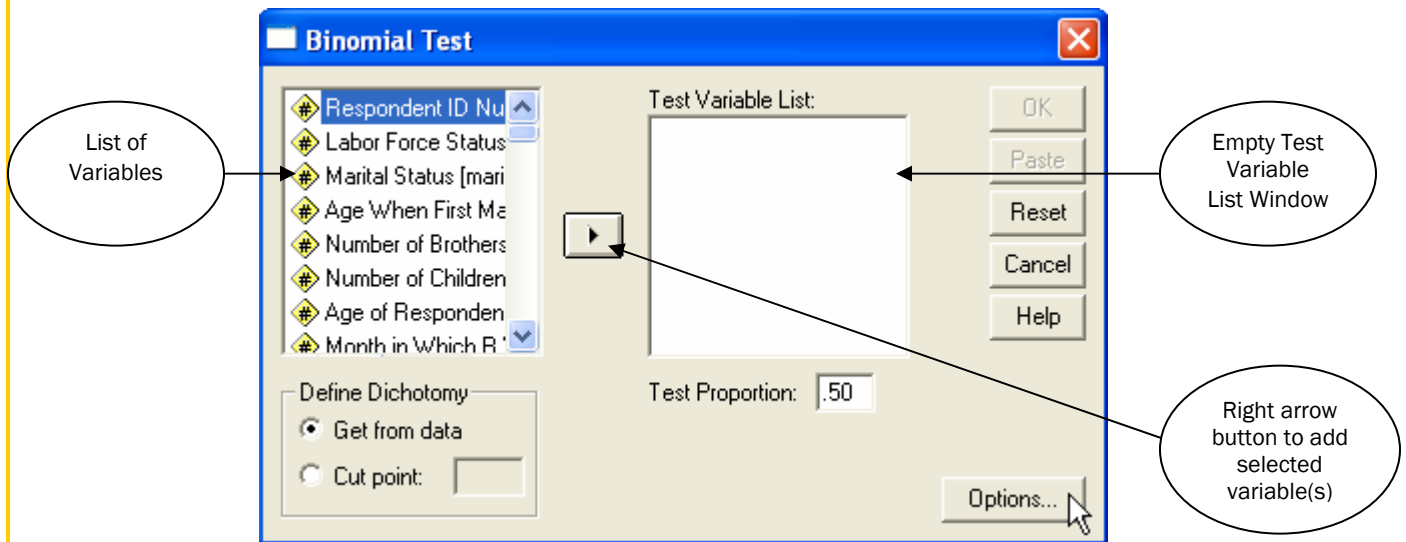
Example. When you toss a dime, the probability of a head equals 1/2. Based on this hypothesis, a dime is tossed 40 times, and the outcomes are recorded (heads or tails). From the binomial test, you might find that 3/4 of the tosses were heads and that the observed significance level is small. These results indicate that it is unlikely that the probability of a head equals 1/2; the coin is probably biased.

Procedure

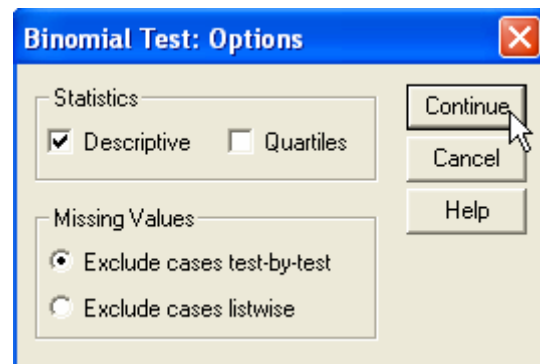
- On the menu bar of the SPSS Data Editor window, click **Analyze > Nonparametric Tests > Binomial...**



- Select one or more numeric variables that you want to test by clicking on the variable labels in the Binomial Test dialog box. To select multiple variables, hold down the Ctrl key and choose the variables you want. Click on the arrow button to add selected variables to the Test Variable List window. You may also specify the test proportion in this dialog box.



3. Click on the **Options...** button to select quartiles, descriptive statistics, and to control the treatment of missing values. Click on the **Continue** button.



4. Click the **OK** button in the Binomial Test dialog box to run the analysis. The output will be displayed in a separate SPSS Viewer window.

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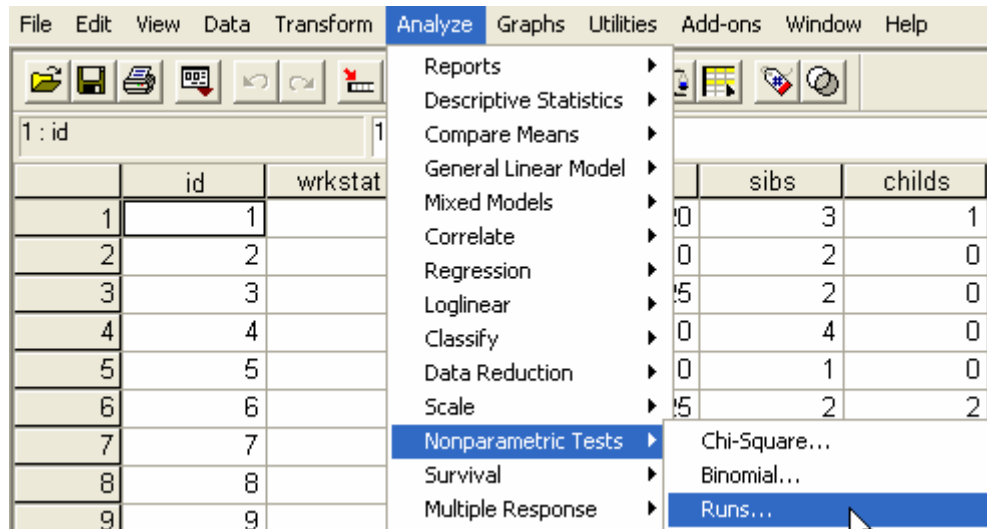
RUNS TEST

The Runs Test procedure tests whether the order of occurrence of two values of a variable is random. A run is a sequence of like observations. A sample with too many or too few runs suggests that the sample is not random.

