**Correlation Exercise**

Leg strength partly determines an athlete’s ability to jump. The data set provided, *Correlation Exercise.xlsx* shows one-rep maximum squat values and vertical jump height for 14 elite male rugby players.

There are three learning objectives intended for this exercise:

1. Understand the basic concepts of correlation and apply those concepts to real questions.
2. Learn to run a correlation analysis using Microsoft Excel.
3. Learn to run a correlation analysis using SPSS

**Resources: Please check these resources before asking a question**

* + This sheet
  + *Correlation and its Applications.ppt* (class notes)
  + *How to Perform a Bivariate Correlation in SPSS.doc*

**Exercises**

1. Download *Correlation Exercise.xls* from my webpage and save it to your H: drive.
2. In Excel, click on the *DATA 14* tab and:
   1. Plot the squat and jump data using a scatter plot.
   2. Determine the Pearson’s correlation coefficient for the data.
   3. Determine the level of significance.
   4. Explain the meaning of your results.
3. Using Excel, explore the concept of “level of significance” by simulating the replication of a study. The tab *DATA F9 14*, is identical to the worksheet you just created. The exception is that every time you hit F9, you can resample the data. This is like repeating the study. I.e., recruit 14 more rugby players from the same elite league and measure their squat and jump. From conducting one study, you found that r=.66 with p=.005. Repeat the study and see what happens. Perform the following from *DATA F9 14*.
   1. While focused on the correlation (r) and the probability of error (p value), hit F9 10 times, and record the values in the text box provided. Manually (pen and paper) record both values before typing them in, otherwise the numbers will change. Would you have found a significant relationship in all 10 repetitions of the study?
4. Using Excel, explore the relationship between significance and *N*. The tab *DATA F9 100* is identical to the last worksheet used, expect now *N* = 100. Now you are repeating the study with 100 rugby players per sample instead of 14.
   1. While focused on the correlation (r) and the probability of error (p value), hit F9 10 times, and record the values in the text box provided. Mentally record both values before typing them in, otherwise the numbers will change. Would you have found a significant relationship in all 10 repetitions of the study? Compare with your answers from *DATA F9 14*.
5. Using Excel, explore the concept of “chance” **by creating a worksheet** of unrelated data that you can resample over and over again. This will allow you to see how chance, once in a while, can show a relationship that doesn’t exist.
   1. Copy the *DATA 14* tab and rename it *RAND F9 14*.
   2. While in *RAND F9 14*, use the equation =NORMINV(RAND(),10,2) to replace the squat and jump data. I.e., the same equation shown in the last sentence should be in every cell that contains squat and jump data.
   3. This has created two variables that, theoretically, have no relationship. Any correlation between the variables is due only to chance (luck). By hitting the F9 key, you can resample the data. This is like repeating the study. I.e., recruit 14 more rugby players from the same elite league and measure their squat and jump. All the scores will change, but over all, the two columns will still have means near 10 and standard deviations near 2.
   4. While focused on the p value, hit F9 50 times, and count the number of instances p < .05 (see class notes to help understand what this means). Remember, any significant relationship found is due to chance.
   5. While focused on the correlation (r), hit F9 50 times, and count the number of instances that the magnitude of r is greater than 0.3.
   6. Go to the tab RAND F9 100, it is identical to your *RAND F9 14*, only *N*=100. While focused on the correlation (r), hit F9 50 times, and count the times that the magnitude of r is greater than 0.3. Compare this to when *N*=14 in the last tab.
6. Make sure to save the completed exercise to your H: drive.
7. Repeat Step 1 in SPSS by copying the original data into SPSS. Its spreadsheet is set-up slightly different than Excel. For detailed instructions open the Word document “How to Perform a Bivariate Correlation in SPSS”. Make sure you generate the same results as those found in *DATA 14*. You can open SPSS by double-clicking the WebFx applications icon, opening the folder “SPSS”, and double-clicking either SPSS 14, or SPSS 15 depending on which computer lab you’re in.
   1. Save the completed SPSS documents to your H: drive.