HSCC 470
Research Methods and Data Analysis in Health Sciences

Using SPSS: The McNemar Test

Unit Objectives

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

- List the assumptions of the McNemar test.
- Describe when the McNemar test is appropriate for testing a hypothesis.
- Use SPSS to conduct a McNemar 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 McNemar Test

- Comparing frequencies or proportions
- Data measured on nominal level
- 1 group being compared before and after a treatment or intervention
- The groups (before and after) are the same individuals and therefore are dependent
- May be used as a measure of inter-rater agreement of scoring the same individuals
- Data need not be drawn from a normally distributed population

Examples of McNemar's Test

- 2 X 2 contingency tables
- Inter-rater agreement on ACLS Megacode

	Pass	Fail
Examiner 1	24	12
Examiner 2	20	16

Examples of McNemar's Test

- 2 X 2 contingency tables
- Before and after test in the same individuals
- Analagous to paired t test, but used for nominal level data

	Pass	Fail
Pretest	24	12
Post-test	20	16

Conducting McNemar's Test Using SPSS continued

- **Assumptions**
  - Scale of measurement
    - Nominal
  - Population distribution
    - Any distribution
  - Method of sampling
    - Randomized, 1 dependent sample

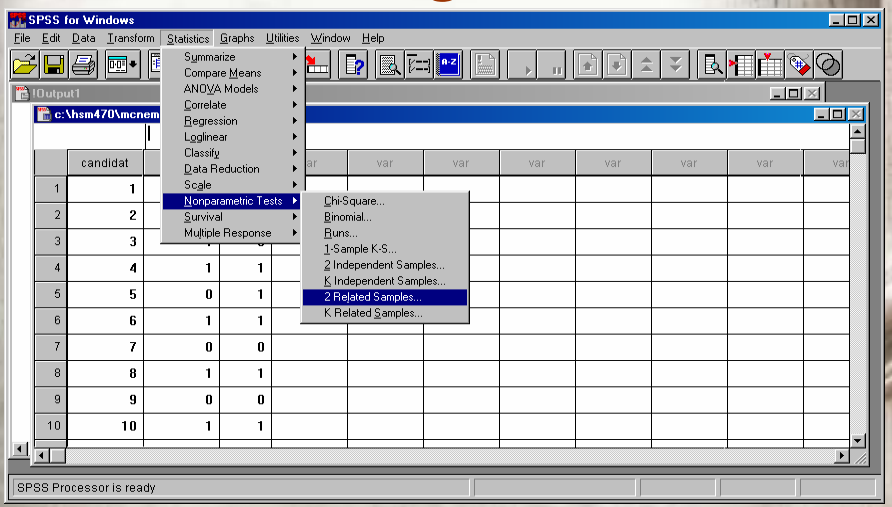
Conducting McNemar's Test Using SPSS continued

- **Hypotheses**
  - Null
    - There is no difference in the pass rates on the NREMT-P practical exam between two evaluators evaluating the same registry candidates
  - Alternative
    - There is a difference in the pass rates on the NREMT-P practical exam between two evaluators evaluating the same registry candidates
  - Select Alpha Level
  - Alpha = 0.05
- **Test statistic**
  - McNemar

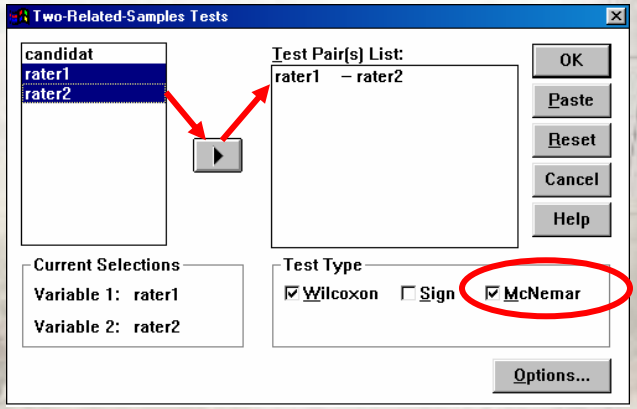
Conducting McNemar's Test Using SPSS continued

