# One Sample t Test

## Data

The following data set reflects one sample of eight individuals measured on one variable. The data are presented in a format suitable for entry into statistical software.

| | Outcome |
|---|---|
| 1 | .00 |
| 2 | .00 |
| 3 | 3.00 |
| 4 | 5.00 |
| 5 | 4.00 |
| 6 | 7.00 |
| 7 | 4.00 |
| 8 | 9.00 |

## Computer Output

The following tables represent typical output from statistical software. Options, labels, and layout vary from program to program.

The table of descriptive statistics can be used to determine the inferential statistics.

| | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Outcome | 8 | 4.000 | 3.117 | 1.102 |

The table of inferential statistics shows the key elements to be calculated.

| | t | df | p | Mean Difference | Lower CI | Upper CI | Cohen's d |
|---|---|---|---|---|---|---|---|
| Outcome | -2.722 | 7.000 | 0.030 | -3.000 | -5.606 | -.394 | -.963 |

## Calculations

Mean Difference (Raw Effect): The Mean Difference is the difference between the sample mean and a user-specified test value or population mean.

$$M - \mu = 4.000 - 7.000 = -3.000$$

Statistical Significance: The *t* statistic is the ratio of the mean difference (raw effect) to the standard error of the mean.

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

With $df = 7$, $t_{CRITICAL} = 2.365$

Because $t > t_{CRITICAL}$, $p < .05$

Effect Size: Cohen's d Statistic provides a standardized effect size for the mean difference (raw effect).

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

Confidence Interval: For this test, the appropriate confidence interval is around (centered on) the mean difference (raw effect).

$$CI_{DIFF} = (M - \mu) \pm (t_{CRITICAL})(SE_M) = -3.000 \pm (2.365)(1.102) = [-5.606, -0.394]$$

## APA Style

For this analysis, a sample mean has been compared to a user-specified test value (or a population mean). Thus, the summary and the inferential statistics focus on that difference. The first example focuses on statistical significance testing, whereas the second version includes and emphasizes interpretation of the confidence interval and effect size.

A one sample *t* test showed that the difference in Outcome scores between the current sample (*N* = 8, *M* = 4.00, *SD* = 3.12) and the hypothesized value (7.00) was statistically significant, *t*(7) = -2.72, *p* = .030.

Analyses revealed that the current sample (*N* = 8, *M* = 4.00, *SD* = 3.12) had dramatically higher Outcome scores than the hypothesized value (7.00), 95% CI [-5.61, -.39], *d* = -0.96, *t*(7) = -2.72, *p* = .030.