

Instructions

You will be given a data set and various research questions that can be answered by running the appropriate statistical tests in jamovi.

For each RQ below, run the appropriate statistical test, then answer the questions associated with each RQ. Finally, transfer your answers to the Scantron provided to you and hand it in along with this handout.

- When appropriated, only use the Shapiro-Wilk to decide whether a distribution is normally distributed.
- Use alpha (α) = 0.05 for the level of significance.
- Use two-tailed tests (non-directional) to test all hypotheses.
- Rank Biserial Correlation effect size should be interpret as follows: ($r = 0,1$ small effect/ $r = 0,3$ medium effect/ $r = 0,5$ large effect).
- Please provide answers to each question based on the respective research question it pertains to.

Dataset

Download the dataset by typing the link below into the Internet Browser (e.g., Edge). Then, proceed to open the file with jamovi.

<https://bit.ly/kin610-final20230518>

RQ1: Is the mean BMI significantly different from 25 in the sample population?

1. Which statistical procedure (test) did you use to answer RQ1?

- a. One-sample t-test
- b. Wilcoxon signed-rank test
- c. Independent-samples t test
- d. Paired-samples t test

2. Based on the analysis you conducted to answer RQ1, which statement is correct?

- a. The sample median for BMI is significantly different from the population value of 25.
- b. The sample median for BMI is **not** significantly different from the population value of 25.
- c. I **failed** to reject the null hypothesis.
- d. The mean, not the median, should be used to compare the sample with the population value
- e. B and C are correct

3. **Based on the calculated effect size for RQ1, which of the following statements is correct?**

- a. There is no need to report the effect size since the test was not significant
- b. There is no need to report the effect size since we are testing one sample only
- c. The practical significance of the observed difference is large.
- d. None of the above.

RQ2: Is there a significant difference in the mean EnduranceScore between males and females?

4. **Which statistical procedure (test) did you use to answer RQ2?**

- a. Independent-samples t test
- b. Mann-Whitney U
- c. Shapiro-Wilk test
- d. Friedman test

5. **Based on the analysis you conducted to answer RQ2, which statement below is correct?**

- a. The researcher failed to reject the null hypothesis.
- b. The researcher rejected the null hypothesis.
- c. Impossible to tell since the assumption of normality was violated.
- d. None of the above.

6. **Based on the analysis you conducted to answer RQ2, one can conclude that:**

- a. Males performed significantly better than females.
- b. Females performed significantly better than males.
- c. Impossible to tell since the assumption of normality was violated.
- d. None of the above.

RQ3: Is there a significant difference in the mean FlexibilityScore and the mean StrengthScore among the participants? (all participants completed the flexibility and the strength tests)

7. **Which statistical procedure (test) did you use to answer RQ3?**

- a. Paired-samples t test
- b. Mann-Whitney U
- c. Wilcoxon signed-rank test
- d. Kruskal-Wallis test

8. **Based on the analysis you conducted to answer RQ3, which statement below is correct?**

- a. The researcher failed to reject the null hypothesis.
- b. The researcher rejected the null hypothesis.
- c. There is no need to check for the assumption of normality.
- d. B and C are correct.

9. Based on the analysis you conducted to answer RQ3, one can conclude that:

- a. There is a significant difference between flexibility and strength scores.
- b. There isn't a significant difference between flexibility and strength scores.
- c. It is important to report the mean difference in this case.
- d. A and C are correct.

RQ4: Does the mean Weight differ significantly among the three age groups (20-29, 30-39, 40-49)?

10. Which statistical procedure (test) did you use to answer RQ4?

- a. Paired-samples t test
- b. Mann-Whitney U
- c. One-way ANOVA (Fisher's)
- d. One-way ANOVA (Welch's)

11. What was the outcome of the Shapiro-Wilk Normality Test?

- a. The assumption of normality was violated.
- b. The assumption of normality was met.
- c. The test was inconclusive.
- d. The test did not have to be performed.

12. What can be concluded from the Levene's Test for Homogeneity of Variances?

- a. The assumption of homogeneity of variances was met.
- b. The assumption of homogeneity of variances was violated.
- c. The test was inconclusive.
- d. The test did not have to be performed.

13. Based on the Post-Hoc Test, between which groups were the differences in mean Weight statistically significant?

- a. 20-29 and 30-39
- b. 30-39 and 40-49
- c. 20-29 and 40-49
- d. A and C are correct
- e. No significant differences were found between any groups

RQ5: Is there a significant difference in the mean scores of Flexibility, Strength, and Endurance within individuals across the participant sample?