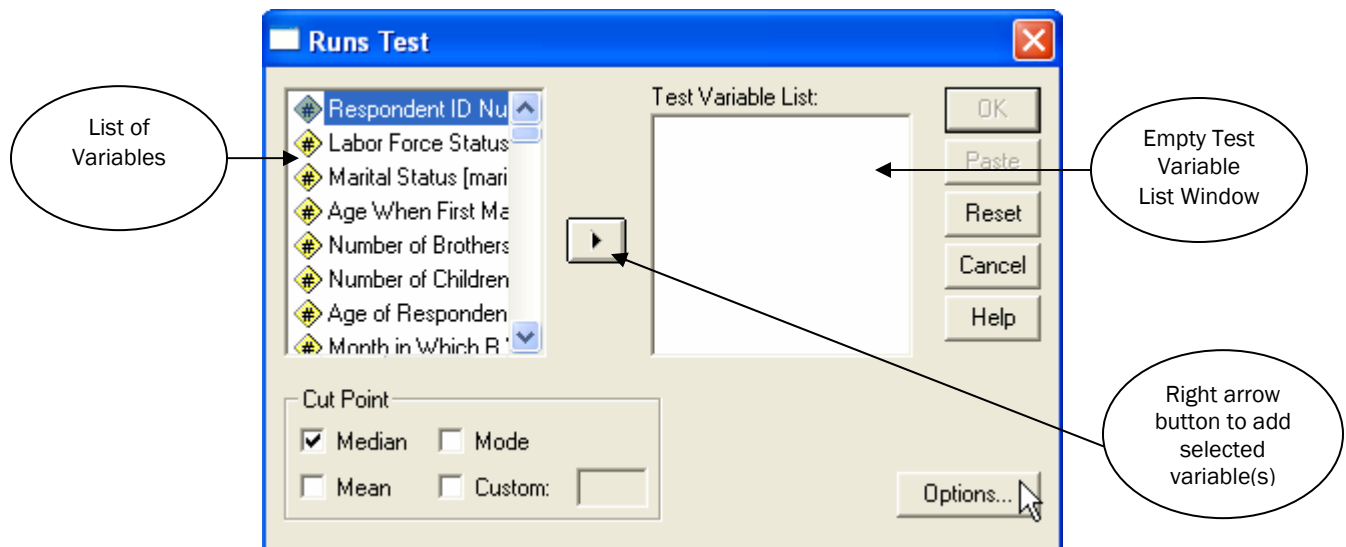
Example. Suppose that 50 people are polled to find out if they like a new brand of cereal. The assumed randomness of the sample would be seriously questioned if all 50 people were of the same age group. The runs test can be used to determine if the sample was drawn at random.

Procedure

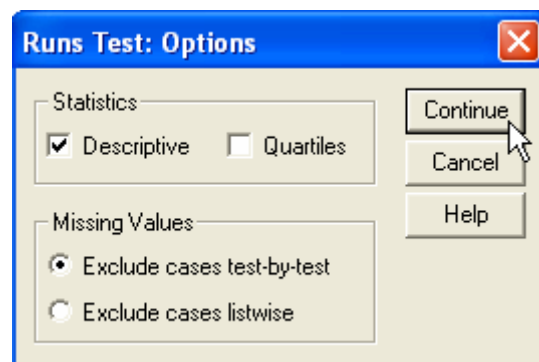
1. On the menu bar of the SPSS Data Editor window, click **Analyze > Nonparametric Tests > Runs...**



2. Select one or more numeric variables that you want to test by clicking on the variable labels in the Runs Test dialog box. To select multiple variables, hold down the Ctrl key and choose the variables you want. Click on the arrow button to add selected variables to the Test Variable List window. You may also specify the test proportion in this dialog box.



3. Click on the **Options...** button to select quartiles, descriptive statistics, and to control the treatment of missing values. Click on the **Continue** button.



- Click the **OK** button in the Runs Test dialog box to run the analysis. The output will be displayed in a separate SPSS Viewer window.

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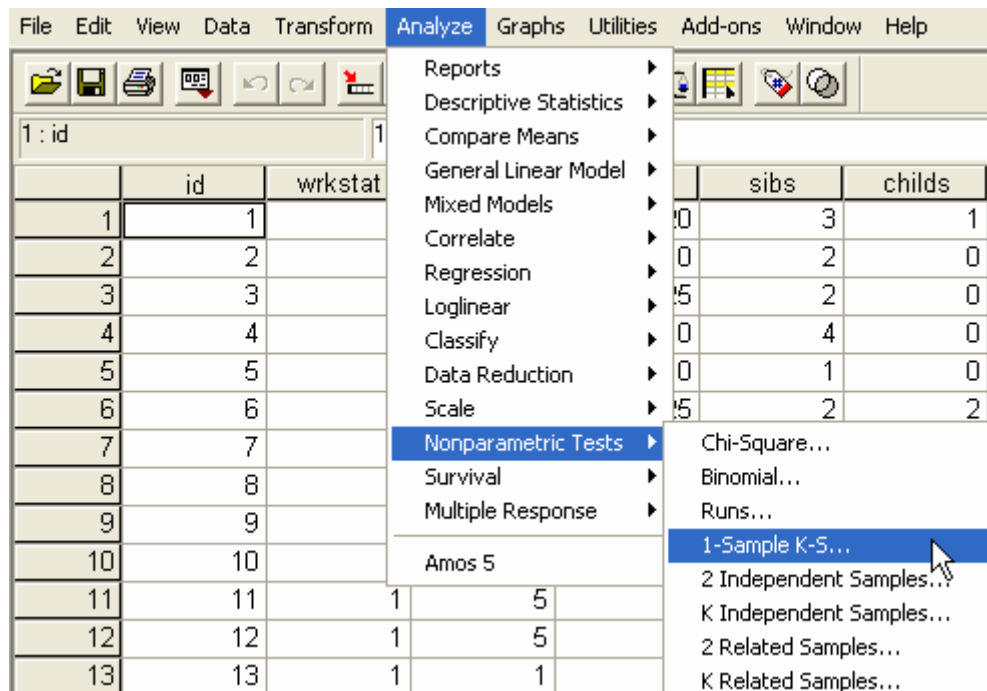
ONE-SAMPLE KOLMOGOROV-SMIRNOV TEST

The Kolmogorov-Smirnov one-sample test for normality is based on the maximum difference between the sample cumulative distribution and the hypothesized cumulative distribution. This goodness-of-fit test tests whether the observations could reasonably have come from the specified distribution. If the D statistic is significant, then the hypothesis that the distribution is normal should be rejected.

