1. Determine whether the data provided is appropriate for the test(s) available and that any analysis is achievable.

2. Formulate a hypothesis test to be used to compare the effectiveness of the two approaches (control, meditation) used during dental surgery.

3. Analyse the data to provide the hypothesis testing conclusion.

4. Provide descriptive statistics (graphs and tables) of the data.

5. Determine the 95% confidence interval for the population mean of each group, and the 95% confidence interval for the difference between the means of the two groups.

# Q1: Determine whether the data provided is appropriate for the test(s) available and that any analysis is achievable.

A1: The study consisted of 100 patients, using random sampling.

A group of 50 males and 50 females due for dental surgery were measured for Anxiety (GSR/Galvanic Skin Response) and Perceived pain (VNRS/verbal numerical Rating Scale), both on a scale of 0 to 10 respectively. We note that there is random sampling used. We have a control group (no meditation) and meditation (treatment) group. This means that there is an experiment, and that we can move forward to set up a Null Hypothesis. The sample size is > 30 so our Normality check is met.

We will look at the data made available to determine whether the results are appropriate to create a test and consider if any analysis is possible. A histogram with outliers? GSR and VNRS GO To R Studio

|  |  |
| --- | --- |
|  |  |

WE NEED to change these??

**Q2. Formulate a hypothesis test to be used to compare the effectiveness of the two approaches (control, meditation) used during dental surgery.**

*What will our Null Hypothesis be?*

# Null and alternative hypotheses.

**Null hypothesis:** There is no difference in the average of the two methods (Meditation & Control), which indicate the Mean difference between the two methods is equal to zero or there is no difference in means.

Let’s write our Null Hypothesis as follow:

**H0 for Males:** **μMeditationGSR = μControlGSR**

**Alternative Hypothesis:** There is a difference in average for the two methods (Meditation & Control), therefore the mean difference is not equal to zero or the two means are not equal.

**HA for males: μMeditationGSR < μControlGSR**

*Where* **μ1 represents male meditation GSR**

**And μ2 represents male Control GSR**

**H0 for Males: μMeditationGSR = μControlGSR**

**HA for Males: μMeditationGSR ≠μControlGSR**

**Q3. Analyse the data to provide the hypothesis testing conclusion.**

We separate our testing into Male and Female and focus on Male GSR difference in mean. We consider what if any differences there are between the Control and Meditation groups.

We gather details on mean, standard deviation from the sample number

|  |  |  |
| --- | --- | --- |
|  | Male Meditation GSR | Male Control GSR |
| xbar (mean) | 6.826 | 7.052 |
| s(standard Deviation) | 0.869 | 1.003 |
| n (sample number) | 23 | 23 |

Point estimate (difference of the 2 means)

Pt. Est = [6.826 -7.0521] = [-0.226]

//////

Standard Error

SE = **≈** = 0.2767

T = = T = = - 0.8167

df = min (n1 -1, n2-1)

df = min (23 -1, 23-1)

df = min (22, 22) = 22

**P value:**

Pt (q = -0.8167, df = 22) = 0.211428

The correct value for this hypothesis test with

T = -0.8167 and df = 22

Or [T] = 0.8167 and df = 22

Critical Value

# qt (p = 0.95, df = 22) = 1.71744 ≈ 1.72

Interval

Pt. Est +/- t\* x SE

= -0.226 +/- (1.72) x 0.2767

= -0.226 +/- 0.475924

= -0.226 +/- 0.48

= (-0.706, 0.254)

WE USE A DIFFERENT Formula;;;;;;;; actually no>

The standard error: SE = Sdiff/SqROOT of N/50

SE = **≈** ≈ ≈ ≈ ≈ 0.14

MeanGSR = 0.386

We can find the test statistic:

T = = 2.76

PVALUE

Confidence interval for a difference of means

**REPEAT for VNRS**

|  |  |  |
| --- | --- | --- |
|  | Male Meditation VNRS | Male Control VNRS |
| xbar (mean) |  |  |
| s(standard Deviation) |  |  |
| n (sample number) |  |  |

**VNRS:**

The sample mean difference for VNRS:

MeanVNRS = MeanMed – MeanCTRL

MeanVNRS = 8.02 - 7.78

MeanVNRS = **0.24**

So, there is a difference between the 2 means or μGSR = μVNRS, therefore H1 is true.

**How many HA are we going for?**

|  |  |  |  |
| --- | --- | --- | --- |
| **VNRS** | Meditation | Control |  |
| Mean |  |  |  |
| Std. Dev |  |  |  |
| Sampling Size | 50 | 50 |  |
| Standard Error |  |  |  |

**4. Provide descriptive statistics (graphs and tables) of the data.**