**WEEK 6 TWO-WAY ANOVA BY HAND**

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ANOVA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source of variation | Bracket terms | Sum of squares | Degree of freedom | Mean square | F ratio | Critical Value |
| Comm\_pref (A) | 4807.167 | 183.167 | 2 | 91.583 | 10.420 | 3.32 |
| Job\_type (B) | 4645.778 | 21.778 | 1 | 21.778 | 2.478 | 4.17 |
| Comm\_pref & Job\_type (AB) | 4980.333 | 151.389 | 2 | 75.694 | 8.613 | 3.32 |
| Within error | 5244 | 263.667 | 30 | 8.789 |  |  |
| Total | 4624 | 620 | 35 |  |  |  |

Interpretation and conclusion

Two-way Anova was used to analyse the effect of preferred mode of communication and job type on sensitivity. The main effect of the preferred mode of communication is significant since the F ratio is *F (2,30) = 10.420, F critical = 3.32, thus F ratio > F critical = (10.420>3.32)* at alpha 0.05 level. Hence, we conclude that there is a statistically significant effect of the preferred mode of communication on Sensitivity. The main effect of the job type is insignificant since the F ratio is *F (1,30) = 2.478, F critical = 4.17, thus F ratio < F critical = (2.478<4.17)* at alpha 0.05 level. Hence, we conclude that there is no statistically significant effect of the job type on sensitivity. The interaction effects of the preferred mode of communication and job type is significant since F ratio is *F (2,30) = 8.613, F critical = 3.32, thus F ratio > F critical = (8.613>3.32)* at alpha 0.05 level. Hence, we conclude that the interaction effects of preferred mode of communication and job type is statistically significant on sensitivity.

**Appendix from SPSS**

**Univariate Analysis of Variance**

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| --- | --- | --- | --- | --- | --- |
| **Between-Subjects Factors** | | | | | |
|  | | | Value Label | N | |
| comm\_pref | | 1 | in person | 12 | |
| 2 | email | 12 | |
| 3 | texting | 12 | |
| job\_type | | 1 | admin | 18 | |
| 2 | mngmt | 18 | |
| **Levene's Test of Equality of Error Variancesa,b** | | | | | | | | | |
|  | | | | | Levene Statistic | | df1 | df2 | Sig. |
| sensitivity | Based on Mean | | | | 1,838 | | 5 | 30 | ,135 |
| Based on Median | | | | ,780 | | 5 | 30 | ,572 |
| Based on Median and with adjusted df | | | | ,780 | | 5 | 17,547 | ,577 |
| Based on trimmed mean | | | | 1,688 | | 5 | 30 | ,168 |
| Tests the null hypothesis that the error variance of the dependent variable is equal across groups. | | | | | | | | | |
| a. Dependent variable: sensitivity | | | | | | | | | |
| b. Design: Intercept + comm\_pref + job\_type + comm\_pref \* job\_type | | | | | | | | | |

Conclusion

The assumption of homogeneity of variance is valid since *F (5,30) = 1.838, p =.135*

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Tests of Between-Subjects Effects** | | | | | | | | |
| Dependent Variable: sensitivity | | | | | | | | |
| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Powerb |
| Corrected Model | 356,333a | 5 | 71,267 | 8,109 | ,000 | ,575 | 40,544 | ,998 |
| Intercept | 4624,000 | 1 | 4624,000 | 526,119 | ,000 | ,946 | 526,119 | 1,000 |
| comm\_pref | 183,167 | 2 | 91,583 | 10,420 | ,000 | ,410 | 20,841 | ,979 |
| job\_type | 21,778 | 1 | 21,778 | 2,478 | ,126 | ,076 | 2,478 | ,332 |
| comm\_pref \* job\_type | 151,389 | 2 | 75,694 | 8,613 | ,001 | ,365 | 17,225 | ,951 |
| Error | 263,667 | 30 | 8,789 |  |  |  |  |  |
| Total | 5244,000 | 36 |  |  |  |  |  |  |
| Corrected Total | 620,000 | 35 |  |  |  |  |  |  |
| a. R Squared = ,575 (Adjusted R Squared = ,504) | | | | | | | | |
| b. Computed using alpha = ,05 | | | | | | | | |

**Estimated Marginal Means**

|  |  |  |  |
| --- | --- | --- | --- |
| **Grand Mean** | | | |
| Dependent Variable: sensitivity | | | |
| Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| 11,333 | ,494 | 10,324 | 12,342 |

