

## Chapter 10 – Comparing Groups with $t$ Tests and Similar Nonparametric Tests

### Chapter 10 Outline

- I. Selection of an Appropriate Inferential Statistic for Basic, Two Variable Difference Questions or Hypotheses
  - A. Utilize Table 10.1 to help select appropriate inferential statistic
    1. Determine if the design is between groups versus within subjects.
    2. Determine the level of measurement.
    3. Determine if the assumptions are met versus markedly violated.
    4. Match the appropriate row and column to select the statistic.
- II. Problem 10.1: One-Sample  $t$  Test
  - A. A one-sample  $t$  test is used to compare the mean of a sample with a hypothesized population mean.
  - B. Follow the directions in the book to compute and interpret and one-sample  $t$ -test.
- III. Problem 10.2: Independent Samples  $t$  Test
  - A. An independent samples  $t$  test is used to investigate the difference between two unrelated groups on an approximately normal dependent variables.
  - B. Assumptions of the independent samples  $t$  test
    1. The variances of the dependent variable in the two populations are equal.
    2. The dependent variable is normally distributed within each population.
    3. The data are independent (the scores of one participant are not dependent upon the scores of the other participants).
  - C. Testing the assumptions
    1. SPSS will automatically test assumption 1 using the Levene test for equal variances.
    2. Assumption 2 can be tested using the Explore command.
    3. Assumption 3 must be addressed during design and data collection.
  - D. SPSS can do several  $t$  tests in one output if they are all using the same independent or grouping variable.
  - E. Follow the directions in the book to compute and interpret an independent samples  $t$  test.
- IV. Problem 10.3: The Nonparametric Mann-Whitney  $U$  Test
  - A. Use of the Mann-Whitney  $U$  Test
    1. For between groups design with two levels of the independent variable.
    2. Can be used with ordinal data
    3. Necessary for groups and scores to be independent.
    4. Use when the assumptions for the independent samples  $t$  test are markedly violated.
  - B. Follow the directions in the book to compute and interpret a Mann-Whitney  $U$  test.
- V. Problem 10.4: Paired Samples  $t$  Test

- A. Use of the Paired Samples  $t$  Test
    - 1. Use if the groups are not independent (e.g. parent and child).
    - 2. Use if the two scores are a repeated measure.
    - 3. Use for a pretest-posttest design.
  - B. Assumptions and Conditions of Use of Paired Samples  $t$  Test
    - 1. The independent variable is dichotomous and its levels (or groups) are paired, or matched, in some way.
    - 2. The dependent variable is normally distributed in the two conditions.
  - C. Follow the directions in the book to compute and interpret a paired samples  $t$  Test.
- VI. Problem 10.5: Using the Paired  $t$  Test to Check Reliability
- A. Reliability Check
    - 1. Test-retest reliability
    - 2. Parallel (equivalent) forms reliability
    - 3. Reliability can be tested by producing a correlation coefficient, but the paired  $t$  test produces a correlation as well as a comparison of the means.
  - B. Follow the directions in the book to compute and interpret a paired  $t$  test to check reliability.
- VII. Problem 10.6: Nonparametric Test for Two Related Samples (Wilcoxon)
- A. Use when the assumptions of the paired  $t$  test are violated.
  - B. Follow directions in the book to compute and interpret the Wilcoxon Signed Ranks Test.