HSCC 470
Research Methods and Data Analysis in Health Sciences

Using SPSS: The Mann-Whitney U Test

Unit Objectives

Upon completion of this unit, the student will be able to:

- List the assumptions of the Mann-Whitney U test.
- Describe when the Mann-Whitney U test is appropriate for testing a hypothesis.
- Use SPSS to conduct the Mann-Whitney U test and correctly interpret the output.

Statistical Methods to Test Hypotheses

Scale of Measurement	Two Treatment Groups Consisting of Different Individuals	Three or More Treatment Groups Consisting of Different Individuals	Before and After a Single Treatment in the Same Individuals	Association Between Two Variables
Interval	Unpaired *t* test	ANOVA	Paired *t* test	Linear Regression and Pearson Correlation
Nominal	Chi-square	Chi-square	McNemar's test	Contingency Coefficients
Ordinal	Mann-Whitney rank-sum test	Kruskal-Wallis statistic	Wilcoxon signed-rank test	Spearman Rank Correlation

Assumptions of the Mann-Whitney U Test

- Only 2 groups are being compared
- The groups are independent
- Data do not have to be drawn from a normally distributed population
- Ordinal data, or interval data drawn from a non-normally distributed population
- Comparing ranks

Conducting the Mann-Whitney U Test Using SPSS

- **Example:**
  - Your employer conducts a survey regarding the company benefit package. Wanting to provide a package that meets the needs of everyone, your boss is concerned that there are differences in opinions on preferred benefits between the older and younger employees. Your boss has asked you to analyze the results of the survey and report back to him.

Conducting the Mann-Whitney U Test Using SPSS

- **Example continued**
  - Rank the importance of the following benefits in descending order (1 = least important):
    - Retirement plan
    - 401-K
    - Major medical plan
    - Comprehensive medical plan
    - Prescription drug plan
    - Dental plan
    - Educational benefits
    - Paid holidays

Conducting the Mann-Whitney U Test Using SPSS

- **Sample of 50 "older" paramedics and 50 "younger" paramedics**
- **For each benefit an average ranking is assigned by each group.**

401K Retirement Plan	
Older	**Younger**
3	2
7	6
8	3
1	5
.	.
.	.
243/50 = 4.86	176/50 = 3.52

Conducting the Mann-Whitney U Test Using SPSS

- **Assumptions**
  - Scale of measurement
    - Ordinal data
  - Population distribution
    - May come from any distribution
  - Method of sampling
    - Randomized, 2 independent samples
  - Sample size
    - "older" paramedics N = 50
    - "younger" paramedics N = 50

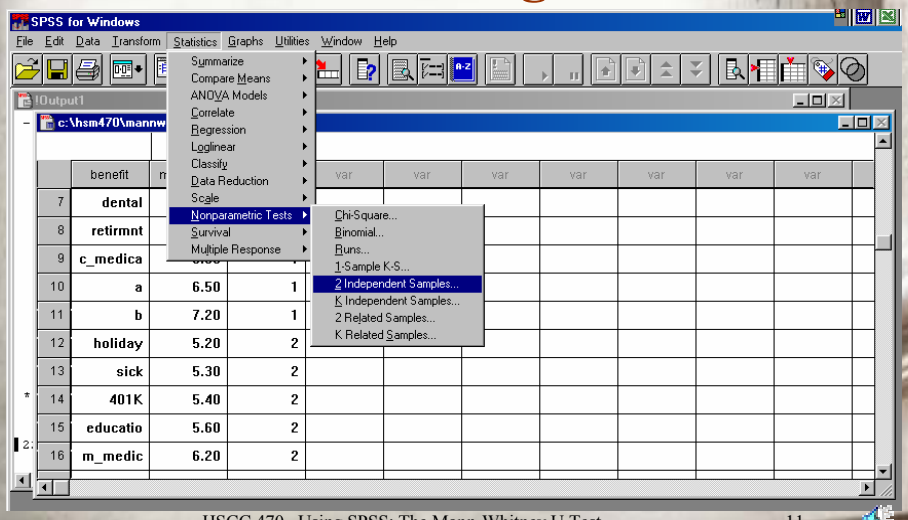
Conducting the Mann-Whitney U Test Using SPSS

