Effect size	Standardized mean difference
Analysis type	Multiple outcomes from same subjects
Level	Advanced

Synopsis

This analysis uses fictional data. Each study in the analysis has one set of subjects, and these subjects provide data for the impact of tutoring. Outcome is the standardized mean difference for the tutored group vs. the control group. Each study reports three outcomes – the effect size (a) for reading (b) for math (c) for music.

We use this example to show

- How to enter data for multiple outcomes within a study
- How compute a combined effect across outcomes ("What is the effect for "Achievement")
- How to compare the effect size for different outcomes ("Is the effect larger for reading than for math?")

To open a CMA file > Download and Save file | Start CMA | Open file from within CMA

Download CMA file for computers that use a period to indicate decimals Download CMA file for computers that use a comma to indicate decimals

Download this PDF Download data in Excel Download trial of CMA Start the program

- Select the option [Start a blank spreadsheet]
- Click [Ok]
- Click Insert > Column for > Study names

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The program displays this wizard

Select [Comparison of two groups...]

Select [Show all 100 formats] Click [Next]



If unsure, select the first option, which is appropriate for most analyses. You will be able to return to this panel and change the selection.

- Comparison of two groups, time-points, or exposures (includes correlations)
- Estimate of means, proportions or rates in one group at one time-point
- C Generic point estimates

C Generic point estimates, log scale

Drill down to

Click [Next]

Continuous (means) Unmatched groups, post-data only Mean, SD and sample size in each group



The program displays this wizard

Enter the following labels into the wizard

- First group > Treated
- Second group > Control

Click [Ok] and the program will copy the names into the grid

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Some (or all) studies will include data for two or more outcomes. These outcomes are based on THE SAME subjects.

The possible outcomes are Reading, Math, and Music. We will be using multiple rows for each study, and need a column that will identify the outcome for each row.

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Click Insert > Column for > Outcome names

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Rather than enter the data directly into CMA we will copy the data from Excel

- Switch to Excel and open the file "Multiple Outcomes"
- Highlight the rows and columns as shown, and press CTRL-C to copy to clipboard

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5	Hedges, 2006	Math	76	20	42	70	20	40								
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- Switch to CMA
- Click in cell Study-name 1

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- Press [CTRL-V] to paste the data
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At this point we should check that the data has been copied correctly

The column that had been called "T Mean" is now "Treated Mean". Similarly, all columns have the intended labels

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	Study name	Outcome	Treated Mean	Treated Std-Dev	Treated Sample size	Control Mean	Control Std-Dev	Control Sample size	Effect direction	Std diff in means	Std Err	Variance	Hedges's g	Γ
4	Cooper, 2008	Math	78.000	21.000	80	70.000	22.000	78						
5	Cooper, 2008	Reading	80.000	22.000	81	72.000	19.000	80						
6	Cooper, 2008	Music	82.000	22.000	81	72.000	19.000	80						
7	Hedges, 2006	Math	76.000	20.000	42	70.000	20.000	40						
8	Hedges, 2006	Reading	76.000	19.000	40	68.000	21.000	42						
9	Hedges, 2006	Music	75.000	19.000	40	68.000	21.000	42						
10	Lipsey, 2012	Math	76.000	22.000	102	72.000	22.000	88						
11	Lipsey, 2012	Reading	76.000	20.000	100	70.000	20.000	90						
12	Lipsey, 2012	Music	77.000	20.000	100	70.000	20.000	90						
13	Rothstein, 2000	Math	78.000	19.000	78	70.000	19.000	82						
14	Rothstein, 2000	Reading	78.000	22.000	80	72.000	22.000	80						
15	Rothstein, 2000	Music	79.000	22.000	80	72.000	22.000	80						
16	Wilson, 2010	Math	78.000	17.000	22	72.000	19.000	22						
17	Wilson, 2010	Reading	78.000	18.000	20	70.000	22.000	20						
18	Wilson, 2010	Music	75.000	18.000	20	70.000	22.000	20						
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Click File > Save As and save the file

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2	<u>O</u> pen	Ctrl+0	ome	Treated Mean	Treated Std-Dev	Treated Sample size	Control Mean	Control Std-Dev	Control Sample size	Effect direction	Std diff in means	Std Err	Variance	Hedges's g	St
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6	Print	Ctrl+P		75.000	19.000	40	68.000	21.000	42						
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13	Rothstein, 2000	Math	-	78.000	19.000	78	70.000	19.000	82						
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16	Wilson, 2010	Math		78.000	17.000	22	72.000	19.000	22						
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Note that the file name is now in the header.

