

MEAN & MEDIAN COMPARISONS

- Continuous Variables
 - Mean
 - Standard Deviation (SD)
 - Standard Error (SE)
 - Confidence Intervals (CIs)
- Median
- Minimum, Maximum (Range)
- Percentiles
- Interquartile Range (IQR)
- Symmetric
- Skewed

OBJECTIVE

To identify basic characteristics & analysis for continuous outcomes with a categorical predictor (group means)

PURPOSE

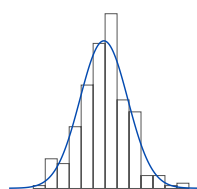
To review unadjusted continuous outcome analysis with a single categorical predictor (no covariates)

COMMON VARIABLES

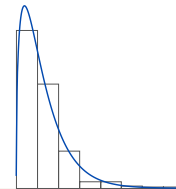
- **Continuous outcomes:** BMI value, weight (in lbs or kg), systolic blood pressure (mmHG), disease specific scales like the MHI (0-100), Timed 25 Foot Walk (in seconds)
- **Categorical predictors:** Treatment Arms, Intervention Groups, Event Status, Sex, Race, Disease Class, Age (in groups)

DESCRIPTIVE STATISTICS

CONTINUOUS DISTRIBUTIONS: When continuous outcomes are plotted, you can see the shape of the distribution, this is important to determine how you will report or describe your outcome



Symmetric



Skewed

Measures of Central Tendency: Very simply, this is the value at the center of the data sample, based on the shape:

- **Symmetric:** Use the Mean
- **Skewed:** Use the Median

Measures of Spread: Describe the amount of variability in your data

- **Symmetric:** Use SD
- **Skewed:** Use the Range or IQR

SD vs SE: The SD describes the variability in your sample (the data), the SE describes the variability of your mean. Always report the SD when reporting on your data, the SE is used in specific statistical circumstances.

Confidence Intervals: The CI describes the certainty (or confidence) about your mean estimates. The most common is the 95% CI, that is you are 95% confident the true mean lies within the bounds of the 95% CI.

Percentiles & Interquartile Range (IQR): The first quartile, or the 25th-tile, is the value where 25% of data points are less than that value, the median is the 50th-tile, etc. The IQR is the (25th-tile, 75th-tile). Report with a median.

COMPARING GROUPS

2 Groups: H0: Is the mean/median in Group A the same as the mean/median in Group B? vs HA: Is the mean/median in A \neq B?

- **Symmetric:**
 - **Two Groups:** two-group t-test
 - **Matched pairs or Single group with paired measures (pre-post):** paired t-test
- **Skewed or N < 30:** Wilcoxon rank sum test (also called Mann-Whitney) or for paired measures use the Wilcoxon signed-rank

> 2 Groups: Do all groups have the same mean/median or are there at least 2 different means/medians?

- For example, with 3 groups A, B, and C:
 - H0: mean/median of A = B = C
 - HA: (A=B) \neq C or (A=C) \neq B or (C=B) \neq A or A \neq B \neq C
- **Symmetric:** Analysis of Variance (ANOVA), the statistical test is an F-test
 - If you find for HA, follow with Tukey's HSD test to determine which means are different
- **Skewed or N < 30:** Kruskal-Wallis test
 - If you find for HA, follow with the Steel-Dwass test