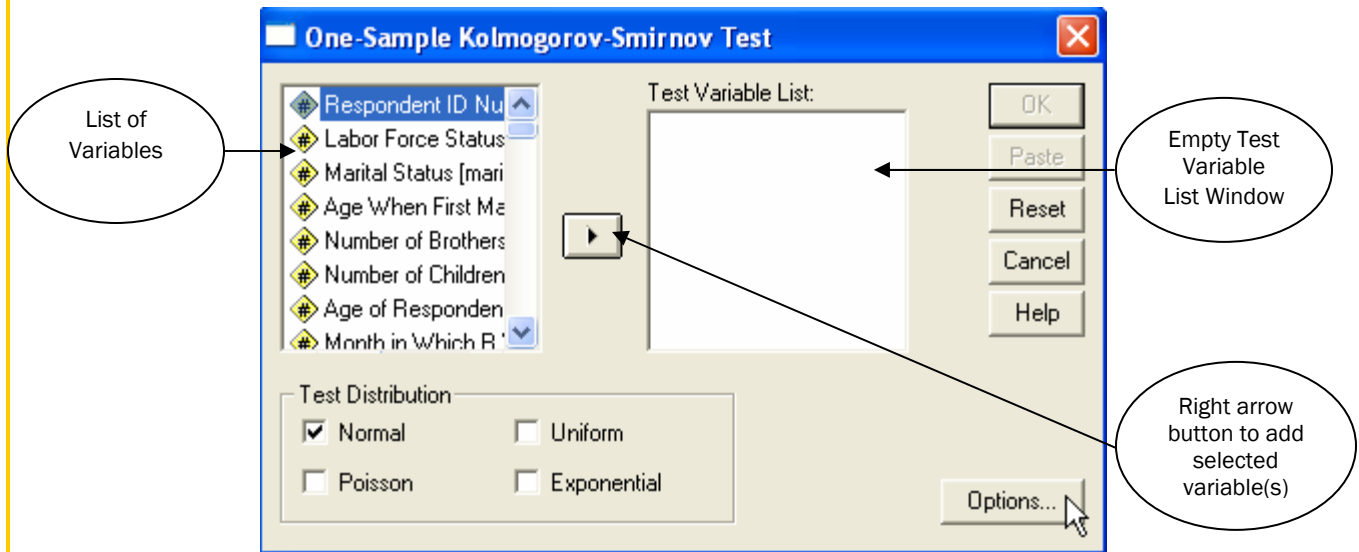
Example. Many parametric tests require normally distributed variables. The one-sample Kolmogorov-Smirnov test can be used to test that a variable, say test scores of a class, is normally distributed.

Procedure

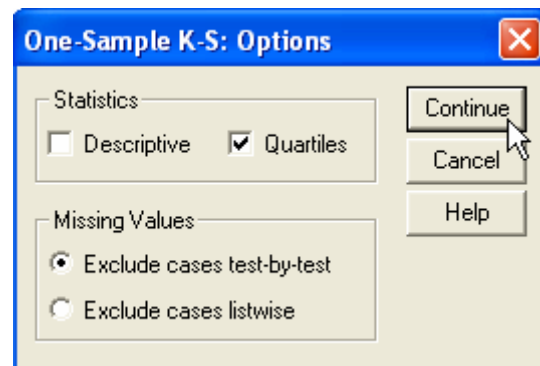
- On the menu bar of the SPSS Data Editor window, click **Analyze > Nonparametric Tests > 1-Sample K-S...**



- Select one or more numeric variables that you want to test by clicking on the variable labels in the One-Sample Kolmogorov-Smirnov Test dialog box. To select multiple variables, hold down the Ctrl key and choose the variables you want. Click on the arrow button to add selected variables to the Test Variable List window. You may also specify the test proportion in this dialog box.



3. Click on the **Options...** button to select quartiles, descriptive statistics, and to control the treatment of missing values. Click on the **Continue** button.



4. Click the **OK** button in the One-Sample Kolmogorov-Smirnov Test dialog box to run the analysis. The output will be displayed in a separate SPSS Viewer window.

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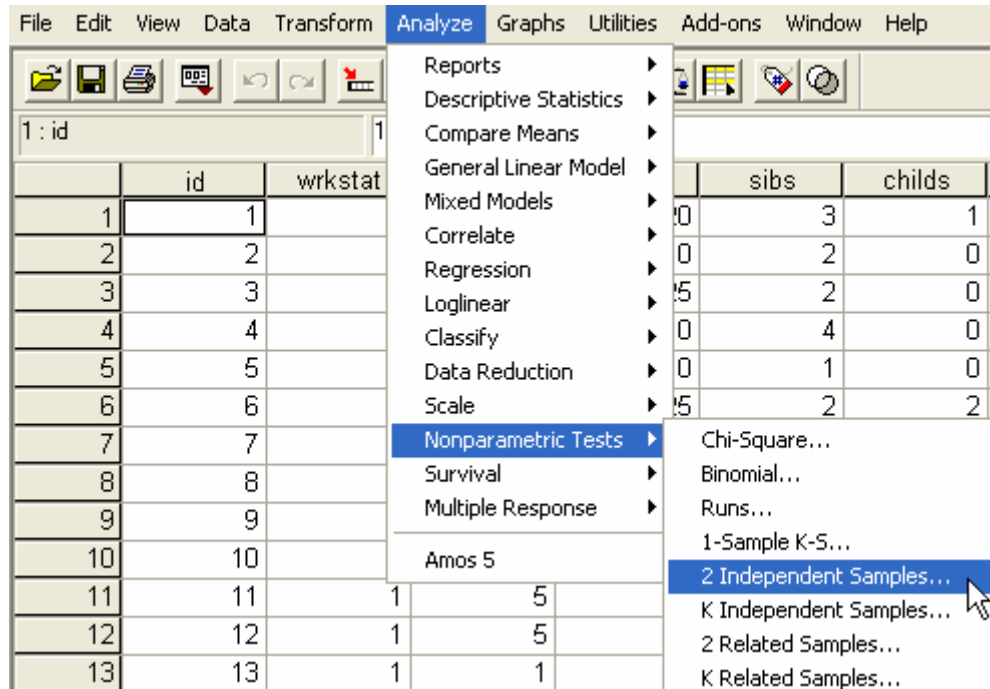
TWO-INDEPENDENT-SAMPLES TESTS

