

One Sample t Test

(Note that some aspects of this output have been rearranged for the sake of presentation!)

Descriptives

	N	Mean	Median	SD	SE
Outcome	8	4.000	4.000	3.117	1.102

These values of the one-sample statistics are identical to the values that would be provided by the "Descriptives" commands. See the earlier annotated output for details of how these are computed from frequency distributions.

The "Standard Error of the Mean" provides an estimate of how spread out the distribution of all possible random sample means would be. Here it's calculated as:

$$SE_M = \frac{SD}{\sqrt{N}} = \frac{3.117}{\sqrt{8}} = 1.102$$

One Sample T-Test

		statistic	df	p	Mean difference	Cohen's d	95% Confidence Interval	
							Lower	Upper
Outcome	Student's t	-2.722	7.000	0.030	-3.000	-.963	-5.606	-.394

Note. H_a population mean ≠ 7

The "statistic", "df", and "p" columns provide the results of the statistical significance test. First, *t* provides the standardized statistic for the mean difference:

$$t = \frac{M - \mu}{SE_M} = \frac{-3.000}{1.102} = -2.722$$

The *t* statistic follows a non-normal (studentized or *t*) distribution that depends on degrees of freedom. Here, *df* = *N* - 1 = 8 - 1 = 7. A *t* with 7 *df* that equals -2.722 has a two-tailed probability (*p*) of .030, a statistically significant finding.

The "Mean Difference" is the difference between the sample mean (*M* = 4) and the user-specified test value (*u* = 7). For the example, the sample had a mean one point higher than the test value. This raw effect size is important for the significance test, the confidence interval, and the effect size.

"Cohen's *d*" provides a standardized effect size for the difference between the two means.

$$d = \frac{M - \mu}{SD} = \frac{-3.000}{3.117} = 0.963$$

Given Cohen's heuristics for interpreting effect sizes, this would be considered a large effect.

This section provides a confidence interval around (centered on) the "Mean Difference." Calculation requires the appropriate critical value. Specifically, the *t* statistic (with 7 *df*) that has a probability of .05 equals 2.365. As a result:

$$CI_{DIFF} = M_{DIFF} \pm (t_{CRITICAL})(SE_M) = -3.000 \pm (2.365)(1.102)$$

Thus, the researcher estimates that the true population mean difference is somewhere between -5.606 and -.394 (knowing that the estimate could be incorrect).