# Correlations

These values of the statistics are identical to the values that would be provided by the “Frequencies” or “Descriptives” commands. See the earlier annotated output for details of how these are computed from frequency distributions. Note that they are calculated separately for each variable.

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Outcome 1 | 2.0000 | 2.44949 | 4 |
| Outcome 2 | 6.0000 | 2.44949 | 4 |

**Correlations**

| | | Outcome 1 | Outcome 2 |
|---|---|---|---|
| Outcome 1 | Pearson Correlation | 1 | .500 |
| | Sig. (2-tailed) | | .500 |
| | Sum of Squares and Cross-products | 18.000 | 9.000 |
| | Covariance | 6.000 | 3.000 |
| | N | 4 | 4 |
| Outcome 2 | Pearson Correlation | .500 | 1 |
| | Sig. (2-tailed) | .500 | |
| | Sum of Squares and Cross-products | 9.000 | 18.000 |
| | Covariance | 3.000 | 6.000 |
| | N | 4 | 4 |

*. Correlation is significant at the 0.05 level (2-tailed).

These boxes represent the conjunction of both variables and therefore present the statistics relevant to the relationship between the two variables. (Thus, the boxes are redundant.)

This “Sum of Cross Products” (SCP) is not easily determined from the summary statistics of the output, but rather from the data (and the calculations are therefore not shown here).

The “Covariance” is a function of the Sum of Cross Products and the sample size:

$$COV = \frac{SCP}{(N-1)} = \frac{9.000}{(4-1)} = 3.000$$

The “Pearson Correlation” coefficient is a function of the covariance and the standard deviations of both variables:

$$r = \frac{COV}{(SD_X)(SD_Y)} = \frac{3.000}{(2.449)(2.449)} = .500$$

Though the statistic is not shown, *t* provides the standardized statistic for testing whether the correlation differs from zero:

$$t = \frac{r}{\sqrt{(1-r^2)/(N-2)}} = \frac{.500}{\sqrt{(1-.500^2)/(4-2)}} = .816$$

The *t* statistic follows a non-normal (studentized or *t*) distribution that depends on degrees of freedom. Here, $df = N - 2 = 4 - 2 = 2$. A *t* with 2 *df* that equals .816 has a two-tailed probability (*p*) of .500, which is not a statistically significant finding.

This box presents information about the first variable that can be derived from the “Std. Deviation” above. The “Covariance” here actually represents the estimated Variance (or Mean Squares) of the variable: $MS = SD^2 = 2.44949^2 = 6.000$. The “Sum of Squares” for this variable is then found (knowing that $SS = MS \times df$) to be equal to 18.000. Finally, note that, by definition, the variable is perfectly correlated with itself ($r$ = 1.0).

This box presents information about the second variable that can be derived from the “Std. Deviation” above. The “Covariance” here actually represents the estimated Variance (or Mean Squares) of the variable: $MS = SD^2 = 2.44949^2 = 6.000$. The “Sum of Squares” for this variable is then found (knowing that $SS = MS \times df$) to be equal to 18.000. Finally, note that, by definition, the variable is perfectly correlated with itself ($r$ = 1.0).