This test compares two groups of cases on one variable. The most popular of the two-independent samples tests is the Mann-Whitney U test, which tests if two sampled populations are equivalent.

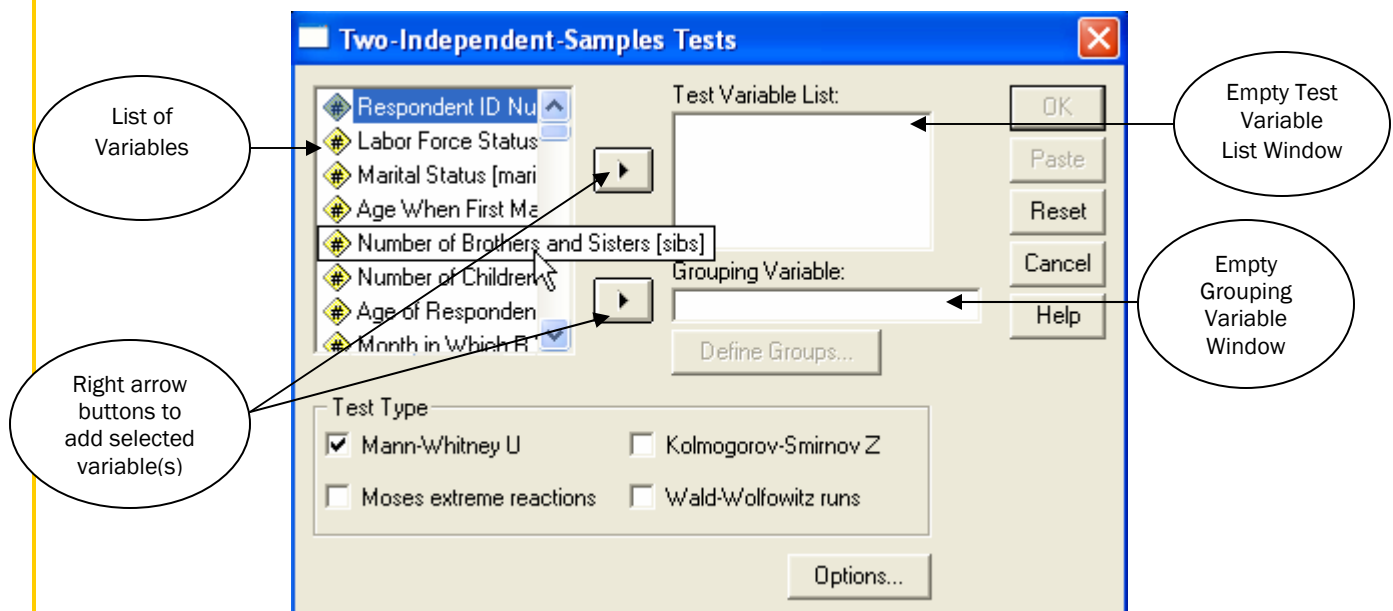
Example. New dental braces have been developed that are intended to be more comfortable, to look better, and to provide more rapid progress in realigning teeth. To find out if the new braces have to be worn as long as the old braces, 10 children are randomly chosen to wear the old braces, and another 10 are chosen to wear the new braces. From the Mann-Whitney U test, you might find that, on average, those with the new braces did not have to wear the braces as long as those with the old braces.

Procedure

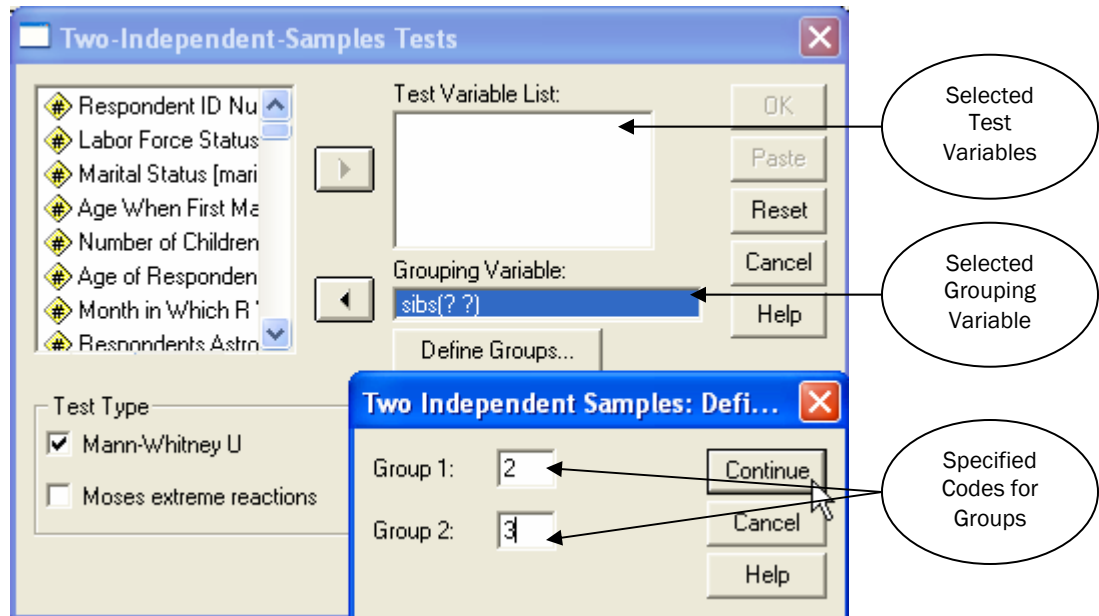
1. On the menu bar of the SPSS Data Editor window, click **Analyze > Nonparametric Tests > 2 Independent Samples...**