- **Hypotheses**
  - Null
    - There is no difference in the rankings of importance of employer provided benefits between younger and older paramedics.
  - Alternative
    - There is a difference in the rankings of importance of employer provided benefits between younger and older paramedics.
- **Select Alpha Level**
  - Alpha = 0.05
- **Test statistic**
  - Mann-Whitney U Test

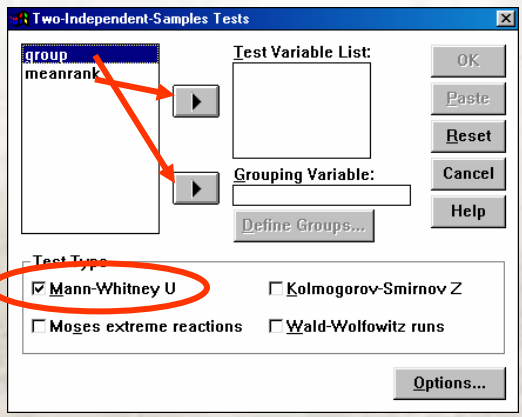
Conducting the Mann-Whitney U Test Using SPSS

- ***P*-value**
- **Conclusion**

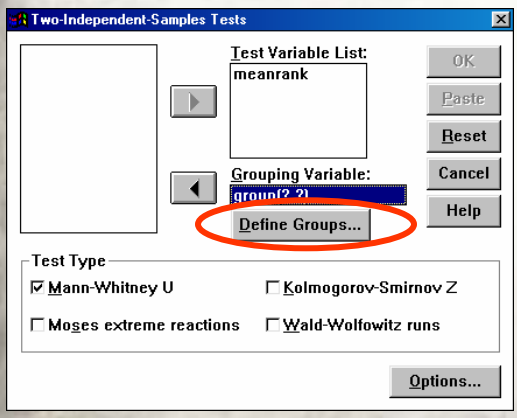
Conducting the Mann-Whitney U Test Using SPSS

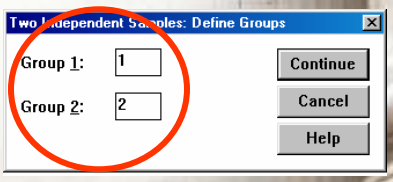


Conducting the Mann-Whitney U Test Using SPSS

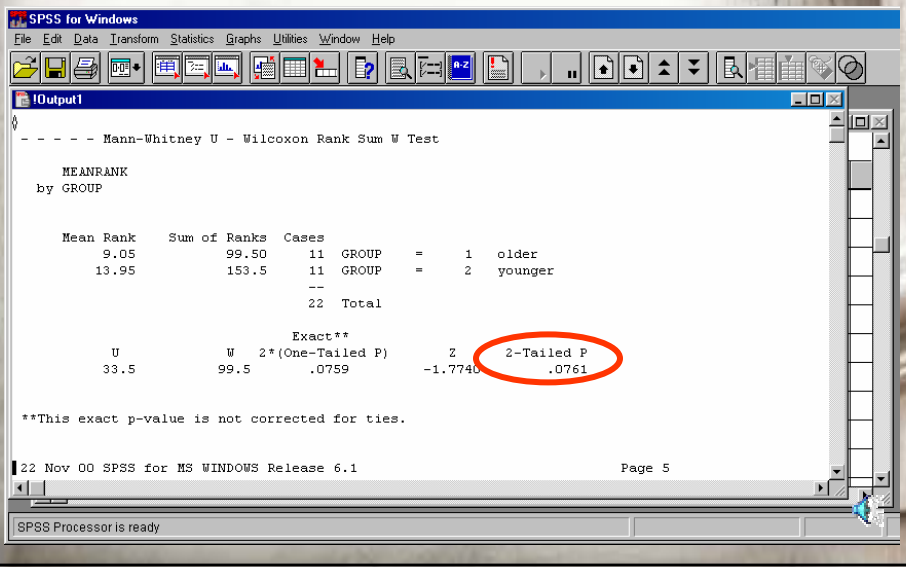


Conducting the Mann-Whitney U Test Using SPSS





Conducting the Mann-Whitney U Test Using SPSS



Conducting the Mann-Whitney U Test Using SPSS

- ***P*-value**
  - ***P*** = 0.0761
- **Conclusion**
  - P value is greater than alpha. Therefore, we cannot reject the null hypothesis and conclude that there is no difference in the rankings of employer-provided benefits between younger and older paramedics.