



# Intro to Stats

## Hypothesis Testing

## Hypotheses

- ▶ Educated guesses based on theory and past research
- ▶ Translate a research question into a testable form
- ▶ Depends on methods and measures
  
- ▶ The hypothesis is formed with respect to a population --- but tested with a sample

## Population vs. sample

- ▶ Population-level:
  
- ▶ Sample-level:

## The Problem

The hypothesis is formed with respect to a population --- but tested with a sample

No sample ever perfectly represents the population (sampling error)

## The Logic

- 1) We state the hypotheses
- 2) Predict sample characteristics
- 3) Obtain a random sample from the population
- 4) Compare the obtained sample data with the prediction made from the hypothesis

## The Null ( $H_0$ )

- ▶ A formal hypothesis
- ▶ Relates to the population
  
- ▶ There is no relationship between variables (they are equal, not different, not related, etc.)

## The Null

- ▶ Acts as a starting point
- ▶ Assume nothing until it is proven; null until proven significant
- ▶ Benchmark against which outcomes are measured to ensure that chance is not a good explanation

\*Usually not stated in articles

## Research Hypotheses

- ▶ Statement that there is a relationship between the variables
- ▶ Nondirectional
  - Unspecified difference/relationship
- ▶ Directional
  - Specified difference/ relationship

## Population vs. sample

- ▶ Population-level:
  - Emotional intelligence training will not improve children's math grades
  - $H_0$  : Scores in Class A = Scores in Class B
- ▶ Sample-level:
  - Emotional intelligence training will improve children's math grades
  - $H_1$  : Scores in Class A > Scores in Class B

## Why Two?

- ▶ Null hypotheses refer to the population; research hypotheses to the sample
- ▶ Null hypotheses cannot be directly tested; research hypotheses can
- ▶ Null hypotheses are in Greek; research hypotheses in Roman symbols

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \bar{X}_1 \neq \bar{X}_2$$