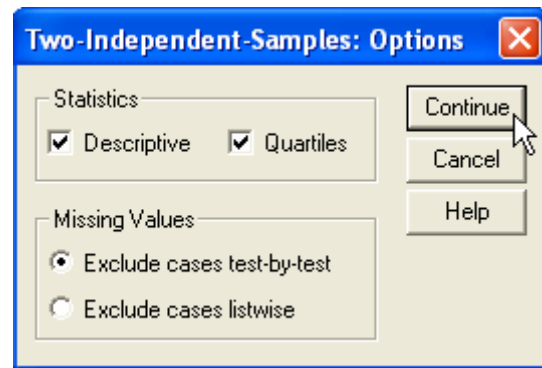
2. Select one or more numeric variables that you want to analyze by clicking on the variable labels in the Two-Independent-Samples Tests dialog box. Select a single grouping variable. To select multiple variables, hold down the Ctrl key and choose the variables you want. Click on the respective arrow buttons to add selected variables to the Test Variable List and Grouping Variable windows.



3. Click on the **Define Groups...** button to specify codes that will split the file into two groups or samples. Click on the **Continue** button.



4. Click on the **Options...** button to select quartiles, descriptive statistics, and to control the treatment of missing values. Click on the **Continue** button.



5. Click the **OK** button in the Two-Independent-Samples Tests dialog box to run the analysis. The output will be displayed in a separate SPSS Viewer window.

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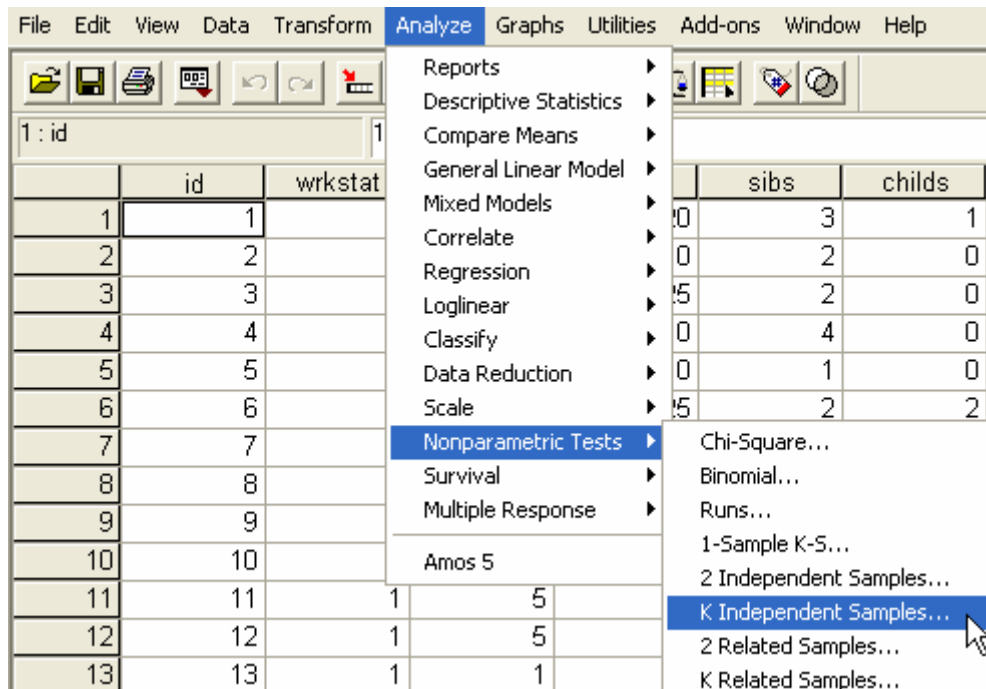
TESTS FOR SEVERAL INDEPENDENT SAMPLES

The Tests for Several Independent Samples procedure compares two or more groups of cases on one variable. These tests determine whether one can reject the null hypothesis that two or more independent samples come from the same underlying population distribution.

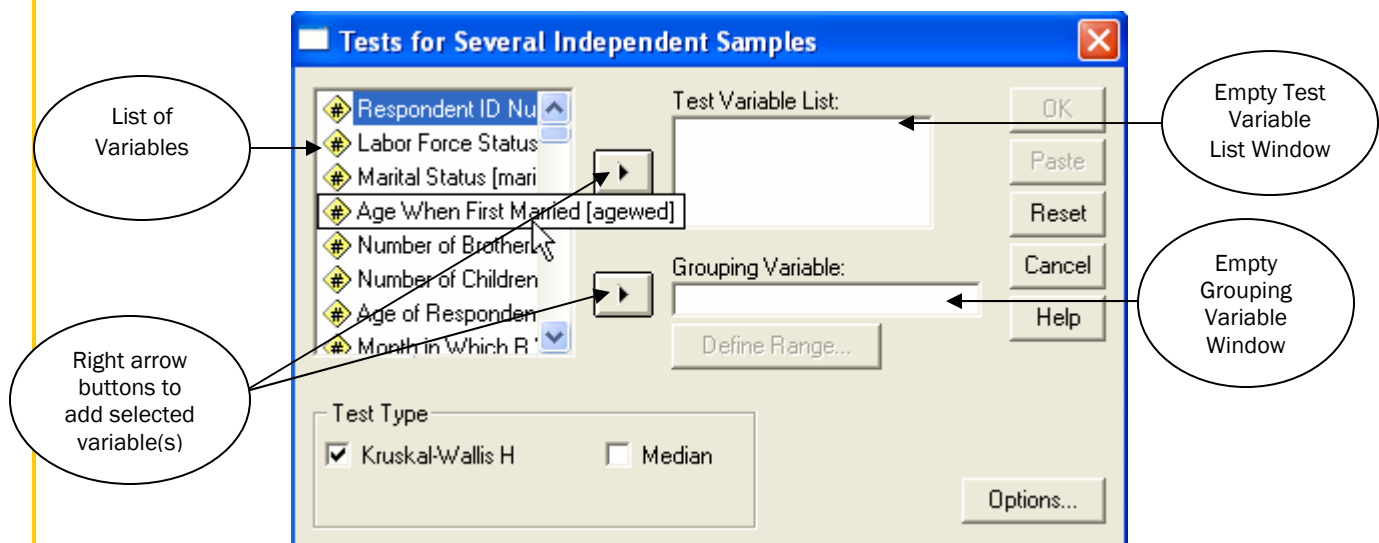
Example. Do three brands of AA batteries differ in the average time they last? The Kruskal-Wallis one-way analysis of variance might reveal that the three brands do differ in average lifetime.