- [Save] will over-write the prior version of this file without warning
- [Save As...] will allow you to save the file with a new name

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	Study name	Outcome	Treated Mean	Treated Std-Dev	Treated Sample size	Control Mean	Control Std-Dev	Control Sample size	Effect direction	Std diff in means	Std Err	Variance	Hedges's g
4	Cooper, 2008	Math	78.000	21.000	80	70.000	22.000	78					
5	Cooper, 2008	Reading	80.000	22.000	81	72.000	19.000	80					
6	Cooper, 2008	Music	82.000	22.000	81	72.000	19.000	80					
7	Hedges, 2006	Math	76.000	20.000	42	70.000	20.000	40					
8	Hedges, 2006	Reading	76.000	19.000	40	68.000	21.000	42					
9	Hedges, 2006	Music	75.000	19.000	40	68.000	21.000	42					
10	Lipsey, 2012	Math	76.000	22.000	102	72.000	22.000	88					
11	Lipsey, 2012	Reading	76.000	20.000	100	70.000	20.000	90					
12	Lipsey, 2012	Music	77.000	20.000	100	70.000	20.000	90					
13	Rothstein, 2000	Math	78.000	19.000	78	70.000	19.000	82					
14	Rothstein, 2000	Reading	78.000	22.000	80	72.000	22.000	80					
15	Rothstein, 2000	Music	79.000	22.000	80	72.000	22.000	80					
16	Wilson, 2010	Math	78.000	17.000	22	72.000	19.000	22					
17	Wilson, 2010	Reading	78.000	18.000	20	70.000	22.000	20					
18	Wilson, 2010	Music	75.000	18.000	20	70.000	22.000	20					
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We need to tell the program the direction for each effect size

For each study, click in the Direction column and select Auto

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	Study name	Outcome	Treated Mean	Treated Std-Dev	Treated Sample size	Control Mean	Control Std-Dev	Contr Sample	ize Eff	ect direction	Std m	l liff in eans	Std Err	Variance	Hedges's g	Std Err	Variance	Difference in means	Std Err	Variance
4	Cooper, 2008	Math	78.000	21.000	80	70.000	22.000		78 Auto	•		0.372	0.160	0.026	0.370	0.160	0.026	8.000	3.421	11.704
5	Cooper, 2008	Reading	80.000	22.000	81	72.000	19.000		80 Auto			0.389	0.159	0.025	0.387	0.158	0.025	8.000	3.241	10.507
6	Cooper, 2008	Music	82.000	22.000	81	72.000	19.000		80 Auto			0.486	0.160	0.026	0.484	0.159	0.025	10.000	3.241	10.507
7	Hedges, 2006	Math	76.000	20.000	42	70.000	20.000		40 Auto			0.300	0.222	0.049	0.297	0.220	0.048	6.000	4.419	19.524
8	Hedges, 2006	Reading	76.000	19.000	40	68.000	21.000		42 Auto			0.399	0.223	0.050	0.395	0.221	0.049	8.000	4.430	19.621
9	Hedges, 2006	Music	75.000	19.000	40	68.000	21.000		42 Auto			0.349	0.223	0.050	0.346	0.221	0.049	7.000	4.430	19.621
10	Lipsey, 2012	Math	76.000	22.000	102	72.000	22.000		88 Auto			0.182	0.146	0.021	0.181	0.145	0.021	4.000	3.201	10.245
11	Lipsey, 2012	Reading	76.000	20.000	100	70.000	20.000		90 Auto			0.300	0.146	0.021	0.299	0.146	0.021	6.000	2.906	8.444
12	Lipsey, 2012	Music	77.000	20.000	100	70.000	20.000		90 Auto			0.350	0.146	0.021	0.349	0.146	0.021	7.000	2.906	8.444
13	Rothstein, 2000	Math	78.000	19.000	78	70.000	19.000		82 Auto			0.421	0.160	0.026	0.419	0.159	0.025	8.000	3.005	9.031
14	Rothstein, 2000	Reading	78.000	22.000	80	72.000	22.000		80 Auto			0.273	0.159	0.025	0.271	0.158	0.025	6.000	3.479	12.100
15	Rothstein, 2000	Music	79.000	22.000	80	72.000	22.000		80 Auto			0.318	0.159	0.025	0.317	0.158	0.025	7.000	3.479	12.100
16	Wilson, 2010	Math	78.000	17.000	22	72.000	19.000		22 Auto			0.333	0.304	0.092	0.327	0.298	0.089	6.000	5.436	29.545
17	Wilson, 2010	Heading	78.000	18.000	20	70.000	22.000		20 Auto			0.398	0.319	0.102	0.390	0.313	0.098	8.000	6.356	40.400
18	Wilson, 2010	Music	75.000	18.000	20	70.000	22.000		20 Auto			0.249	0.317	0.101	U.244	0.311	0.097	5.000	6.356	40.400
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• Click the Merge Rows icon

