EPSY 5261: Introductory Statistical Methods

Day 11
Hypothesis Testing for Comparing Two Means

Learning Goals

- At the end of this lesson, you should be able to...
 - List the steps of a hypothesis test
 - Describe the purpose of a hypothesis test for comparing groups
 - Describe a parametric approach to hypothesis testing for comparing two means
 - List the assumptions for using the t-distribution to test for a difference in means

Recall: Variable Types

- We have been working with quantitative data
 - The population mean (μ) has been our parameter of interest
- Sometimes we have two groups that we want to compare (this could be an additional categorical variable)
 - The parameter of interest is now $\mu_{group1} \mu_{group2}$

Hypothesis Testing

- Purpose: to test a claim about a population parameter
- One Group
 - RQ: Did the average movie length increase in 2022?
- Two Groups
 - RQ: Is there a difference in average movie length between dramas and comedies?

Steps of Hypothesis Testing

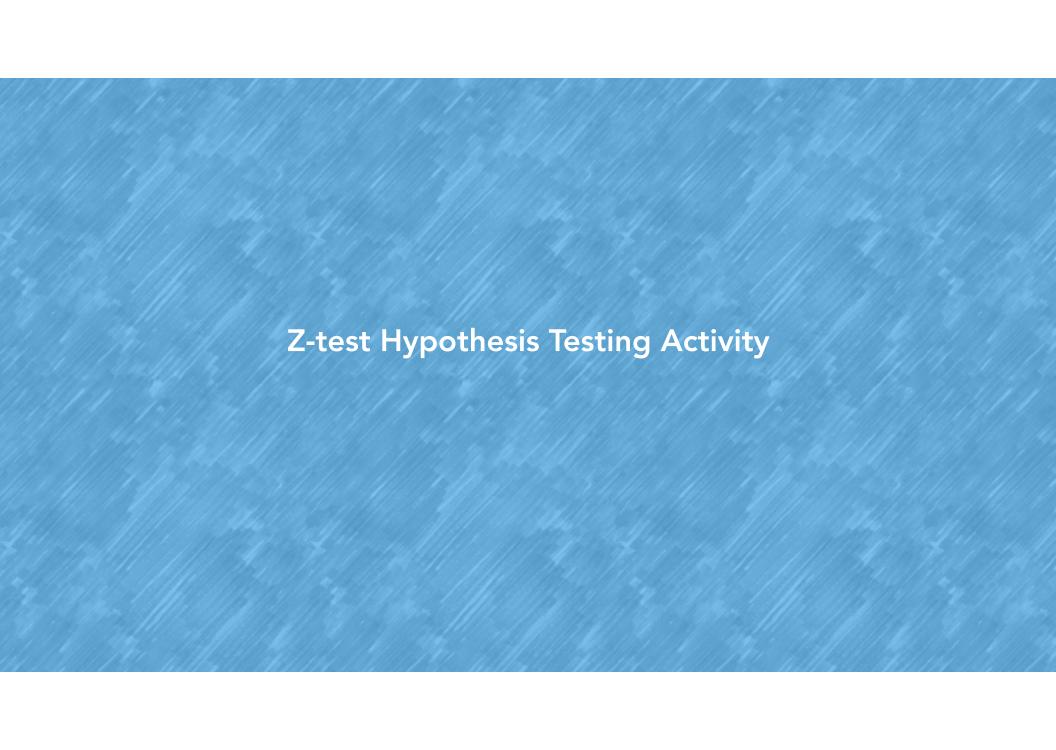
- 1. Formulate a research question
- 2. Write your hypotheses
- 3. Find **Distribution** of the Null Hypothesis
- 4. Compare Sample to the Distribution of Null Hypothesis
- 5. Get a p-value
- 6. Make a decision to reject or fail to reject the p-value
- 7. Communicate your **conclusion** in context

Assumptions

- n \geq 30 OR sample distribution looks reasonably normal
 - For single mean: only need to check this for one distribution
 - For difference in means: conditions must be met for <u>both</u> sample distributions
- If these are not met, better to use a randomization test

Use R Studio

- Use the t-distribution to help us get our estimate for the variability
- Use functions in R Studio to also give us our p-value
- We will explore the entire hypothesis test process in today's activity!



Summary

- Hypothesis tests help us test a claim while taking into account sampling variability
- They provide one form of evidence to help answer a research question
- We can use a z-distribution to help us conduct our test when we have categorical data