Data Analysis

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## Introduction

This report starts with descriptive statistics and then presents the results of paired t-tests and repeated measures ANOVA conducted on Likert-scale responses before and after an intervention.

### Descriptive Statistics

| question | time | count | mean | std dev | median | min | max | variance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 02 | pre | 23 | 2.09 | 1.12 | 2 | 1 | 5 | 1.26 |
| 02 | post | 23 | 1.35 | 0.65 | 1 | 1 | 3 | 0.42 |
| 03 | pre | 22 | 2.73 | 0.88 | 2 | 2 | 4 | 0.78 |
| 03 | post | 22 | 1.91 | 1.06 | 2 | 1 | 4 | 1.13 |
| 04 | pre | 23 | 4.78 | 0.42 | 5 | 4 | 5 | 0.18 |
| 04 | post | 23 | 4.48 | 0.90 | 5 | 1 | 5 | 0.81 |
| 05 | pre | 23 | 1.87 | 0.76 | 2 | 1 | 4 | 0.57 |
| 05 | post | 23 | 1.65 | 0.88 | 1 | 1 | 4 | 0.78 |
| 06 | pre | 23 | 2.00 | 0.90 | 2 | 1 | 4 | 0.82 |
| 06 | post | 23 | 1.87 | 0.92 | 2 | 1 | 4 | 0.85 |
| 08 | pre | 23 | 4.35 | 0.65 | 4 | 3 | 5 | 0.42 |
| 08 | post | 23 | 4.61 | 0.58 | 5 | 3 | 5 | 0.34 |
| 09 | pre | 23 | 4.48 | 0.51 | 4 | 4 | 5 | 0.26 |
| 09 | post | 23 | 4.52 | 0.90 | 5 | 1 | 5 | 0.81 |
| 10 | pre | 23 | 4.35 | 0.65 | 4 | 3 | 5 | 0.42 |
| 10 | post | 23 | 4.61 | 0.72 | 5 | 3 | 5 | 0.52 |
| 11 | pre | 23 | 4.78 | 0.52 | 5 | 3 | 5 | 0.27 |
| 11 | post | 23 | 4.83 | 0.39 | 5 | 4 | 5 | 0.15 |
| 12 | pre | 23 | 2.13 | 1.01 | 2 | 1 | 5 | 1.03 |
| 12 | post | 23 | 1.70 | 0.82 | 2 | 1 | 4 | 0.68 |
| 13 | pre | 23 | 3.39 | 0.89 | 3 | 1 | 5 | 0.79 |
| 13 | post | 23 | 4.35 | 0.83 | 5 | 2 | 5 | 0.69 |
| 14 | pre | 23 | 2.96 | 1.07 | 3 | 1 | 4 | 1.13 |
| 14 | post | 23 | 1.74 | 0.81 | 2 | 1 | 4 | 0.66 |
| 15 | pre | 23 | 2.52 | 1.12 | 2 | 1 | 4 | 1.26 |
| 15 | post | 23 | 2.30 | 1.06 | 2 | 1 | 4 | 1.13 |
| 17 | pre | 23 | 4.43 | 0.79 | 5 | 2 | 5 | 0.62 |
| 17 | post | 23 | 4.78 | 0.42 | 5 | 4 | 5 | 0.18 |
| 18 | pre | 23 | 3.48 | 1.08 | 4 | 2 | 5 | 1.17 |
| 18 | post | 23 | 3.87 | 1.18 | 4 | 1 | 5 | 1.39 |
| 19 | pre | 23 | 1.04 | 0.21 | 1 | 1 | 2 | 0.04 |
| 19 | post | 23 | 1.00 | 0.00 | 1 | 1 | 1 | 0.00 |
| 20 | pre | 23 | 4.00 | 0.85 | 4 | 2 | 5 | 0.73 |
| 20 | post | 23 | 4.43 | 0.79 | 5 | 2 | 5 | 0.62 |
| 21 | pre | 23 | 2.52 | 1.04 | 3 | 1 | 4 | 1.08 |
| 21 | post | 23 | 2.52 | 1.20 | 2 | 1 | 5 | 1.44 |
| 22 | pre | 23 | 4.22 | 0.74 | 4 | 3 | 5 | 0.54 |
| 22 | post | 23 | 4.78 | 0.42 | 5 | 4 | 5 | 0.18 |
| 23 | pre | 23 | 4.39 | 0.89 | 5 | 2 | 5 | 0.79 |
| 23 | post | 23 | 4.26 | 1.10 | 5 | 1 | 5 | 1.20 |

### Paired t-tests results

A paired t-test compares the mean scores between the pre-test and post-test for each question.

**Interpreting the t-value:** Magnitude: A larger absolute t-value indicates a greater difference between the means, suggesting a stronger evidence against the null hypothesis (which usually states that there is no difference between the groups).

Sign: The sign of the t-value (positive or negative) indicates the direction of the difference between the means.

Table 1: Paired t-test results

| question | t\_statistic | degrees\_freedom | p\_value |
| --- | --- | --- | --- |
| 02 | 2.55 | 22 | **0.0182** |
| 03 | 3.25 | 21 | **0.0038** |
| 04 | 1.43 | 22 | 0.1663 |
| 05 | 1.00 | 22 | 0.3282 |
| 06 | 0.48 | 22 | 0.6325 |
| 08 | -1.66 | 22 | 0.1103 |
| 09 | -0.22 | 22 | 0.8243 |
| 10 | -1.45 | 22 | 0.1619 |
| 11 | -0.44 | 22 | 0.6647 |
| 12 | 1.42 | 22 | 0.1705 |
| 13 | -4.00 | 22 | **0.0006** |
| 14 | 4.57 | 22 | **0.0002** |
| 15 | 0.69 | 22 | 0.4961 |
| 17 | -1.78 | 22 | 0.0881 |
| 18 | -1.25 | 22 | 0.2239 |
| 19 | 1.00 | 22 | 0.3282 |
| 20 | -1.93 | 22 | 0.0665 |
| 21 | 0.00 | 22 | 1.0000 |
| 22 | -3.21 | 22 | **0.0040** |
| 23 | 0.59 | 22 | 0.5602 |