**Study:** In this experiment, we are testing the development of a new scale. We gave participants a 25 question scale with the intention of measuring sport related attitudes (see attached scale). Participants were given a -3 *strongly disagree* to +3 *strongly agree* Likert scale for each question with 0 indicating a neutral score.

Remember to paste your output in this document and upload your R script to blackboard to complete this assignment.

**Questions:** Please see attached scale for individual questions.

**Data Screening:**

**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 by making them NA.

**Missing data:**

1. Include output that shows if you have missing data.
2. *Mice* the missing data!
3. Include a summary with the missing data replaced.

**Outliers:**

1. Calculate Mahalanobis distance scores for your data.
   1. What is your *df* for the cut off score?
   2. What is the cut off score?
   3. How many Mahalanobis outliers did you have?
2. Exclude all outliers.

**Additivity:**

1. Look at the symbols table for the correlations – it’s a bit too big to include.
2. Are any of the variables too highly correlated?

**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 and Homoscedasticity:**

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

**Hypothesis testing:**

1. Before you start:
   1. Include output for both KMO and Barlett’s test.
   2. What does the Kaiser-Meyer-Olkin statistic tell you about sampling adequacy? Give number and interpretation.
      1. How many participants do you have? Do you seem to meet the 10-15 people per item suggestion?
   3. What does Barlett’s test tell you? Give number and interpretation.
2. Number of factors:
3. Theory suggests **three** factors.
4. How many does the Kaiser criterion suggest?
   * 1. Include the sum of the eigenvalues for both criteria.
5. How many does the scree plot suggest?
   * 1. Include the scree plot.
6. How many does the parallel analysis indicate?
   * 1. Include the parallel analysis.
7. **Run the factor analysis with three factors.**
8. Simple structure:
9. Use maximum likelihood as the fitting estimation and direct oblimin for the rotation.
10. Rounds of Loading Interpretation:
    * 1. Include the loadings for each round of analysis.
      2. Describe which questions were considered *bad* and why you excluded them.
      3. Continue this process until you achieve simple structure.
11. Adequate solution:
12. Include the fit indices (RMSEA + CI, RMSR, CFI, TLI).
13. Describe the fit indices (good, acceptable, poor).
14. Include the reliabilities for each factor.
15. Are the reliabilities acceptable?
16. Label the factors based on the questions.
17. Create subscale averages for each participant based on your EFA results. You should have three new columns that are the *average score* of the factors created above.
18. Include a summary of the means and standard deviations for these subscales.
19. Write up:
20. Short description of the scale.
21. List the type of analysis – rotation, fitting estimation, program used.
22. Values on why you had enough people and an adequate set of correlations.
23. Number of factors suggested you choose and why (scree, eigenvalues, parallel analysis)
24. What questions you eliminated – why did you eliminate them? Go through the rounds one at a time.
25. Simple solution table of the last round of loadings. (APA style!)
26. Interpretation of the factors.
27. Description of adequacy of solution – fit indices, reliabilities, and average/SD scores for the factors.