Statistics
Chapter Eight

- Nonparametric tests are used primarily when:
  - → Outcomes (DV) are not measured on an interval or ratio scale
  - → Assumptions for parametric tests are severely violated
    - → Especially when sample sizes are small

- Selection of a nonparametric test depends mostly on:
  - → Number of groups being compared (two vs three or more)
  - → Type of comparison being made
    - → Independent groups (between-subjects design)
    - → Dependent groups (within-subjects/ repeated measures, correlated groups design)

- Chi-Square Test of Independence
  - → Tests relationships between two categorical variables in a crosstab table
    - → A test of differences in proportions between groups

- Chi-Square Test Hypotheses
  - → Null hypothesis: The two categorical variables are independent (uncorrelated)
    - → Prop: Proportions across groups are equal
  - → Alternative hypothesis: The two variables are not independent - they are related
    - → Prop: Proportions across groups are not equal

- Assumptions for Chi-Squared Test
  - → Random sampling from the population
  - → Each observation is independent (eg. no correlated groups)
  - → Each cell in the contingency table must have an expected frequency greater than zero

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- General logic for Chi-Squared Test
  - → If the null hypothesis is true there should be no differences in proportions (relative frequencies) for groups being compared
  - → The test contrasts observed frequencies in each cell of a crosstab table with expected frequencies = the frequencies that would be expected if the null hypothesis were true

- Observed vs Expected Frequencies
  - → Each cell needs an expected frequency
    - → E = Row total × Column Total ÷ N
  - → Observed frequency is just what's in the cell

- Sampling Distribution
  - → For each cell:
    - → $(O - E)^2 \div E$
  - → Add all the cell components together to obtain X^2
  - → In X^2 df = (Rows - 1) × (Columns - 1)
  - → If calculated $X^2 \geq$ tabled value reject the null hypothesis

- If expected value for multiple cells is < 5 use Fisher's exact test
  - → Sometimes for 2×2 tables a correction factor is applied: Yates Continuity Correction

- Magnitude of Effects
  - → Index summarizing strength of relationship in 2×2 = phi (φ)
    - → Phi varies from 0-1 & can be interpreted as pearsons r
  - → Index summarizing strength of relationship in larger tables: Cramér's V
    - → Varies from 0 to 1

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- Other Tests for Independent groups
  - → For ordinal level data - or for higher-level data when parametric tests can't be used bc of a violated assumption:
    - → Two groups: Mann-Whitney U Test
    - → Three or more groups: KrusKal-Wallis Test
  - → Both are rank tests that examine differences btwn groups in location

- The Mann-Whitney U Test
  - → Tests the null hypothesis that two population distributions are identical
    - → The nonparametric analog of the independent group t-test
  - → For Ns > 20, normal distribution (z values) can be used
  - → When displaying outcomes in a table, median values of the dependent variable for the two groups are often shown

- KrusKal-Wallis Test
  - → Tests the null hypothesis that three or more population distributions are identical
    - → The nonparametric analog of a one-way ANOVA
  - → Compares the ranks of the values for the groups
  - → Test statistic is H which follows chi-squared distribution
  - → Significant results only indicate that there is a difference among the groups, does not indicate which ones
    - → To isolate groups that are significantly different use the Dunn Procedure
    - → This involves using the Mann-Whitney U Test for all possible pairs

* In Spss look at the significance level
  - → .05 or smaller, reject the null hypothesis