# Intro to Stats

Variability

## Variability

- Reflects the degree to which scores differ from one another
- Usually in reference to the mean value
- A measure of the central tendency and variability give an efficient overview of a set of data

# Range

- Most general measure of variability
- Imprecise and VERY sensitive to extreme scores
- Subtract lowest score from highest score
- r = (H – L)

# Standard Deviation (SD)

- The average variability in a set of scores
  - (the average distance from mean)
- $s = \sqrt{\frac{\Sigma(X-\overline{X})^2}{n-1}}$ (also known as the sum of squares)

$X$ = each individual score
$\overline{X}$ = mean of all scores
$n$ = sample size

## Why n – 1?

- It's more conservative
  - Forces the denominator to be smaller and to estimate more variability
  - When we run inferential analyses, this means we are less likely to think there is a difference between 2 groups when there actually isn't
- The difference based on using n or n-1 decreases as the sample gets bigger (and more similar to the population)

## Standard Deviation (SD)

- The larger the SD, the more different your scores are from one another
- The SD is sensitive to extreme scores, just like the mean
- Can be used to identify scores that are unusually far from the mean

# Variance

- Square of the standard deviation

- $s^2 = \frac{\Sigma(X-\overline{X})^2}{n-1}$

$X$ = each individual score
$\overline{X}$ = mean of all scores
$n$ = sample size

# SD vs. Variance

- SD is in the original units; variance is in units squared

- Squared units are typically difficult to interpret meaningfully (much less communicate)

- Variance is important for later inferential statistics though!

# The importance of variability

- Without variability, everyone is the same
  - So there's nothing to explain!
- Can be caused by poor methods
- Show up in descriptive statistics
  - Truncated ranges
  - Small standard deviations