

KIN 610 | Final Project

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Learning objectives

1. Identify variables from a research question statement
2. Formulate hypotheses from a research question statement
3. Identify the appropriate statistical procedure to test the formulated hypothesis
4. Conduct statistical analysis in SPSS
5. Interpret the results of the data analysis
6. Create tables and figures to illustrate the findings
7. Prepare a research report

Dataset

1. [Link](#) to download the data set
2. [Link](#) to download the data codebook

The data for this project come from the [NFL Scouting Combine](#). The NFL Combine is held prior to the draft every year, testing players in the 40 yard dash, vertical jump, bench press, broad jump, shuttle, and three cone drill.

The description of each drill can be [found here](#) and [here](#). Please, [click here](#) to learn about football positions.

This data set CANNOT be considered a true random sample since not everyone from the study population had the same chance to be included in the sample.

For the final project, I have modified the data set in the following ways:

1. Extra variables were created for each dependent variable and random numbers were generated for these variables. Thus, the data for the “pos-test” variables are fabricated.
2. Scores were also fabricated using the test’s population mean and standard deviation for the Wonderlic¹ variable. Due to privacy, the data for this variable are not publicly available.

Steps You will be given a research question and a data set. Then, after running the appropriate statistical model, proceed to write the report.

You will be asked to:

¹Wonderlic test - Wikipedia." https://en.wikipedia.org/wiki/Wonderlic_test. Accessed 21 Oct. 2020.

1. Identify the dependent and independent variable(s) Once you are given access to the research question and the data set, identify the Independent and Dependent variables that will be part of your analysis:

- For the DV, identify whether it is continuous or discrete (nominal or ordinal).
 - For the IV, identify the levels associated with it (i.e. sex - two levels; males and females)
 - Whenever applicable, run the normality plots with tests to verify whether the distribution of scores for the dependent variable is approximating or deviating from normality. Use this information to decide whether you will need to use a parametric or non-parametric test (i.e. independent-samples t-test vs Mann-Whitney test).
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2. Formulate the hypothesis(es) for each of the dependent variable(s) A hypothesis for each of the DVs must be formulated. First, state your prediction; i.e., 10-year-old girls will overperform 10-year-old boys on the skill of skipping.

Next, you must decide whether you will be testing your hypothesis using the one-tailed or the two-tailed test. Once this is decided, you are ready to state the H_0 and the H_a :

- H_0 : 10-year-old girls and boys perform similarly on the skill of skipping
- H_a : 10-year-old girls and boys will perform differently on the skill of skipping

Notice above that H_a was stated as non-directional (two-tailed) because, even though we predicted that girls will do better than boys, we are uncertain of this prediction. Thus, the recommendation is to choose the two-tailed test.

Recall that you should only use a directional hypothesis (one-tailed) if you have strong evidence of the direction of the effect (refer to our textbook about one- and two-tailed tests).

3. Choose the appropriate statistical model to test the hypothesis(es) State the statistical procedure (i.e., ANOVA, Spearman rho) you selected to test the hypothesis(es) and explain the rationale for choosing the procedure(s).

Recall that the selection of the procedure will depend on several factors, including but not limited to, 1) the nature of the dependent variable (continuous, discrete), 2) the level (nominal, ordinal, scale), 3) the number of DVs/IVs. In addition, because the sample you are using is not a true random sample, normality cannot be assumed by default. You must run the normality plots with tests for each dependent variable and report it appropriately.

Note that you must choose a statistical model for each research hypothesis (H_a) formulated. For instance, if...

4. Run the chosen model using JASP Use JASP to open the data set and run the statistical model selected in #3 above.

Note that the relevant graphs/tables generated by JASP should be used to support your write-up.

5. Data Analysis and Interpretation Under this section, you will be asked to interpret the results based on the output generated by JASP.

This is the most important section of your report. Ensure to be throughout when writing this section.

Hint: Please download and read [this article](#) that covers the best practices of Methods/Results/Conclusion write-ups.

Include the following and in the sequence presented below:

1. Statistical Analysis

- Refer to the NCBI article (link above) to learn what to include here.

2. Results²

- a. You will be required to add at least two tables and one graph to enhance the Results section. Tables and graphs must come from JASP and be related to the statistical model used to test your hypothesis(es).

- Descriptive Statistics (AKA demographics)
- Results table related to analysis you used

b. Conclusions

- Refer to the NCBI article (link above) to learn what to include here.

c. Limitations

- Refer to the NCBI article (link above) to learn what to include here.

6. References (following the 6th APA Style) All sources consulted must be properly cite (in-text citation following APA Style) and the sources must be listed under References.

Appendices A. Correlation reference criteria

When evaluating the size of a bivariate correlation, please use Cohen (1988)

Coefficient Value	Strength of Association
$0.1 < r < .3$	small correlation
$0.3 < r < .5$	medium/moderate correlation

²Ensure to phrase your results following the APA Style → <https://bit.ly/2HirVLv>

Coefficient Value	Strength of Association
$r > .5$	Large/strong correlation

B. Research Questions³

Research Question #1

It has been published in the press that players from Iowa State work harder during practice compared to players from any other college teams in the country.

Since you had access to players from another university in the State of Iowa (University of Iowa), you decided to test this hypothesis.

As a group, do players from Iowa State (70) perform better than players from Iowa University (69) on the Bench Press (post) test? How about for vertical leap (post)?

You will need to Filter cases to perform this analysis so that only values 69 and 70 is selected for college. If a parametric test is selected/checked.