14. Which statistical procedure (test) did you use to answer RQ5?

- a. Repeated-Measures ANOVA (no Sphericity correction)
- b. Repeated-Measures ANOVA (with Sphericity correction)
- c. Between-subjects Factorial ANOVA
- d. One-way ANOVA

15. **Based on the analysis you conducted to answer RQ5, which statement below is correct?**
- a. The researcher failed to reject the null hypothesis.
 - b. The researcher rejected the null hypothesis.
 - c. There is no need to check for the assumption of normality.
 - d. B and C are correct
16. **Based on the readings for this course (RandomStats Blog), the most appropriate measure of effect size for this analysis is (RQ5):**
- a. Eta-squared
 - b. Partial Eta-squared
 - c. Generalized et-squared
 - d. None of the above
17. **What does the effect size value signify?**
- a. The proportion of total variance that can be explained by the independent variable.
 - b. The total variability attributed to error.
 - c. The likelihood that the observed effects were due to chance.
 - d. None of the above.
18. **From the Tests of Sphericity, what can be inferred from the p-value of Mauchly's test?**
- a. The assumption of sphericity has not been violated.
 - b. The assumption of sphericity has been violated.
 - c. The p-value is unrelated to the assumption of sphericity.
 - d. It indicates the power of the study.
19. **If the calculated p-value is less than .001 in the post hoc comparisons, this suggests that?**
- a. There is a less than 0.1% chance that the observed differences could have occurred by chance.
 - b. There is a more than 0.1% chance that the observed differences could have occurred by chance.
 - c. The differences between the groups are not statistically significant.
 - d. The observed differences between the groups would occur 0.1% of the time.
20. **Based on the post hoc comparisons, which pair of conditions showed no significant difference after applying the appropriate correction for multiple comparisons?**
- a. Flexibility and Strength
 - b. Flexibility and Endurance
 - c. Strength and Endurance
 - d. All conditions showed significant differences

RQ6: Is there an interaction effect of age group (20-29, 30-39, 40-49) and gender (Male, Female) on the weight of participants?

21. Which statistical procedure (test) did you use to answer RQ6?
- Repeated-Measures ANOVA (no Sphericity correction)
 - Within-subjects ANOVA
 - Between-subjects Factorial ANOVA
 - Mixed Factorial ANOVA
22. What does the p-value in the ANOVA table for the Age_Group main effect tell us about the relationship between age group and weight?
- There is no main effect for age group.
 - There is a main effect for age group.
 - The main effect for age group is irrelevant since there was an interaction effect.
 - Non of the above.
23. Based on the results of Levene's test, which of the following is correct?
- The assumption of homogeneity of variances has been violated.
 - The assumption of homogeneity of variances has not been violated.
 - The assumption of homogeneity of variances is irrelevant.
 - The assumption of homogeneity of variances is ambiguous.
24. Based on the readings for this course (RandomStats Blog), the most appropriate measure of effect size for this analysis (RQ6) is:
- Eta-squared
 - Partial Eta-squared
 - Generalized et-squared
 - None of the above
25. What is the implication of the statistically significant interaction ($p < .05$) between Age_Group and Gender on weight?
- The effect of Age_Group on weight is different for different genders.
 - The effect of Age_Group on weight is the same for all genders.
 - The effect of Gender on weight is different for different age groups.
 - Both A and C are correct.
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Appendix A

Description of each variable in the dataset:

1. ParticipantID (Nominal): A unique identifier for each participant.
2. Age (Ratio): Age of the participant in years.
3. Gender (Nominal): Gender of the participant (0 = Male, 1 = Female).
4. Height (Ratio): Height of the participant in centimeters.
5. Weight (Ratio): Weight of the participant in kilograms.
6. BMI (Ratio): Body Mass Index of the participant, calculated as weight (kg) divided by height (m) squared.
7. ExerciseFrequency (Ordinal): How often the participant exercises per week (1 = Low, 2 = Moderate, 3 = High, 4 = Very High, 5 = Extremely High).
8. ExerciseDuration (Ratio): Duration of the participant's exercise session in minutes.
9. ExerciseIntensity (Ordinal): Intensity of the participant's exercise (1 = Low, 2 = Moderate, 3 = High).
10. FlexibilityScore (Ordinal): Flexibility score of the participant (1-10 scale).
11. StrengthScore (Ordinal): Strength score of the participant (1-10 scale).
12. EnduranceScore (Ordinal): Endurance score of the participant (1-10 scale).
13. Age_Group (Ordinal): Age group of the participant (Young Adult, Adult, Mature).
14. BMI_Group (Ordinal): BMI category of the participant (Underweight, Normal weight, Overweight, Obese).

Appendix B

Parametric tests	Nonparametric equivalents
1. One sample t-test	1. Wilcoxon signed-rank test
2. Independent samples t-test	2. Mann-Whitney U test
3. Paired samples t-test	3. Wilcoxon signed-rank test
4. One-way ANOVA	4. Kruskal-Wallis test
5. Repeated measures ANOVA	5. Friedman test
6. Between-subjects factorial ANOVA	6. Aligned Rank Transform (ART)