“EXERCISE 36 Analysis of Variance (ANOVA)”

“Name:” _Esther Anderson, RN___________________________

“1. The researchers found a significant difference between the two groups (control and treatment) for change in mobility of the women with osteoarthritis (OA) over 12 weeks with the results of $F_{(1,22)} = 9.619, p = 0.005$. Discuss each aspect of these results.”

The F-value is high enough at the 5% level of significance to suggest a significant difference between the control and treatment groups. The p-value 0.005 < 0.05 hence this suggests a rejection of the null hypothesis, meaning that the control and treatment groups are found to be different.

“2. State the null hypothesis for the Baird and Sands (2004) study that focuses on the effect of the GI with PMR treatment on patients’ mobility level. Should the null hypothesis be rejected for the difference between the two groups in change in mobility scores over 12 weeks? Provide a rationale for your answer.”

The null hypothesis is that the mean mobility scores for both groups are the same. As stated previously, since the p-value 0.005 < 0.05 this means I reject the null hypothesis. So the mean "difficulty with mobility score" for both groups must be different.

“3. The researchers stated that the participants in the intervention group reported a reduction in mobility difficulty at week 12. Was this result statistically significant, and if so at what probability?”

Yes the result was statistically significant at probability $p < 0.001$, according to the text.
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“4. If the researchers had set the level of significance or \( \alpha = 0.01 \), would the results of \( p = 0.001 \) still be statistically significant? Provide a rationale for your answer.”

Yes this still implies statistical significance because \( 0.001 < 0.01 \)

“5. If \( F(3, 60) = 4.13, p = 0.04 \), and \( \alpha = 0.01 \), is the result statistically significant? Provide a rationale for your answer. Would the null hypothesis be accepted or rejected?”

In this case the result would not be considered statistically significant because \( 0.04 > 0.01 \). In this case I would accept the null hypothesis and conclude that there is no difference between the control and treatment groups.

“6. Can ANOVA be used to test proposed relationships or predicted correlations between variables in a single group? Provide a rationale for your answer.”

Yes this is one of the main functions of the ANOVA -- to say whether or not there exists a relationship or correlation between groups. Normally, if the p-value is less than the significance level there is a difference between the groups, and if the p-value is larger than the significance level there is no difference between the groups.
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“7. If a study had a result of $F(2, 147) = 4.56, p = 0.003$, how many groups were in the study, and what was the sample size?”

If $K = \text{number of groups in the study}$, and $df = K - 1$ then $K = df+1 = 2+1 = 3$. So there are 3 groups in the study. There are $N - K$ number of participants so $N = K+147 = 3+147 = 150$ participants.

“8. The researchers state that the sample for their study was 28 women with a diagnosis of OA, and that 18 were randomly assigned to the intervention group and 10 were randomly assigned to the control group. Discuss the study strengths and/or weaknesses in this statement.”

In my opinion, I would like to see a larger sample size. But I agree with the choice to put more participants into the intervention group rather than the control group. That is because I would be more interested in the results from the intervention group so a larger sample is appropriate, but there is still enough in the control group to play their part as well.

“9. In your opinion, have the researchers established that guided imagery (GI) with progressive muscle relaxation (PMR) reduces pain and decreases mobility difficulties in women with OA?”
I think the results are significant enough to warrant further investigation. In my opinion it may be helpful to perform a couple other similar studies done by independent groups to validate the results of the Baird & Sands group, as there is always the possibility of some bias entering the study. By performing multiple independent studies this will increase the strength of the argument that GI with PMR reduces pain and decreases mobility difficulty in women with OA.

“10. The researchers stated that this was a 12-week longitudinal, randomized clinical trial pilot study with 28 women over 65 years of age with the diagnosis of OA. What are some of the possible problems or limitations that might occur with this type of study?”

Since the study lasts for quite a long time, researches will need to be careful that those in the intervention and control groups do not find out which group they are in, as this possibility exists to a greater degree given the length of the trial. Also, a slightly larger group of women may help to validate the results to a greater extent.
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“Comments for the Instructor:”

“Instructor’s Comments:”

“Score: [Blank] / 8:”

“Grading Rubric:”