Simple Effect of preferred mode of communication

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| --- | --- | --- | --- | --- |
| **Between-Subjects Factors** | | | | |
| comm\_pref | | | Value Label | N |
| in person | job\_type | 1 | admin | 6 |
| 2 | mngmt | 6 |
| email | job\_type | 1 | admin | 6 |
| 2 | mngmt | 6 |
| texting | job\_type | 1 | admin | 6 |
| 2 | mngmt | 6 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Tests of Between-Subjects Effects** | | | | | | | | | |
| Dependent Variable: sensitivity | | | | | | | | | |
| comm\_pref | Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Powerb |
| in person | Corrected Model | 3,000a | 1 | 3,000 | ,208 | ,658 | ,020 | ,208 | ,070 |
| Intercept | 2523,000 | 1 | 2523,000 | 175,208 | ,000 | ,946 | 175,208 | 1,000 |
| job\_type | 3,000 | 1 | 3,000 | ,208 | ,658 | ,020 | ,208 | ,070 |
| Error | 144,000 | 10 | 14,400 |  |  |  |  |  |
| Total | 2670,000 | 12 |  |  |  |  |  |  |
| Corrected Total | 147,000 | 11 |  |  |  |  |  |  |
| email | Corrected Model | 30,083c | 1 | 30,083 | 4,788 | ,054 | ,324 | 4,788 | ,507 |
| Intercept | 1220,083 | 1 | 1220,083 | 194,178 | ,000 | ,951 | 194,178 | 1,000 |
| job\_type | 30,083 | 1 | 30,083 | 4,788 | ,054 | ,324 | 4,788 | ,507 |
| Error | 62,833 | 10 | 6,283 |  |  |  |  |  |
| Total | 1313,000 | 12 |  |  |  |  |  |  |
| Corrected Total | 92,917 | 11 |  |  |  |  |  |  |
| texting | Corrected Model | 140,083d | 1 | 140,083 | 24,648 | ,001 | ,711 | 24,648 | ,994 |
| Intercept | 1064,083 | 1 | 1064,083 | 187,229 | ,000 | ,949 | 187,229 | 1,000 |
| job\_type | 140,083 | 1 | 140,083 | 24,648 | ,001 | ,711 | 24,648 | ,994 |
| Error | 56,833 | 10 | 5,683 |  |  |  |  |  |
| Total | 1261,000 | 12 |  |  |  |  |  |  |
| Corrected Total | 196,917 | 11 |  |  |  |  |  |  |
| a. R Squared = ,020 (Adjusted R Squared = -,078) | | | | | | | | | |
| b. Computed using alpha = ,05 | | | | | | | | | |
| c. R Squared = ,324 (Adjusted R Squared = ,256) | | | | | | | | | |
| d. R Squared = ,711 (Adjusted R Squared = ,683) | | | | | | | | | |

Simple effect of Job type

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Between-Subjects Factors** | | | | | | | | | |
| job\_type | | | | | Value Label | | | N | |
| admin | | comm\_pref | | 1 | in person | | | 6 | |
| 2 | email | | | 6 | |
| 3 | texting | | | 6 | |
| mngmt | | comm\_pref | | 1 | in person | | | 6 | |
| 2 | email | | | 6 | |
| 3 | texting | | | 6 | |
| **Tests of Between-Subjects Effects** | | | | | | | | | | | | | | | | |
| Dependent Variable: sensitivity | | | | | | | | | | | | | | | | |
| job\_type | | Source | | Type III Sum of Squares | | | df | Mean Square | | F | | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Powerb |
| admin | | Corrected Model | | 131,444a | | | 2 | 65,722 | | 7,450 | | ,006 | ,498 | 14,899 | ,886 |
| Intercept | | 2640,222 | | | 1 | 2640,222 | | 299,270 | | ,000 | ,952 | 299,270 | 1,000 |
| comm\_pref | | 131,444 | | | 2 | 65,722 | | 7,450 | | ,006 | ,498 | 14,899 | ,886 |
| Error | | 132,333 | | | 15 | 8,822 | |  | |  |  |  |  |
| Total | | 2904,000 | | | 18 |  | |  | |  |  |  |  |
| Corrected Total | | 263,778 | | | 17 |  | |  | |  |  |  |  |
| mngmt | | Corrected Model | | 203,111c | | | 2 | 101,556 | | 11,599 | | ,001 | ,607 | 23,198 | ,979 |
| Intercept | | 2005,556 | | | 1 | 2005,556 | | 229,061 | | ,000 | ,939 | 229,061 | 1,000 |
| comm\_pref | | 203,111 | | | 2 | 101,556 | | 11,599 | | ,001 | ,607 | 23,198 | ,979 |
| Error | | 131,333 | | | 15 | 8,756 | |  | |  |  |  |  |
| Total | | 2340,000 | | | 18 |  | |  | |  |  |  |  |
| Corrected Total | | 334,444 | | | 17 |  | |  | |  |  |  |  |
| a. R Squared = ,498 (Adjusted R Squared = ,431) | | | | | | | | | | | | | | | | |
| b. Computed using alpha = ,05 | | | | | | | | | | | | | | | | |
| c. R Squared = ,607 (Adjusted R Squared = ,555) | | | | | | | | | | | | | | | | |