**Week 6: Homework**

**Submission Rules**

1. This is an **individual homework** assignment. While you are welcome to ask for help from the instructor(s) and teaching assistants, you are expected to complete the data analysis and write-up of the report on your own. Having others write your code or your report is considered academic misconduct.
2. We recommend you submit your document as one **PDF file.**
3. Your software code and output must be submitted in an appendix (i.e. at the end of your report). Do not include code that did not work or is not needed for this assignment. If any code or direct output (excluding graphical summaries) from your software is included within your report, 1 point of the total homework score will be deducted.
4. In your report, share statistical summaries or inferential results (**edited into tables**) or graphs that further your argument, making sure to give titles to all tables and graphs/figures (example: Table 1 or Figure 1). Make sure you label graph axes and round statistical summaries or inferential results to two decimal places or 3 significant figures.
5. Your report should be **no longer than 1 page** (not including appendix and figures).
6. Write your report as you would for a client or collaborator, in full sentences and paragraphs. While not a formal part of the grade, make sure your presentation of your work is clean, readable, and professional. Sloppy presentation makes any data analysis less trustworthy. Points will be deducted for excessively sloppy submissions.

**Background**

Studies have shown the negative immediate impact of being sleep deprived but it was not clear how long the negative effect lasts. To understand the repercussions of sleep deprivation, researchers studied the lingering effect of sleep deprivation on visual learning[[1]](#footnote-1). They recruited 21 college-aged participants and randomly assigned them to one of two groups. Both groups received training with a visual discrimination task and their baseline performance on a test was measured. Performance was measured as the minimum time (in milliseconds) between stimuli appearing on a computer screen and when they could accurately report what they had seen on the screen. The first night following this training, one group was deprived of sleep (n=11) and the other group was permitted unrestricted sleep (n=10). Both groups were allowed unrestricted sleep on the following two nights and then were retested on the third day. The outcome of interest was the change in performance on the test between baseline and post-intervention. A negative value indicates a decrease in performance.

The data can be found on Canvas, titled *SleepDeprivation.csv*. There are two variables in the dataset: *group* for the two sleep groups, and *improvement* for the change in performance (pre-post).

**Report Format and Audience**

Suppose you are a reporter and analyst for NPR and came across this dataset about the sleep deprivation. Your boss tasks you with writing an online news article that summarizes your findings of this data. [Note: Feel free to be creative in this assignment as long as you hit all of the necessary requirements (see below). The goal is to try to communicate statistical findings in nontechnical language to the general public.]

**Research Questions**

In particular, your boss wants you answer the following question:

* Does the effect of sleep deprivation last, or can a person “make up” for sleep deprivation by getting a full night’s sleep in subsequent nights?

Be sure to include in your article:

1. **Exploratory data analysis:** Explore the variables of interest.
   * Create at least one graphical summary for the two groups on the variable of interest.
   * Calculate summary statistics for each of the two groups, individually, on the variable of interest. Also calculate a summary statistic comparing the two groups on the variable of interest.
   * Discuss the results of the variable of interest. [Note: This discussion is a comparison of the two groups.]
2. **Inference:** Carry out inferential methods to answer the question.
3. **Conclusion:** Discuss the study results.
   * Provide an answer to the question.
   * Report on any study limitations.

1. Stickgold, R., James, L., & Hobson, J. A. (2000). Visual discrimination learning requires sleep after training. *Nature neuroscience*, *3*(12), 1237. [↑](#footnote-ref-1)