

Chapter 8 – Cross-Tabulation, Chi-Square, and Nonparametric Measures of Association

Chapter Outline

- I. Problem 8.1: Chi-Square and Phi (or Cramer's V)
 - A. Requires two nominal or dichotomous variables.
 - 1. Nominal variables have distinct, unordered variables and each subject is in only one level
 - 2. Less appropriate if either variable has three or more ordered levels
 - a. These statistics do not take into account order.
 - b. Sacrifice power if you use these statistics with ordinal or scale variables.
 - B. Chi-Square
 - 1. Requires relatively large sample size and relatively even split of subjects among the levels.
 - 2. Expected counts in 80% of the cells should be greater than 5.
 - 3. Tells if the relationship is statistically significant but does not tell the effect size.
 - C. Fisher's Exact Test
 - 1. Can be used for 2x2 crosstabs instead of chi-square for small samples.
 - 2. Tells if the relationship is statistically significant but does not tell the effect size.
 - D. Phi or Cramer's V
 - 1. Provides a test of statistical significance.
 - 2. Provides information about the strength of the association between two categorical variables and can be used as a measure of effect size.
 - a. Measure is similar to r .
 - b. Values near 0 indicate no relationship.
 - c. Values near ± 1.0 indicate strong relationships.
 - 3. Phi is appropriate for 2x2 crosstabs.
 - 4. Cramer's V is appropriate for larger crosstabs.
 - E. Assumptions and Conditions for the Use of Chi-Square, Phi and Cramer's V
 - 1. The data for the variables must be independent.
 - 2. Data are treated as nominal, even if ordered.
 - 3. For chi-square, if the expected frequencies are less than 5, the test of significance is too liberal. At least 80% of the expected frequencies should be 5 or larger. All should be at least 5 if you have a 2x2 chi-square.
 - F. Follow directions in book to compute and interpret chi-square, phi (or Cramer's V).
- II. Problem 8.2: Other Nonparametric Associational Statistics

- A. Follow directions in book to compute and interpret phi/Cramer's V and Kendall's tau-b
- III. Problem 8.3: Cross-Tabulation and Computation of Eta
 - A. Eta is used when one variable is nominal and the other is approximately normal/scale.
 - B. Follow directions in book to compute and interpret eta.
- IV. Problem 8.4: Cohen's Kappa for Reliability with Nominal Data
 - A. Cohen's Kappa is used when there are two nominal variables with the same values
 - 1. Usually two raters' observations or scores using the same codes.
 - 2. Allows two raters to be checked for reliability (agreement between the measures).
 - B. Follow the directions in the book to compute and interpret Cohen's Kappa.