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Effect Size Calculator
A guide to using the spreadsheet

Effect Size Calculator is a Microsoft Excel spreadsheet. It runs in version 5 or later (including Office97). If you enter the mean, number of values and standard deviation for the two groups being compared, it will calculate the 'Effect Size' for the difference between them, and show this difference (and its 'confidence interval') on a graph. It will also calculate the standard 't-test' for comparing two means to see whether the difference is statistically significant.

The spreadsheet consists of two sheets: 'Calculator', in which data are entered and values calculated, and 'Graph', which plots the effect size estimate and its confidence intervals. Click on the tabs at the bottom of the screen to alternate between them.

Calculator

This sheet is divided into three sections:

I. Data Entry (columns A to G)

This section contains the cells in which data can be entered. **Do not alter the contents of any cell that is shaded.** Type only in blank cells, otherwise important formulae may be lost.

Column	Heading	Description
A	Outcome Measure	Type a short label for each outcome measure entered. The contents of cells A4 to A7 are used as the labels for the effect size estimates in the Graph.
B	Treatment group: mean	Enter the mean for the treatment group.
C	Treatment group: n	Enter the number of values in the treatment group.
D	Treatment group: SD	Enter the standard deviation of the values in the treatment group.
E	Control group: mean	Enter the mean for the control group.
F	Control group: n	Enter the number of values in the control group.
G	Control group: SD	Enter the standard deviation of the values in the control group.

2. Raw Difference (columns H to M)

This section calculates the raw difference between the two groups and the 'pooled' standard deviation, together with p-values and confidence limits for these.

Column	Heading	Description
H	Pooled standard deviation	This is the pooled estimate of standard deviation from both groups, based on the assumption that any difference between their SDs is only due to sampling variation.
I	p-value for difference in SDs	This is the 'p-value' for an F-test of whether their SDs are close enough to differ only by chance. It is the probability that a difference as big as this would have occurred if the samples were drawn from the same population. Conventionally, values less than 0.05 are taken to cast doubt on this assumption.
J	Mean Difference	This is simply the difference between the two means. If the outcome is measured on a familiar scale, this difference is interpretable as the size of the effect.
K	p-value for mean diff (2-tailed T-test)	This is the 'p-value' for a standard T-test of whether the two means are close enough to differ only by chance. It is the probability that a difference as big as this would have occurred if the samples were drawn from the same population. Conventionally, values less than 0.05 are taken to cast doubt on this assumption, ie if $p < 0.05$, the difference is unlikely to have arisen by chance and is said to be 'statistically significant'.
L	Confidence interval for difference: lower	The confidence interval is an alternative way to indicate the variability in estimates from small samples. The default calculation here is a '95% confidence interval' (other percentages can be given by changing the value in cell W10). If multiple samples of two groups of the same size as these, taken from a population in which the true difference was the value in column J, there would be variation in the differences found. However, for every 100 samples taken, for 95 of them (on average) the difference would be between the lower and upper confidence limits. The confidence interval is usually interpreted as a 'margin of uncertainty' around the estimate of the difference between experimental and control groups.
M	Confidence interval for difference: upper	

3. Standardised Effect Size (columns N to S)

This section calculates the difference between the two groups as a standardised Effect Size, corrects it for bias and computes a confidence interval.

Column	Heading	Description
N	Effect Size	This is the difference between the two means (column J), divided by the pooled estimate of standard deviation (column H). It calibrates the difference between the experimental and control groups (ie the effect of the intervention) in terms of the standard deviation.
O	Bias corrected (Hedges)	The effect size estimate is slightly biased and is therefore corrected using a factor provided by Hedges and Olkin (1985). The correction factors are stored in column AA. This corrected estimate is the one plotted in the Graph.
P	Standard Error of E.S. estimate	This is a measure of the amount the effect size estimate would vary if you repeatedly took different samples.
Q	Confidence interval for Effect Size: lower	See comments on column L, above. Again this is a 95% confidence interval; other values can be shown by changing cell W10. Upper and lower confidence limits are also shown in the Graph.
R	Confidence interval for Effect Size: upper	
S	Effect Size based on control group SD	In some cases it may not be appropriate to use a pooled estimate of standard deviation, so the control group SD is used.

The formulae to calculate these statistics have been pasted into ten rows of the spreadsheet (ie rows 4 to 13). If you want to calculate more than ten Effect Sizes, the formulae can be copied into further rows. The easiest way to do this is to first select the cells containing the bottom row with the formulae already in and the rows into which you want to paste them. For example, if you want a further five rows, click in cell H13, drag to S18 and release. Then press CTRL + D (ie hold down CTRL and press and release D).

Graph

The graph plots the Effect Size estimate (column O) and its confidence limits (columns Q and R). It uses the text in column A as a label for each Effect Size.

By default, the graph plots four Effect Sizes, corresponding to the values in rows 4 to 7. To include more (or fewer) Effect Sizes, move the pointer over one of the diamonds representing the Effect Size estimate, and click. The text

    =SERIES("Effect Size estimate",Calculator!$A$4:$A$7,Calculator!$O$4:$O$7,1)

will appear in the formula bar (towards the top of the screen). If you want only two Effect Sizes to be shown, change both the '7's into '5's (so that the values in rows 4 to 5 will be plotted) and press RETURN. Alternatively, to plot five Effect Sizes, replace the '7's with '8's. Then click on one of the Upper confidence limit points and repeat the correction, and again for the Lower confidence limit.