Procedure

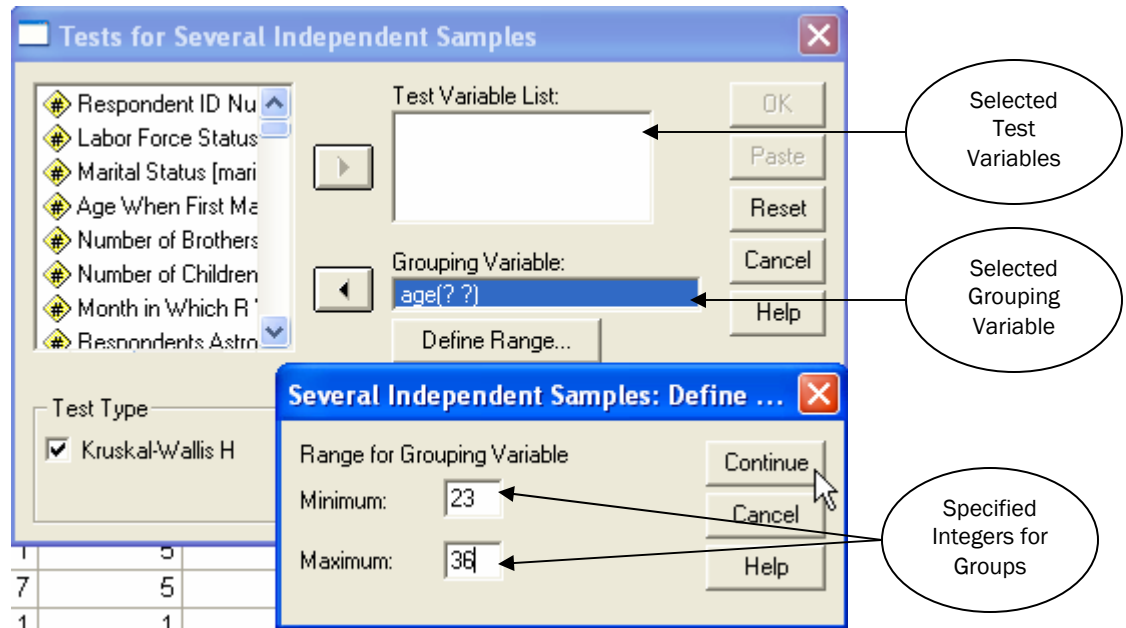
1. On the menu bar of the SPSS Data Editor window, click **Analyze > Nonparametric Tests > K Independent Samples...**



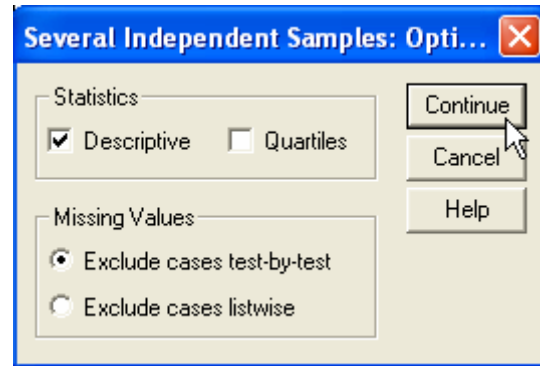
2. Select one or more numeric variables that you want to analyze by clicking on the variable labels in the Tests for Several Independent Samples dialog box. Select a single grouping variable. To select multiple variables, hold down the Ctrl key and choose the variables you want. Click on the respective arrow buttons to add selected variables to the Test Variable List and Grouping Variable windows.



- Click on the **Define Range...** button to specify minimum and maximum integer values for the grouping variable. Click on the **Continue** button.



- Click on the **Options...** button to select quartiles, descriptive statistics, and to control the treatment of missing values. Click on the **Continue** button.



- Click the **OK** button in the Tests for Several Independent Samples dialog box to run the analysis. The output will be displayed in a separate SPSS Viewer window.

