**Final Writing Assignment**

Question 4: Do two different 8-week strengthening programs (standard of care, advanced weight-bearing) have an equal effect on **knee extensor strength**, when administered 4-12 mos. post THA?

1. Alternative Hypothesis: The two different 8-week strengthening programs (standard of care and advanced weight bearing) will not have an equal effect on knee extensor strength, when administered 4-12 after THA.

Null Hypothesis: The two different 8-week strengthening programs (standard of care and advanced weight bearing) will have an equal effect on knee extensor strength, when administered 4-12 after THA.

1. The statistical test I have chosen to run on the data is a one-way analysis of variance or a one-way ANOVA because we only have two factors that need to be compared. The assumptions needed for this test are the data must come from a normal population (i.e., run a normality test on the data), homogeneity of variance must be satisfied (i.e., run a Levene’s Test), and the samples must be drawn independently.
2. My Summarized Descriptive Table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Range** | **Minimum** | **Maximum** | **Mean** | **Std. Deviation** |
| Height (cm) | 28 | 34.5 cm | 153.5 cm | 188.0 cm | 169.87 cm | 8.907 cm |
| Weight (kg) | 28 | 66.4 kg | 46.8 kg | 113.2 kg | 81.704 kg | 17.822 kg |
| Age (years-old) | 28 | 41 years-old | 36 years-old | 77 years-old | 59.54 years-old | 11.263 years-old |
| Number of Months Post Surgery | 28 | 7.5 months | 4.5 months | 12 months | 7.446 months | 2.043 months |
| Knee Extensor Strength (N-m) | 28 | 101.15 N-m | 34.79 N-m | 135.94 N-m | 82.857 N-m | 30.489 N-m |

1. One-way ANOVA test (test needed to answer hypothesis) results:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ANOVA** | | | | | |
| knee extensor strength(N-m) | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 4992.366 | 1 | 4992.366 | 6.456 | .017 |
| Within Groups | 20106.878 | 26 | 773.341 |  |  |
| Total | 25099.244 | 27 |  |  |  |

1. *P* < 0.05 at *p =* 0.017, so the ANOVA table indicates that there is a significant difference between the two 8-week strengthening programs (standard of care and advanced weight bearing) and their effects on knee extensor strength, when administered 4-12 months post THA. This means that the two different 8-week strengthening programs had an unequal effect on knee extensor strength when administered 4-12 months after THA, *F* = 6.456, *p =* 0.017, ω = 0.45.

Chart, box and whisker chart

Description automatically generated

Chart, box and whisker chart

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I chose these graphs to help portray my results because they show how the difference in treatment affected knee extensor strength 4-12 months after surgery. You can clearly see in the graphs that the two treatments had an unequal effect on knee extensor strength, as the advanced exercise seemed to, on average, strengthen the knee extensor more than the standard of care.

1. I chose to conduct a one-way ANOVA (after running descriptive statistics and normality tests on the data to make sure test assumptions for a one-way ANOVA were met, which they were) because I only had two factors to compare, and a one-way ANOVA examines the averages of two or more factors in an attempt to find statistical proof that related populations’ averages differ significantly. I knew that the test assumption of the data coming from a normal population was met because the tests of normality I ran on the data did not produce significance values that were less that the alpha level of 0.05, which also meant I did not have to perform a Kruskal-Wallis Rank Sum Test or transform the data. The test assumption of the homogeneity of variance being satisfied was confirmed through running a Levene’s Test on the data, which showed the standard of care and advanced exercise as having equal variances. The third and final assumption of the sample being independent was already met during the collecting of the data because the samples were drawn from independently of another.
2. After conducting analysis tests on the data provided, I have concluded that there is in fact an unequal effect on knee extensor strength between the two different 8-week strengthening programs of standard care and advanced exercise, when administered 4-12 months post THA. The advanced exercise strengthening program seemed to improve the strength of the knee extensor more than the standard care program within the 8 weeks of physical therapy needed after THA. Knowing this, clinics should begin to adopt the advanced exercise strengthening program over the standard care program to better improve their patients’ knee extensor strength, after having surgery on it. This will not only improve the patient’s quality of life post-surgery/physical therapy (they will hopefully be able to physically do more with the knee, and have less of a chance of needing to repeat the procedure/therapy if they have the best care given to them the first time around), but will also elevate the clinic’s status in post patient care (they will most likely have more patients not needing repeat procedures/therapy; patients will also be thankful to have greater strength in their knee extensor again, and might refer others they may know with similar issues to the practice because they had a positive experience/outcome).