For the first three questions please open the data set on the D2L course website (included in the Data Set section of the course website) named: **Assignment1\_2022.sav**.

This data set contains 2 different measures of job satisfaction. Satisfaction with (a) the job itself, and (b) base pay, both measured on a 7-point scale from 1=not at all satisfied to 7=extremely satisfied. Three groups of employees were assessed (a) unionized workers, (b) lower and middle level managers, and (c) company executives. Employees were coded based upon sex and country.

1. Please statistically compare the mean level of satisfaction with base pay between males and females. Note it was hypothesized that males would score higher because of perceptions of systematic pay discrimination against women. This is what you should provide in order (**please use labels 1a, 1b, 1ca 1d to organize your response**):

1a. Report the t value, degrees of freedom, p-value, and whether or not you would declare statistical significance. **Use the format: t(df) = x, p< XX.** (3 points)

1b. Report the 95% confidence interval (report the values) for this analysis and explain what the interval means (3 points)

1c. Report Cohen’s d and Eta Squared for this t-test whether the test is statistically significant or not. (2 points)

1d. What conclusion might you draw from the results of the Levene’s test? (2 points).

1. 2. Perform a 2 (Country) X 2 (sex) ANOVA with satisfaction with the job as the criterion variable. **Assume there is no violation of the homogeneity of variance assumption.** This is what you should provide in order (**please use labels 2a, 2b to organize your overall response**):

2a. Report the F-test for the interaction and the Eta Squared (not partial eta squared) estimate of effect size. **Use the Format F(df1, df2) = x, p=xx, Eta Squared =** **xxx.** (2 points).

2b. Treating “Country” as the moderator, perform simple effect tests comparing males and females. Note there is an expectation that males would be more satisfied compared to females. What alpha level (Type I error) did you use for each simple test? Report the t values **using the format: t(df) = x, p= XX.** For any statistically significant t-test result report Eta Squared as your effect size estimate (8 points).

1. Create 3 age groups 22-35, 36-49, 50 and above. Run 2 orthogonal planned comparisons with the 3 age groups as a predictor of satisfaction with pay. Report the pertinent output by copying it into your exam. There is no need to explain the output. How do the results of these planned comparisons relate to the overall 1-way ANOVA comparing the 3 age groups on the pay satisfaction variable?

4. What is meant by an error/degrees of freedom trade-off when we consider running a 2-way ANOVA instead of a 1-way ANOVA with a given set of data? Does the trade-off necessarily work out in our favour such that the same main effect becomes statistically significant only in the 2-way analysis? Why or why not?

5. Assume researchers conducted a repeated-measures ANOVA on an expanded version of the data set for questions 1-2. They compared the ratings across three types of job satisfaction (the two types of satisfaction from the data set for questions 1-2) as well as a measure of satisfaction with employee benefits (not included in the data set) . Here is a selection of their output:

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| --- | --- | --- | --- | --- | --- |
| **Mauchly's Test of Sphericitya** | | | | | |
|  | | | | | |
| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. |
|
| Jsat | .996 | 1.972 | 2 | .373 |
|  | | | | | |

Please provide a critical commentary of their analysis (highlighting statements that are incorrect) from the description as follows:

“We ran a 1-way repeated measures ANOVA to determine if there are statistically significant differences in the ratings across the 3 different types of job satisfaction. An advantage of this approach is the probability of a Type 1 error is reduced due to the fact that each participant provided three data points instead of one. The Mauchly test was not statistically significant and thus we interpreted the Greenhouse-Geisser F-test results. The results are statistically significant F(2,1.9) = 83.6, p=.000, with an Eta squared of .19, suggesting that job satisfaction across the 3 types of satisfaction accounts for 19% of the variability in group membership. Post-hoc independent sample t-test results reveal that all pairwise comparisons are statistically significant at p <.05”. **Please number your criticisms as you describe them in turn. Label each criticism separately (i.e., Criticism 1, Criticism X etc.) Each criticism should be one sentence in length – two at maximum.**

6. When interpreting individuals’ scores on some measure why are standardized scores potentially beneficial compared to absolute raw scores? Why are z-scores also useful when computing and interpreting the covariance between two variables?

7. Here is an excerpt from an article published in a top scholarly journal. Do you agree with the authors’ reasoning bases upon their description of the results? Would you have recommended a different analytic approach? Why or why not?

“We were interested in examining 3 different AMAZON delivery systems to determine which one would show the fastest processing speed. We expected the third system using flying drones to significantly decrease the time it takes for customers to receive their orders compared to the other 2 systems under consideration. Accordingly, we decided the appropriate approach to take is a 1-way ANOVA test with time from order to customer receipt as the dependent variable. Results indicated a statistically significant result F(2, 322) = 6 , p=.000, Eta Squared = .03. In practical terms, this result indicates significantly faster delivery times depending on the method of delivery. However, our follow-up Tukey HSD tests failed to find any significant pairwise comparisons among the means (p > .05 for each test). This lack of significance is not easily explainable and, overall, suggests mixed support for our hypothesis.”

8. Is the following quotation correct? Why or why not? “When we conduct a t-test of group differences or a one-way ANOVA, we are concerned about the size of the SSwithin relative to the size of the SSbetween - rather than the absolute magnitude of within group variability”. Also, when we perform a 1-way ANOVA is it fair to say we are testing the null hypothesis that Eta Squared = 0 in the population? Why or why not?