Lab 9:

Your Name Here

2025-10-20

#Include all libraries here  
  
  
  
#Import the data here

## Scenario and Goal

Welcome back! For this lab you’ll step into the role of a data analyst for a clinical psychology lab. Your team has just completed a pilot randomized controlled trial (RCT) for a new, brief CBT (Cognitive Behavioral Therapy) intervention designed to reduce symptoms of depression (group variable). You’ve been given the initial dataset and tasked with running the primary analyses to see if the intervention shows promise.

This dataset includes participant demographics (sex, age) and depression scores from before (bdi\_pre) and after (bdi\_post) the trial. As is common in clinical research, some participants dropped out before the final assessment, resulting in **missing data**.

The BDI is a common measure to assess for symptoms of depression. It stands for the Beck Depression Inventory and higher scores indicate a higher level of depression.

## Exercises

### **Task 1: Setup & Data Inspection (10 points)**

Your first and most important task is always to understand and inspect your data before running any analyses.

**Tasks:**

1. **Initial Inspection:**
   * Use glimpse() to see the structure of your data.
   * Use summary() to get a quick overview of each variable. **Pay close attention to the bdi\_post variable.** What do you notice?
2. **Visualization:**
   * Generate a visualization of the distribution for bdi\_pre and bdi\_post
     + These can be two separate figures
3. **Summary Stats (2 tables)**:
   * Provide descriptive statistics (Means & SD) in a nice looking table for age, bdi\_pre, bdi\_post. Include a correlation table with those variables as well.

### **Task 2: Paired-Samples t-test - Did the Individual CBT Work?**

For participants who received one-on-one therapy (group == "Individual CBT"), did their depression scores significantly decrease?

1. **Filter the data:** Create a new data frame called individual\_tx that contains *only* the participants from the Individual CBT group.
2. **Run the test:** Conduct a **paired-samples t-test** on the bdi\_pre and bdi\_post scores within the individual\_tx data.
3. **Interpret the results:** Based on the results, was there a statistically significant change in BDI scores? Describe the direction and magnitude of the change.

### **Task 3: One-Sample t-test - Achieving Clinical Remission**

A BDI score below 10 is often considered the cutoff for clinical remission. Did our individual CBT group, on average, get below this threshold?

1. **Run the test:** Using the individual\_tx data, conduct a **one-sample t-test** on the bdi\_post scores, testing against a population mean (mu) of 10.
2. **APA Write-up:** Report your results in a full APA-formatted sentence. You will need to calculate the mean and standard deviation for the bdi\_post scores separately to include in your write-up.

### **Task 4: One-Way ANOVA**

Now we’ll compare the final outcomes (bdi\_post) across all three groups: Individual CBT, Group CBT, and the Waitlist Control.

1. **Run the ANOVA:** Using the full cbt\_data, conduct a one-way ANOVA to test for differences in bdi\_post among the three group conditions.
2. **Interpret the ANOVA:** Look at the summary() of your ANOVA object. Is the overall F-test significant? What does this tell us? Note the degrees of freedom—does the sample size make sense given the data?
3. **Run Post-Hoc Tests:** A significant ANOVA requires a post-hoc test. Run a **Tukey HSD** test to see which specific groups differ.
4. **Write a conclusion:** In 2-3 sentences, summarize the findings from the post-hoc test. Which treatment(s) were effective compared to the control group?

### **Task 5: Independent-Samples t-test - Exploring Sex as a Moderator**

We were also interested to use exploratory analyses to further understand the impact of the treatment. For instance, did the therapy work equally well for males and females? Let’s investigate this.

**Tasks:**

1. **Calculate change scores:** Create a new data frame called cbt\_active\_tx that contains only the two **active therapy groups** (Individual and Group CBT). Add a new column to it called bdi\_change, calculated as bdi\_pre - bdi\_post.
2. **Run the test:** In this cbt\_active\_tx data, conduct an **independent-samples t-test** to see if there is a significant difference in the bdi\_change scores between participants identified as Male and Female.
3. **Visualize and Interpret:** Create a ggplot boxplot to visualize the bdi\_change scores by sex. Based on your test and your plot, is there any evidence that the treatment effect was different for males versus females in this pilot study?

*End of Lab. Don’t forget to Knit! 🧶*