

## Achieved power: Correlation

Using the Software G\*Power version 3.1.9.4, the achieved power was computed to be 0.562, which is below the ideal value of 0.8. I show the calculation of the achieved power below, but in your article, you will just write:

Using the Software G\*Power version 3.1.9.4 (Faul et al., 2007), the achieved power is 0.562 which is below the ideal value of 0.8. The parameters used to compute the achieved power were a level of significance of 5%, a sample size of 17 and an effect size of 0.5 (see Cohen (1992) for a discussion on the choice of effect size). A future recommendation that a further study be conducted on this topic using a larger sample size to obtain a higher achieved power.

### References:

Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155-159.

Faul, F., Erdfelder, E., Lang, A. et al. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175–191. <https://doi.org/10.3758/BF03193146>

The screenshot shows the G\*Power software interface. The 'Test family' is set to 'Exact' and the 'Statistical test' is 'Correlation: Bivariate normal model'. The 'Type of power analysis' is 'Post hoc: Compute achieved power - given  $\alpha$ , sample size, and effect size'. The 'Input Parameters' section includes 'Tail(s)' set to 'Two', 'Determine =>' set to 'Correlation  $\rho$  H1', ' $\alpha$  err prob' set to '0.05', 'Total sample size' set to '17', and 'Correlation  $\rho$  H0' set to '0'. The 'Output Parameters' section shows 'Lower critical r' as '-0.4821460', 'Upper critical r' as '0.4821460', and 'Power (1- $\beta$  err prob)' as '0.5615184'.

Input Parameters		Output Parameters	
Tail(s)	Two	Lower critical r	-0.4821460
Determine =>	Correlation $\rho$ H1	Upper critical r	0.4821460
$\alpha$ err prob	0.05	Power (1- $\beta$ err prob)	0.5615184
Total sample size	17		
Correlation $\rho$ H0	0		

### Input parameters

#### Type of power analysis:

Post-hoc: Compute achieved power - given  $\alpha$ , sample size and effect size.

#### Tails:

We select 'Two' tails, because we look at correlations in either direction, i.e. a positive or a negative correlation.

#### Correlation $\rho$ H1:

The population correlation coefficient ( $\rho$ ) is used as the effect size measure. Cohen (1992) suggest that  $\rho$  values of 0.1, 0.3 and 0.5 represent small, medium and large effect sizes, respectively. We always, ideally, want to see a large effect size in hypothesis testing, so 0.5 was used.

$\alpha$  error probability:

This is the level of significance, i.e. the p-value which you compare all the p-values to. For your study it was selected to be 0.05.

Total sample size:

$n = 17$

Correlation  $\rho$  H0:

This is always set at zero, because the hypotheses for correlations are as follows:

H0:  $\rho = 0$  (there is not statistically significant correlation)

H1:  $\rho \neq 0$  (there is a statistically significant correlation)

If p-value < 0.05, we reject H0 and we find that there is a statistically significant correlation.

Note that the right-hand side of the equations of the hypotheses have a zero, and this is why we always set correlation  $\rho$  H0 equal to zero.