- *P*-value
- Conclusion

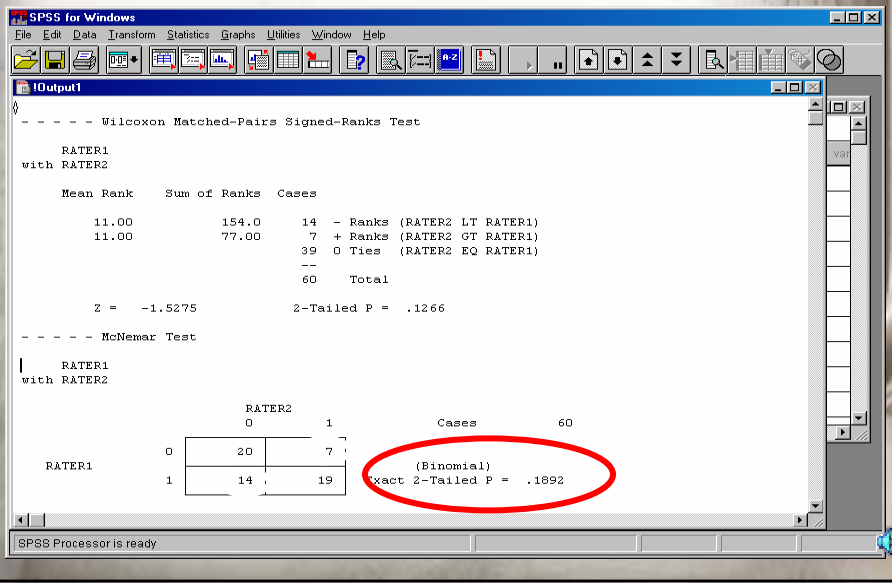
Conducting McNemar's Test Using SPSS



Conducting McNemar's Test Using SPSS continued



Conducting McNemar's Test Using SPSS continued



Conducting McNemar's Test Using SPSS continued

- *P*-value
  - ***P*** = 0.1892
- **Conclusion**
  - *P* value is greater than alpha. Therefore, we cannot reject the null hypothesis and conclude that there is no difference in the pass rates on the NREMT-P practical exam between two evaluators evaluating the same registry candidates

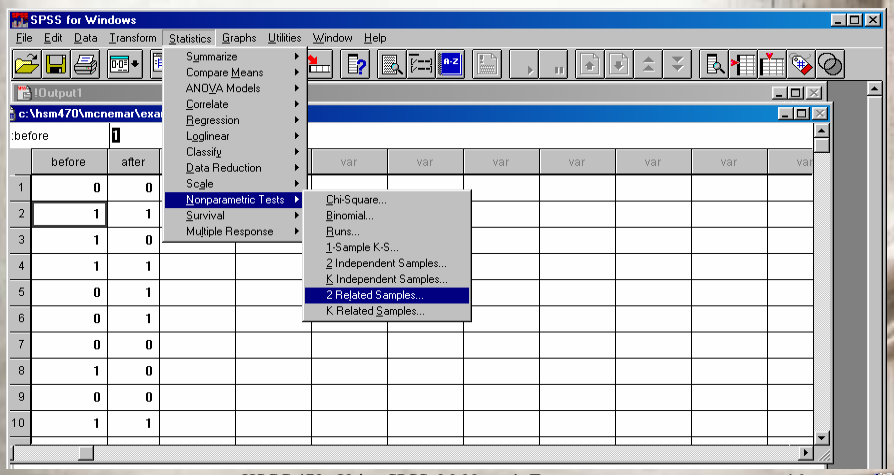
Conducting McNemar's Test Using SPSS continued

- **Hypotheses**
  - Null
    - There is no difference in the proportion of paramedics favoring an AAS degree requirement before and after receiving their degree.
  - Alternative
    - There is a difference in the proportion of paramedics favoring an AAS degree requirement before and after receiving their degree.
  - Select Alpha Level
  - Alpha = 0.05
- **Test statistic**
  - McNemar

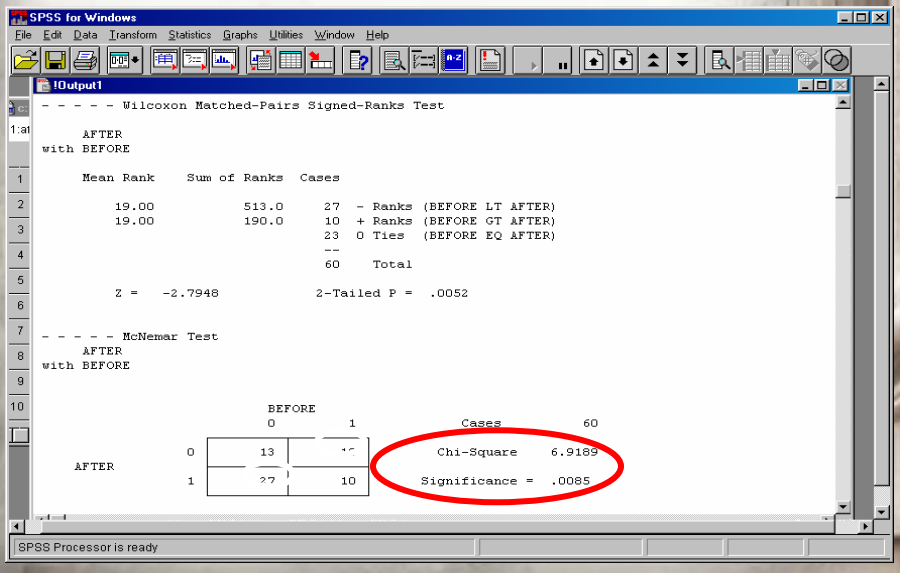
Conducting McNemar's Test Using SPSS continued

- *P*-value
- Conclusion

Conducting McNemar's Test Using SPSS continued



Conducting McNemar's Test Using SPSS continued



Conducting McNemar's Test Using SPSS continued

- ***P*-value**
  - $\boldsymbol{P} = 0.0085$
- **Conclusion**
  - *P* value is less than alpha. Therefore, we reject the null hypothesis and conclude that there is a difference in the proportion of paramedics favoring an AAS degree requirement before and after receiving their degree.