PSY652, Unit 5, In class activity – Exploring MLR with BAC experimental data

Dataframes: bac\_exp.csv

Build inside your BAC\_notebook for this activity.

We’ve been exploring a dataset from an observational study designed to predict drinking and BAC among women. In this practice activity we will consider a variant of this study. A team of alcohol researchers are interested in estimating a female’s blood alcohol content (bac) as a function of grams of alcohol consumed (alc\_gm) and her body weight in kilograms (weight). The team conducted an **experiment** to answer their research questions. 81 participants were selected to participate—9 women within each of the following weight categories: 50, 55, 60, 65, 70, 75, 80, 85, and 90 kilograms. Following a random assignment protocol, within each of these weight categories, one individual was assigned to consume 20 grams of alcohol, one to consume 25 grams, one to consume 30 grams, and so forth in increments of 5 grams up to 60 grams. 120 minutes after the start of the experiment each participant’s blood alcohol content was recorded. The data are in a file called bac\_exp.csv.

At the bottom of your notebook:

1. Create a first level header called “Explore experimental data.” Create a second level header called “Get descriptive statistics.” Insert a code chunk. Inside this code chunk create a new version of the bac variable called bac100 using mutate: bac100 = bac\*100. We start here because bac is a very small number and multiplying it by a constant won’t change the overall model, but will make our output easier to read. Next, use the describe function to get descriptive statistics for all variables in the dataset.
2. Create a second level header (“Get scatterplot matrix”) and a new code chunk. Use the ggpairs function to get a scatterplot matrix of bac100, weight, and alc\_gm in the experimental dataset. Take a close look at the plot, make note of any unusual elements of the scatterplot.
3. Create a second level header (“Regress bac100 on weight”) and a new code chunk. Regress bac100 on weight and ask for the output.
4. Create a second level header (“Regress bac100 on alc\_gm”) and a new code chunk. Regress bac100 on alc\_gm and ask for the output.
5. Create a second level header (“Regress bac100 on weight and alc\_gm”) and a new code chunk. Regress bac100 on weight and alc\_gm, and ask for the output. Study the output for steps 3, 4, and 5. How do the slopes change from the SLR to the MLR?
6. By hand or using a calculator, use the results of the MLR to obtain the predicted bac100 for a woman who weighs 70 kilograms and consumes 40 grams of alcohol.
7. Make a plot of the relationship between alc\_gm and bac100, allow a separate line for women who weigh 40 kg, 60 kg, and 80 kg.
8. Create a second level header (“Get partial and semi-partial correlations”) and a new code chunk. Use ols\_correlations to get the partial and semi-partial correlations from the MLR, also request the squared matrix to obtain the squared partial and semi-partial correlations.
9. Draw a Venn diagram to represent the relationship between the three variables.



