HOW TO TALK TO A STATISTICIAN

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Why do I need a statistician?

- Keep current with the literature
- Planning a study
- Proposal writing
- Data analysis and interpretation
- Presentation development
When should I seek a statistician’s help?

- Literature interpretation
- Defining the questions
- Deciding data collection instruments
- Determining the sample size
What does the statistician need to know?

- General idea of project
- What has been done before
- Rationale for the study
- Budget constraints
Statistical Vocabulary

- Hypothesis - Statement of research question that sets forth the appropriate statistical evaluation. Must be specified before the study begins.
Statistical Vocabulary

- Null Hypothesis - Statement of no differences or association between variables. Rejected, usually, when P<0.05. Rejection results in acceptance of....
Statistical Vocabulary

• Alternative Hypothesis - Statement of differences or association between variables. Cannot be tested. Only accepted when null hypothesis is rejected.
Statistical Vocabulary

• One-tailed vs. two-tailed hypotheses:
  One-tailed states that an outcome is expected in only one direction. Two-tailed specifies that the direction of the effect is unknown.
Statistical Vocabulary

• Type I Error: Rejecting the null hypothesis and accepting the alternative when the null is true.

• Type II Error: Failing to reject the null hypothesis when differences due exist between groups of interest.
Statistical Power

• Primary factors -
  – effect size
  – variability
  – sample size
Statistical Power

- Secondary factors -
  - sampling unit
  - dropouts
  - confounding variables
  - multiple hypotheses
  - post-hoc hypotheses
Statistics

• Types of Statistical Information
  – descriptive
  – parametric
  – non-parametric
  – analytic
  – association
Statistics - Descriptive

• Types of Descriptive Data
  – central tendency
  – variance
  – standard deviation
  – standard error of the mean
  – confidence intervals
Statistics - Non-parametric

• Types of Nonparametric Tests
  – Chi-square
  – Mann-Whitney-U
  – Kruskal-Wallis
  – Spearman Rank-Order Correlation
Statistics - Parametric

- Types of Parametric Tests
  - t-test
  - ANOVA, ANCOVA, MANOVA
  - correlation
  - regression
Statistics - Post-hoc Testing

- Types of Post-hoc Testing
  - uncorrected
  - Bonferroni
  - Tukey
  - Scheffe
Statistics - A Final Word

- STATISTICS NEVER PROVE ANYTHING!