Scholarly Activity

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**Data Analysis: Hypothesis Testing**

Data analysis is recognized as the critical step of the overall research process to make better inferences about the research project. It is noteworthy to indicate that independent samples t test, dependent samples (paired samples) t test, and ANOVA are recognized as major statistical forms to characterized existing association between different variables (Creswell, 2014). This form of consideration is vital to correctly identify the trend of variables considered for the research study (Ngulube, 2019). The data set for the research project of Sun Coast Remediation is used to practically apply and analyze the statistical tests of independent samples t test, dependent samples (paired samples) t test, and ANOVA. These tests are used to determine the suitability of the hypothesis constructed by researcher for this specific project (Nickerson, 2000).

**Independent Samples *t* Test: Hypothesis Testing**

*Ho4:* There is no statistically significant difference in mean values for the DV between Group A(Prior Training Scores) and Group B (Revised Training Scores).

*Ha4:* There is a statistically significant difference in mean values for the DV between Group A (Prior Training Scores) and Group B (Revised Training Scores).

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| t-Test: Two-Sample Assuming Unequal Variances |
|  |  |  |
|  | *Group A Prior Training Scores* | *Group B Revised Training Scores* |
| Mean | 69.79032258 | 84.77419355 |
| Variance | 122.004495 | 26.96456901 |
| Observations | 62 | 62 |
| Hypothesized Mean Difference | 0 |  |
| df | 87 |  |
| t Stat | -9.666557191 |  |
| P(T<=t) one-tail | 9.69914E-16 |  |
| t Critical one-tail | 1.662557349 |  |
| P(T<=t) two-tail | 1.93983E-15 |  |
| t Critical two-tail | 1.987608282 |   |

 The central aim of conducting independent samples t test is to successfully compares the means of two independent groups to statistically determine whether population means of two groups are significantly different or not (Bakker & Wicherts, 2014). The means values for both the groups are different as this value (69.790) for group A is less than the mean value of group B (84.7741). The results for this test provides information to establish existing difference between two independent groups of prior training scores and revised training scores for the 62 observations. The alpha value for this test is set as 0.05 that is established as benchmark to determine the significance of p value (Rochon, Gondan, & Kieser, 2012). The outcomes of the study show that the mean value for Group A is lower as compare to Group B. Moreover, the results for p value of two tail also helps to identify the overall significance of the hypothesis development. The outcome for the indicator of p value shows that p value (1.939) is greater than alpha value (.05). This result clearly shows that the null hypothesis is accepted that means that there is no statistically significance difference in mean values of the DV between Group A and Group B.

**Dependent Samples (Paired Samples) *t* Test: Hypothesis Testing**

Ho5: The true mean difference between the paired samples of (Pre-Exposure) and (Post-Exposure) is equal to zero.

Ha5: The true mean difference between the paired samples of (Pre-Exposure) and (Post-Exposure) is not equal to zero.

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| t-Test: Paired Two Sample for Means |
|  |  |  |
|  | *Pre-Exposure μg/dL* | *Post-Exposure μg/dL* |
| Mean | 32.85714 | 33.28571429 |
| Variance | 150.4583 | 155.5 |
| Observations | 49 | 49 |
| Pearson Correlation | 0.992236 |  |
| Hypothesized Mean Difference | 0 |  |
| df | 48 |  |
| t Stat | -1.9298 |  |
| P(T<=t) one-tail | 0.029776 |  |
| t Critical one-tail | 1.677224 |  |
| P(T<=t) two-tail | 0.059553 |  |
| t Critical two-tail | 2.010635 |   |

 The results for this study are helpful to better determine about the mean difference of paired samples for the selected groups. The results based on the consideration of 49 observations for the paired samples of Pre-Exposure and Post-Exposure. The results for this analysis is interesting because p value for the two tail domain is equal to the level of significance (0.05). This result helps researcher to accept the null hypothesis of this study that means that the true mean value between paired samples is equals to the value of zero.

**ANOVA: Hypothesis Testing**

Ho6: Mean value for all the four groups (Air, Soil, Water, Training) is the same

Ha6: Mean value for all the four groups (Air, Soil, Water, Training) is not the same

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Anova: Single Factor |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| SUMMARY |  |  |  |  |  |  |
| *Groups* | *Count* | *Sum* | *Average* | *Variance* |  |  |
| A = Air | 20 | 178 | 8.9 | 9.357895 |  |  |
| B = Soil | 20 | 182 | 9.1 | 3.042105 |  |  |
| C = Water | 20 | 140 | 7 | 6.631579 |  |  |
| D = Training | 20 | 108 | 5.4 | 1.410526 |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| ANOVA |  |  |  |  |  |  |
| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
| Between Groups | 182.8 | 3 | 60.93333 | 11.9231 | 1.76E-06 | 2.724944 |
| Within Groups | 388.4 | 76 | 5.110526 |  |  |  |
|  |  |  |  |  |  |  |
| Total | 571.2 | 79 |   |   |   |   |

 The results of ANOVA test explicitly show that p-value (1.76) for this analysis is greater than the level of significance (0.05). This form of consideration helped to determine that null hypothesis for this analysis is accepted (Cuevas, Febrero, & Fraiman, 2004). In other words, it is established that the mean value for the groups is same.

**References**

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