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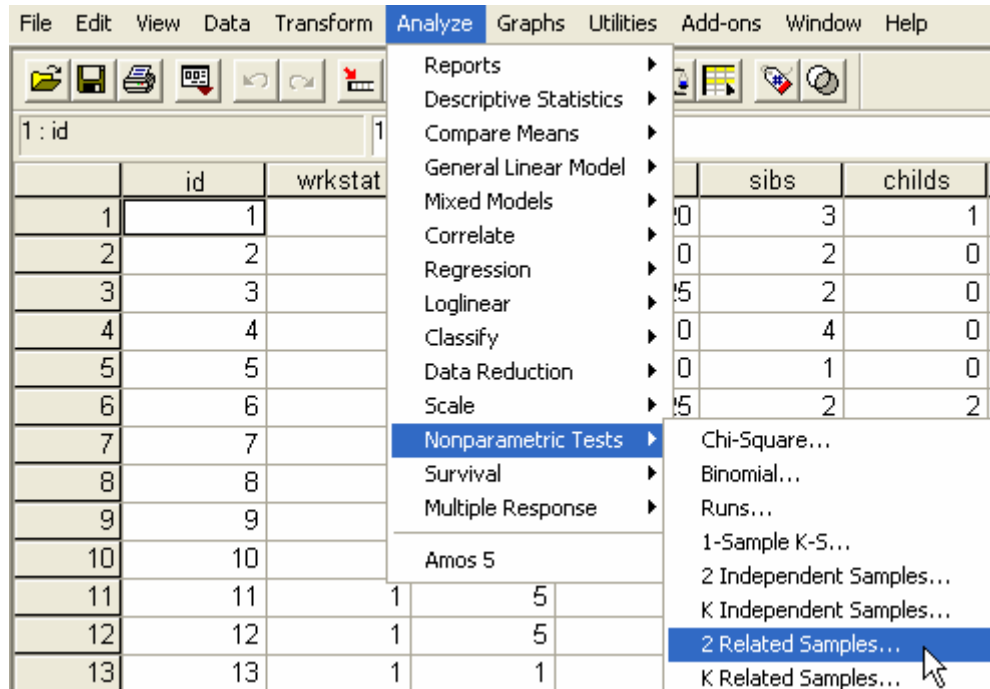
TWO-RELATED-SAMPLES TESTS

The Two-Related-Samples Tests procedure compares the distributions of two variables.

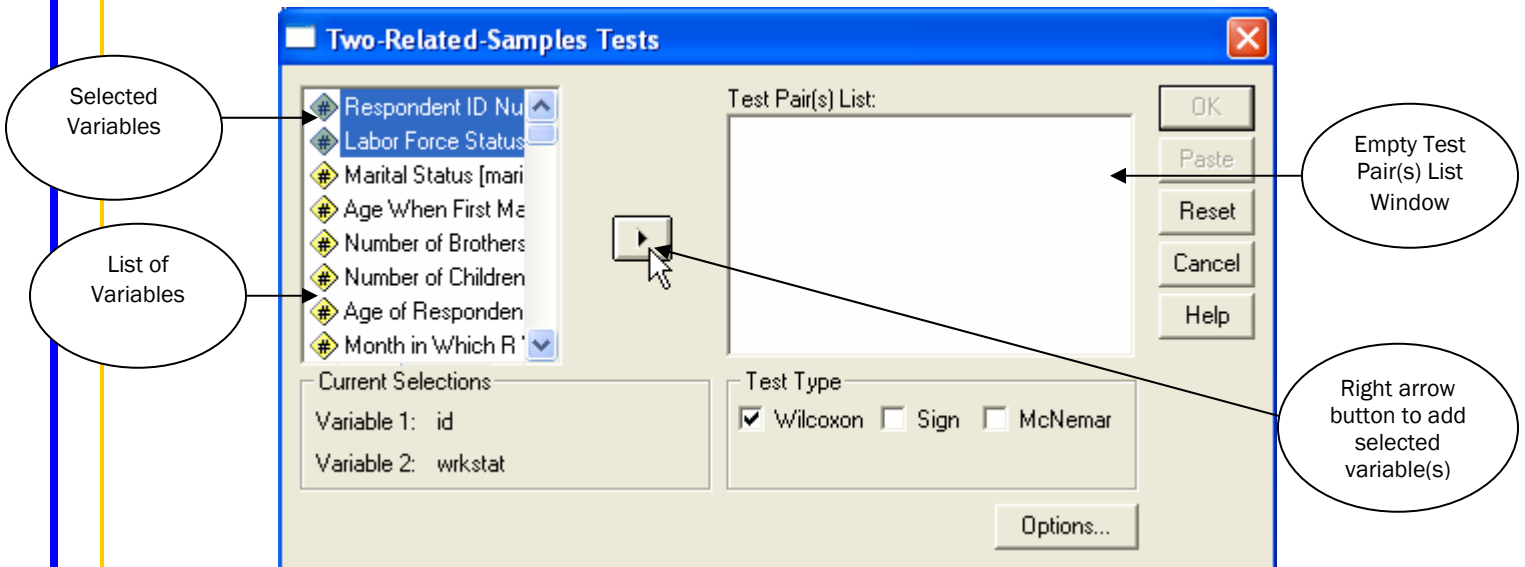
Example. In general, do families receive the asking price when they sell their homes? By applying the Wilcoxon signed-rank test to data for 10 homes, you might learn that seven families receive less than the asking price, one family receives more than the asking price, and two families receive the asking price.

Procedure

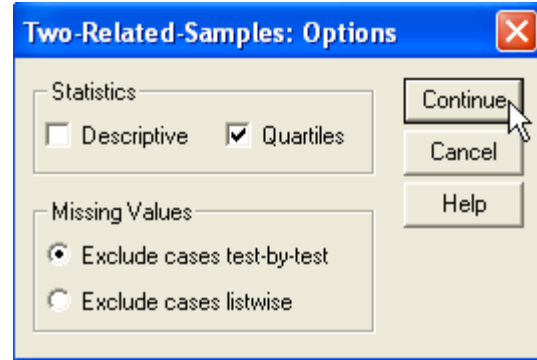
1. On the menu bar of the SPSS Data Editor window, click **Analyze > Nonparametric Tests > 2 Related Samples...**



2. Select one or more pairs of variables that you want to analyze by clicking on the variable labels in the Two-Related-Samples Tests dialog box. The variables must be selected and added in pairs. To select pairs, hold down the Ctrl key and choose the two variables you want. Click on the arrow button to add each selected pair to the Test Pair(s) List window.



- Click on the **Options...** button to select quartiles, descriptive statistics, and to control the treatment of missing values. Click on the **Continue** button.



- Click the **OK** button in the Two-Related-Samples Tests dialog box to run the analysis. The output will be displayed in a separate SPSS Viewer window.