Research Question #2

Research has shown that in the general population there is a negative and moderate to high correlation between weight and performance on the test of Broad Jump'. In other words, the heavier the person, the poorer the performance on the test, and vice-versa.

Assume that you are specially interested in football players that play as Defensive Ends (3). Is there a relationship between Weight and Broad Jump (pre) scores among Defensive Ends (3)?

You will need to Filter cases to perform this analysis so that only the value 3 is selected/checked for position.

Research Question #3

Defensive players are known to be stronger than those playing on other positions. But how about if we compare defense players among themselves from different positions?

Are Defensive Tackles (4), Linebackers (10), and Cornerbacks (2) different when it comes to bench press (pre) scores?

You will need to Filter cases to perform this analysis so that only the values 4, 10 and 2 are selected/checked for position.

Research Question #4

As an athletic trainer working for the NFL Scouting Combine, you decided to test the effectiveness of a program you developed to improve players' agility. If deemed effective, the program could eventually be sold to NFL professional teams.

³If a parametric test is selected, do not forget to run the normality test.

To test the effectiveness of the program, you invited players from Ohio State University to participate in this 2-week program (3 hours everyday). At the end of the 2-week period, players were re-tested on the 20-yard Shuttle and the 3-cone Drill.

Do players from Ohio State University (127) improve their scores on the 20-yard Shuttle from pre to post-test? How about for the 3-cone Drill?

You will need to Filter cases to perform this analysis so that only the value 127 is selected/checked for college.

Research Question #5

There is evidence that Wide Receivers and Running Backs have a higher incidence of concussion compared to players from other football positions. Over the years, this may negatively affect the players' cognitive ability. For instance, how would they compare to Quarterbacks, who arguably are less prone to suffer concussions during a football match.

How do players playing as Wide Receivers (22), Running Backs (18) and Quarterbacks (17) compare on the Wonderlic scores? For this analysis, please, ONLY use the data for 2020 data?

You will need to Filter cases to perform this analysis so that only the values 17, 18 and 22 are selected/checked for position.

Research Question #6

Quarterbacks must have excellent decision-making skills and act quickly under pressure during game plays.

Since the Wonderlic⁴ test assesses cognitive ability under pressure, an interesting question is whether QBs are above average when it comes to cognitive ability.

According to the test developers, the average (mean) score on the Wonderlic test is 20 and the median score is (19).

Do QBs tested in 2018, 2019, and 2019 perform better than the general population on the Wonderlic Cognitive ability test?

You will need to Filter cases to perform this analysis so that only the value 17, is selected/checked for position.

Research Question #7

It has been reported that as a group, Offensive Tackles perform better than Full Backs on the Wonderlic test.

Test the hypothesis that OT (15) players tested in 2018, 2019, and 2020 perform differently than FB (6) players on the Wonderlic Cognitive Ability test.

You will need to Filter cases to perform this analysis so that only the values 5 and 15 are selected/checked for position.

Research Question #8

⁴https://en.wikipedia.org/wiki/Wonderlic_test

n the general population, there is a strong positive correlation between weight and speed. In other words, the heavier the player the slower the individual is, and vice-versa.

Considering that defensive players do train speed during football practices, it would be interesting to verify whether college players have a similar pattern compared to the general population.

Is there a correlation between weight and speed among football Defensive Tackles (4)? How about Defensive Ends (3)?

For this analysis, use the variables Weight and 40-yard Dash Pretest, and filter cases so that only positions 3 and 4 are selected/checked.

Research Question #9

As a Motor Behaviorist, you work for the NFL Scouting Combine and see the opportunity to collect data and test some of the research questions you have in mind.

In 2020, you designed a program to help players improve their speed.

Quarterbacks (17) from all attending colleges were selected to be part of the intervention. Test the hypothesis that the players would improve from pre to post-test on the 40-yard Shuttle.

For this analysis, use the variables 40-yard Shuttle, and filter cases so that only position 17 is selected/checked. Also, note that this study involves only players who were tested in 2020.

Research Question #10

As a Motor Behaviorist, you work for the NFL Scouting Combine and see the opportunity to collect data and test some of the research questions you have in mind.

In 2020, you designed a program to help players improve their speed.

Running Backs (18) from all attending colleges were selected to be part of the intervention. Test the hypothesis that the players would improve from pre to post-test on the 40-yard Shuttle.

For this analysis, use the variables 40-yard Shuttle, and filter cases so that only position 18 is selected/checked. Also, note that this study involves only players who were tested in 2020.

Research Question #11

As a Motor Behaviorist, you work for the NFL Scouting Combine and see the opportunity to collect data and test some of the research questions you have in mind.

In 2020, you designed a program to help players improve their agility.

Quarterbacks (17) from all attending colleges were selected to be part of the intervention. Test the hypothesis that the players would improve from pre to post-test on the 3-cone Drill.

For this analysis, use the variables 3-cone Drill, and filter cases so that only position 17 is selected/checked. Also, note that this study involves only players who were tested in 2020.

Research Question #12

As a Motor Behaviorist, you work for the NFL Scouting Combine and see the opportunity to collect data and test some of the research questions you have in mind.

In 2020, you designed a program to help players improve their agility.

Running Backs (18) from all attending colleges were selected to be part of the intervention. Test the hypothesis that the players would improve from pre to post-test on the 3-cone Drill.

For this analysis, use the variables 3-cone Drill, and filter cases so that only position 18 is selected/checked. Also, note that this study involves only players who were tested in 2020.