### Two Independent-Samples Test:

# The Mann-Whitney UTest



The Mann-Whitney U test evaluates whether the medians on a test variable differ significantly between two groups.



In an SPSS data file, each case must have scores on two variables.

the grouping variable and the test variable.

The grouping variable divides cases into two groups or categories (by values), and the test variable assesses individuals on a variable with at least an ordinal scale.



Although SPSS uses the terms grouping variable and test variable.

the grouping variable may also be referred to as the independent or categorical variable.

the test variable may be referred to as the dependent or the quantitative variable.



### **EXAMPLE**

Based on a developmental theory of cognitive processing, Bob predicted that elderly individuals would have greater difficulty with a particular visual spatial memory task (VSMT) than middle-aged individuals.

14 elderly women (65 years and older) and 26 younger women (31 to 50 years of age), these 40 women were administered the VSMT, a measure that yields scores that range in value from 0 to 100.

Bob's data file has 40 cases one case for each women in the sample. The file contains one variable designating whether a women is part of the younger or the older group and a second variable representing the VSMT scores for each women.



### Example

#### The research question

- Does median performance on the VSMT differ for younger and older women?
- 2. Is performance on the VSMT related to age for women?

# K Independent-Samples Tests:

# The Kruskal-Wallis and the Median Tests



Both the Kruskal-Wallis and the median Tests evaluate whether the population medians on a dependent variable are the same across all levels of a factor.



For the Kruskal-Wallis and the median tests, cases must have scores on an independent or grouping variable and on a dependent or test variable.

The grouping variable divides individuals into two or more groups, and the test variable assesses individuals on at least an ordinal scale.



If the grouping variable has only two levels, no additional significance tests need to be conducted beyond the Kruskal-Wallis or median test.

On the other hand, if a factor has more than two levels and the overall test is significant, follow-up tests are usually conducted. These follow-up tests most frequently involve comparisons between pairs of group medians.



#### **EXAMPLE**

Dana wishes to assess whether vitamin C is effective in the treatment of colds. To evaluate her hypothesis, she decides to conduct a 2-year experimental study.

She obtains 30 volunteers from undergraduate classes to participate. She randomly assigns an equal number of students to three groups: placebo (group1), low doses of vitamin C (group2), and high doses of vitamin C (group3).

In the first and second years of study, students in all three groups are monitored to assess the number of days with cold symptoms that they have. During the first year, students do not take any pills. In the second year, students take pills that contain one of the following: no active ingredients (group1), low doses of vitamin C (group2), and high doses of vitamin C (group3).



#### **EXAMPLE**

Dana's SPSS data file include 30 cases and two variables: a factor distinguishing among the three treatment groups and a dependent variable, the difference in the number of days with cold symptoms in the first year versus the number of days with cold symptoms in the second year.



### Example

The research question

- 1. Do the medians for change in the number of days of cold symptoms differ among those who take placebo, those who take low doses of vitamin C, those who take high doses of vitamin C?
- 2. Is there a relationship between the amount of vitamin C taken and the change in the number of days that individuals show cold symptoms?