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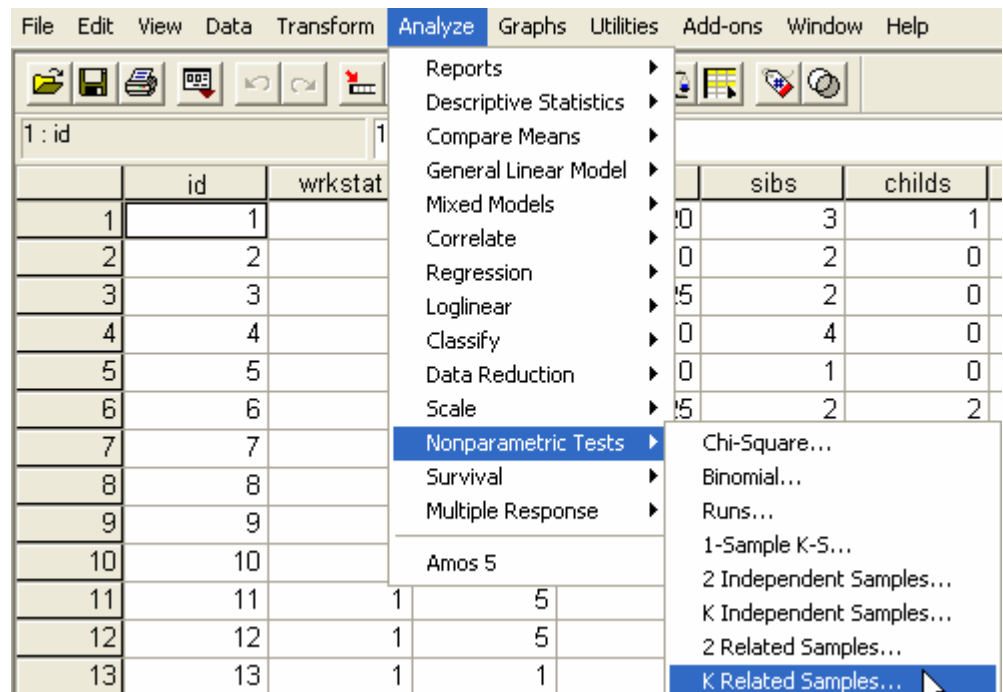
TESTS FOR SEVERAL RELATED SAMPLES

The Tests for Several Related Samples procedure compares the distributions of two or more variables.

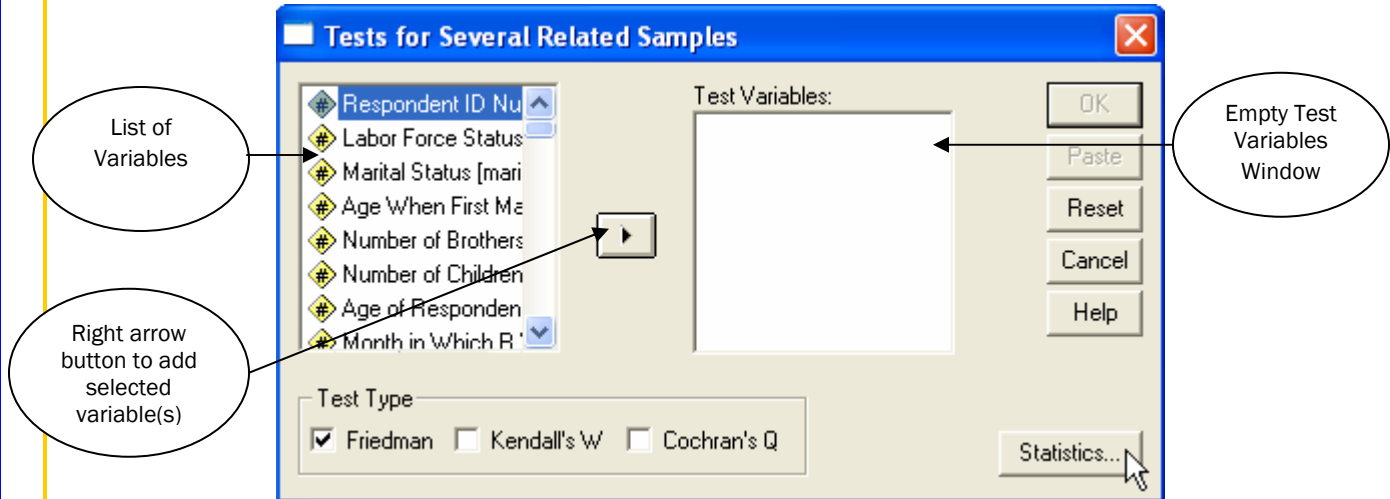
Example. Does the public associate different amounts of prestige with a doctor, a lawyer, a police officer, and a teacher? Ten people are asked to rank these four occupations in order of prestige. Friedman's test indicates that the public does in fact associate different amounts of prestige with these four professions.

Procedure

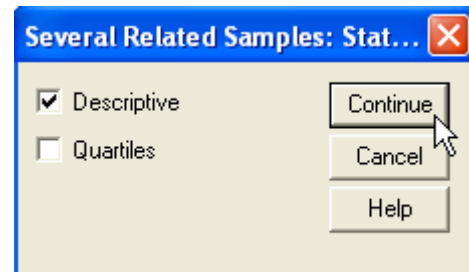
- On the menu bar of the SPSS Data Editor window, click **Analyze** > **Nonparametric Tests** > **K Related Samples...**



2. Select two or more numeric variables that you want to test by clicking on the variable labels in the Tests for Several Related Samples dialog box. To select multiple variables, hold down the Ctrl key and choose the variables you want. Click on the arrow button to add selected variables to the Test Variables window.



3. Click on the **Statistics...** button to select quartiles and descriptive statistics. Click on the **Continue** button.



4. Click the **OK** button in the Tests for Several Related Samples dialog box to run the analysis. The output will be displayed in a separate SPSS Viewer window.

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