**Research Question:**

Does the Supplemental Instruction program help students raise their final course grade? This data is from the summer months, where SI was offered to traditionally hard classes (BMS 110, 307, 308 – anatomy and physiology). The SI program, now called PASS, is an academic assistance program that offers study sessions during the week to review course material and help students prepare for exams. Leaders are hired that have previously performed well in the course and are paired with their previous instructor. We want to show students that attending SI consistently, instead of only review sessions, improves final course grades. Therefore, we expect the “yes going a lot” group to have higher scores than both “somewhat going” and “not going” groups. The “somewhat going” group may have higher final grade scores than the not going group, but since good students may not need to go to sessions, they may also be the same. Include the appropriate output into this document while answering the questions, and include your *R* syntax in your blackboard submission.

**IV:**

SIatall: Coded if participants went to SI sessions:

* 1 = no, they went to no sessions during the summer months.
* 2 = some, they only went to review sessions during the summer months (1-4 times).
* 3 = yes, they went to review and regular sessions, consistently throughout the summer (5-16 times).

**DV:**

SIgradeGPA: Final grades were coded by GPA points (A = 4, B = 3, C = 2, D = 1, F/W = 0).

**Accuracy:**

1. Check the data for out of range scores.
   1. Include a summary showing you do/do not have out of range scores.
   2. If necessary, fix the out of range scores.
      1. Indicate what the problems were in the dataset.
      2. Make all out of range values NA.
      3. Include a summary showing that you fixed the accuracy issues.
2. Fix the factored columns to have nice labels (i.e. Proper Case, Fully Spelled out). Only factor the IV, do not factor the DV.
   1. Use the factor command to change the labels that already exist into better labels or to add labels.
   2. Include a table of each of those columns to show that you fixed the labels. This command will also help you make sure you didn’t accidentally delete the column.
      1. table(*dataset$column*)

**Missing data:**

1. Include a summary of the missing data by participant.
   1. For example, you can do table(missing) to see the percentages by participant.
2. Include a table of the missing data by column after you exclude participants with too much missing data.
3. Exclude all missing data.
4. Why can’t we replace missing data in a between-subjects ANOVA?

**Outliers:**

1. Create z-scores for your dependent variable.
   1. Include a summary of those z-scores.
   2. Do you have any outliers?
   3. Exclude those outliers.

**Normality:**

1. Include the multivariate normality histogram.
2. Interpret the graph. Does it indicate multivariate normality?

**Linearity:**

1. Include the multivariate QQ plot.
2. Interpret the graph. Does it indicate multivariate linearity?

**Homogeneity:**

1. Include the multivariate residuals plot.
2. Interpret the graph. Does it indicate homogeneity?

**Power:**

1. Calculate the number of participants you would need for this study, assuming a medium effect size.
   1. Include a screen shot or summary of the numbers you typed into G\*Power, so we can give you partial credit if you get a different sample size than us.

**ANOVA and Levene’s:**

1. Include the ANOVA and Levene’s test output.
2. Do you meet the homogeneity assumption given the results from Levene’s test?
3. Was the overall test significant?
   1. Include the APA/AMA style write up for F (just the statistics):

**Post Hocs:**

1. Calculate the means, standard deviations, and group sizes for your levels.
   1. Include the tapply ouput.
2. Post hocs:
   1. What type of post hoc *test* did you run?
   2. What type of post hoc *correction* did you run?
   3. Include the t-test output.
3. Effect size:
   1. Calculate the effect size for your pairwise comparisons.
   2. Include the effect size output or MOTE screen shot.
4. Fill in the table below with the information from the above calculations (like the one from the notes):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mean 1 | Mean 2 | P-value | Explain? | Effect size |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Graph:**

1. Include a graph of the means and confidence interval for your ANOVA. Be sure to check the following:
   1. X-axis label
   2. Y-axis label
   3. X-axis group labels
   4. Error bars
   5. Cleaned up graph (no gray backgrounds)

**Write up:**

1. Write up an analysis of what you find in this data, including all the information you answered above. Use the example in the notes for a guide. This write up should include the following for credit:
2. Result section style (APA and AMA):
   1. Double space
   2. Times New Roman 12 point
   3. Two decimals
   4. Centered, bolded Results
3. Short description of the study/variables.
4. Data screening summary:
   1. Accuracy – did you have problems? What did you do to fix it?
   2. Missing data - did you have problems? What did you do to fix it?
   3. Outliers - did you have problems? What did you do to fix it?
   4. Assumptions:
      1. Normality
      2. Linearity
      3. Homogeneity and Levene’s
5. ANOVA
   1. Overall F statistic
   2. Post hoc tests / corrections and results
   3. Effect size for all tests
6. Graph with reference to the figure in the text.