The program will merge the study names for each study

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	Study name	Outcome	Treated Mean	Treated Std-Dev	Treated Sample size	Control Mean	Control Std-Dev	Control Sample size	Effect direction	Std diff in means	Std Err	Variance	Hedges's g	
4		Mat	76.000	20.000	42	70.000	20.000	40 A	vuto	0.300	0.222	0.049	0.297	
5	Hedges, 2006	Rea ting	76.000	19.000	40	68.000	21.000	42 A	uto	0.399	0.223	0.050	0.395	
6		Mus c	75.000	19.000	40	68.000	21.000	42 A	uto	0.349	0.223	0.050	0.346	
7		Math	76.000	22.000	102	72.000	22.000	88 A	vuto	0.182	0.146	0.021	0.181	
8	Lipsey, 2012	Reating	76.000	20.000	100	70.000	20.000	90 A	uto	0.300	0.146	0.021	0.299	
9		Mus c	77.000	20.000	100	70.000	20.000	90 A	vuto	0.350	0.146	0.021	0.349	
10		Mat	78.000	19.000	78	70.000	19.000	82 A	uto	0.421	0.160	0.026	0.419	
11	Rothstein, 2000	Rea ting	78.000	22.000	80	72.000	22.000	80 A	uto	0.273	0.159	0.025	0.271	
12		Mus c	79.000	22.000	80	72.000	22.000	80 A	uto	0.318	0.159	0.025	0.317	
13		Mat	78.000	17.000	22	72.000	19.000	22 A	uto	0.333	0.304	0.092	0.327	
14	Wilson, 2010	Reating	78.000	18.000	20	70.000	22.000	20 A	uto	0.398	0.319	0.102	0.390	
15		Music	75.000	18.000	20	70.000	22.000	20 A	uto	0.249	0.317	0.101	0.244	
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The screen should look like this

There are three effect sizes displayed

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	Study name	Outcome	Treated Mean	Treated Std-Dev	Treated Sample size	Control Mean	Control Std-Dev	Control Sample size Effect direction	Std diff in means	Std Err	Variance	Hedges	s's g	Std Err	Variance	Difference in means	Std Err	Variance
4		Math	76.000	20.000	42	70.000	20.000	40 Auto	0.300	0.222	0.049	0	297	0.220	0.049	000.3	4419	19.524
5 F	ledges, 2006	Reading	76.000	19.000	40	68.000	21.000	42 Auto	0.399	0.223	0.050	0	2 ↓ :	Sort A-Z			430	19.621
6		Music	75.000	19.000	40	68.000	21.000	42 Auto	0.349	0.223	0.050	0	ZI :	Sort Z-A			430	19.621
7		Math	76.000	22.000	102	72.000	22.000	88 Auto	0.182	0.146	0.021	0					201	10.245
8 L	ipsey, 2012	Reading	76.000	20.000	100	70.000	20.000	90 Auto	0.300	0.146	0.021	0	· · · ·	Column pro	operties		906	8.444
9		Music	77.000	20.000	100	70.000	20.000	90 Auto	0.350	0.146	0.021	0		Data entry a	ssistant		906	8.444
10		Math	78.000	19.000	78	70.000	19.000	82 Auto	0.421	0.160	0.026	0	~				005	9.031
11 F	Rothstein, 2000	Reading	78.000	22.000	80	72.000	22.000	80 Auto	0.273	0.159	0.025	0	2	Formulas			479	12.100
12		Music	79.000	22.000	80	72.000	22.000	80 Auto	0.318	0.159	0.025	0	000 :	Show all sel	ected indice	s	479	12.100
13		Math	78.000	17.000	22	72.000	19.000	22 Auto	0.333	0.304	0.092	0	000	Show only t	he primary	index	436	29.545
14 ∨	Vilson, 2010	Reading	78.000	18.000	20	70.000	22.000	20 Auto	0.398	0.319	0.102	0		sherr eniy t	ine printery.		356	40.400
15		Music	75.000	18.000	20	70.000	22.000	20 Auto	0.249	0.317	0.101	0	85	Set primary		dges's g	356	40.400
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- Right-click in the section for Hedges's g
- Select Set primary index to Hedges's g

