

# Choosing a Statistical Test

## 1. Type of Variable

### a. Numerical:

#### i. *Continuous Data*

1. Means
2. Normal Distribution

#### ii. *Discrete Data*

1. Whole Numbers
2. Median

### b. Categorical:

#### i. *Proportions*

## 2. Type of Analysis

### a. Comparison (2+ groups)

- i. Means
- ii. Medians
- iii. Proportions

### b. Relationship between 2 variables ( $\equiv$ Correlation, 1 group)

### c. Predicting one variable from another ( $\equiv$ Regression, 1 group)

## 3. Number of groups & Data sets

### a. 1 group – 2 datasets

- i. E.g. Testing one group of people to see if a new drug helps lower their blood pressure. Record their blood pressure before and after the drug.

### b. 2 groups – 2 datasets

### c. 2+ groups - >2 datasets

## 4. Study Design

### a. Unpaired/Independent

- i. 2 or >2 groups of different subjects

### b. Paired/Matched

- i. 1 group
  1. Before
  2. After

## 5. Distribution of Data

### a. Normal

### b. Non-normal

- i. E.g. ranks, scores

### c. Dichotomous/Binomial

- i. Two categories or levels
- ii. E.g. male or female, pass or fail

	Comparison				Association (Relation between 2 variables)	Regression (Predicting one from another)
	2 datasets		> 2 datasets			
	Paired	Unpaired	Paired	Unpaired		
Normal Distribution (means)	Paired t-test	Unpaired t-test	Repeated measures ANOVA	One-way ANOVA	Pearson Correlation	Linear Regression
Non-normal Distribution (medians)	Wilcoxon Signed Rank	Wilcoxon Ranked Sum Test/ Mann Whitney “U” Test	Friedman Test	Kruskal-Wallis Test	Spearman’s Rank Correlation	Non-Parametric Regression
Dichotomous Data (proportions)	McNemar’s Test	Chi-Squared Test/ Fisher’s Exact Test	Cochran’s Q Test	Chi-Squared Test	Contingency Coefficient	Logistic Regression

Parametric Tests	Nonparametric Tests	Main Characteristics
1-sample t or z test	1-sample sign test	Test on the median for data from a non-symmetric distribution
	1-sample Wilcoxon test	Test on the median for the data from a symmetric distribution
2-sample t-test	Mann-Whitney Test	Test on two medians using ranks of the sample data
One-way ANOVA	Kruskal-Wallis Test	Test on the equality of medians from two or more populations. More powerful than Mood's median test, but less robust to outliers
	Mood's median test	Test on the equality of medians from two or more populations. More robust to outliers than Kruskal-Wallis test, but less powerful
Two-Way Randomized Block ANOVA	Friedman Test	Test on medians, using randomized block experiments.

Common Statistical Tests	
Type of Test	Use
Correlational	These tests look for an association between variables
Pearson Correlation	Tests for the strength of the association between two continuous variables
Spearman Correlation	Tests for the strength of the association between two ordinal variables (does not rely on the assumption of normal distributed data)
Chi-square	Tests for the strength of association between two categorical variables
Comparison of Means	Look for the difference between the means of variables
Paired T-test	Tests for the difference between two related variables
Independent T-test	Tests for the difference between two independent variables
ANOVA	Tests the difference between group means after any other variance in the outcome is accounted for
Regression	Assess if change in one variable predicts change in another variable
Simple regression	Tests how change in the predictor variable predicts the level of change in the outcome variable
Multiple regression	Tests how change in the combination of two or more predictor variables predict the level of change in the outcome variable.
Nonparametric	Are used what the data does not meet assumptions required for parametric tests
Wilcoxon rank-sum test	Tests for difference between two independent variables – takes into account magnitude and direction of variance
Wilcoxon sign-rank test	Tests for difference between two related variables – takes into account magnitude and direction of variance
Sign test	Tests if two related variables are different – ignores magnitude of change, only takes into account direction.