• To run the analysis, click [Run analysis]

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Ч	Study name	Outcome	Treated Mean	Treated Std-Dev	Treated Sample size	Control Mean	Control Std-Dev	Control Sample size	Effect direction	Std diff in means	Std Err	Variance	Hedges's g
	4	Math	76.000	20.000	42	70.000	20.000	40	Auto	0.300	0.222	0.049	0.297
	5 Hedges, 2006	Reading	76.000	19.000	40	68.000	21.000	42	Auto	0.399	0.223	0.050	0.395
	6	Music	75.000	19.000	40	68.000	21.000	42	Auto	0.349	0.223	0.050	0.346
	7	Math	76.000	22.000	102	72.000	22.000	88	Auto	0.182	0.146	0.021	0.181
	8 Lipsey, 2012	Reading	76.000	20.000	100	70.000	20.000	90	Auto	0.300	0.146	0.021	0.299
	9	Music	77.000	20.000	100	70.000	20.000	90	Auto	0.350	0.146	0.021	0.349
	10	Math	78.000	19.000	78	70.000	19.000	82	Auto	0.421	0.160	0.026	0.419
	11 Rothstein, 2000	Reading	78.000	22.000	80	72.000	22.000	80	Auto	0.273	0.159	0.025	0.271
	12	Music	79.000	22.000	80	72.000	22.000	80	Auto	0.318	0.159	0.025	0.317
	13	Math	78.000	17.000	22	72.000	19.000	22	Auto	0.333	0.304	0.092	0.327
	14 Wilson, 2010	Reading	78.000	18.000	20	70.000	22.000	20	Auto	0.398	0.319	0.102	0.390
	15	Music	75.000	18.000	20	70.000	22.000	20	Auto	0.249	0.317	0.101	0.244
	16												
	17												

The issue we need to address when working with multiple outcomes is the fact that the outcomes are not independent of each other, and therefore do not contain independent information

If we compute an effect size for math only, or for reading only, or for math and reading separately, the effect size and its variance are valid. But, if we compute an effect size based on math and reading, a variance that is based on the combined sample size (counting each subject once for math and again for reading) overstates the amount of information contained in the data, over-estimates the precision of the summary effect and under-estimates the variance.

We can see how this plays out in the analyses that follow.

By default the program picks one outcome for each study. Since each study had a row for math, the program is showing an analysis for Math only.

<u>F</u> ile <u>E</u> dit	Format <u>V</u> iew Co	mputational o	ptions Anal	yses <u>H</u> elp											
← Data en	try t⊒ Next ta	ble 井	High resolutio	n plot 🛛 🔁	Select by	+ Effect	measure: Std	I diff in means	• • 🗏 🗖		E E	😲 🗘			
Model	Study name	Outcome			Statis	stics for each	study				Std diff	in means and §	95% CI		
			Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00	
	Cooper, 2008	Math	0.372	0.160	0.026	0.058	0.687	2.318	0.020				-		
	Hedges, 2006	Math	0.300	0.222	0.049	-0.135	0.735	1.350	0.177				-		
	Lipsey, 2012	Math	0.182	0.146	0.021	-0.104	0.468	1.247	0.212			+			
	Rothstein, 2000	Math	0.421	0.160	0.026	0.108	0.734	2.633	0.008				-		
	Wilson, 2010	Math	0.333	0.304	0.092	-0.262	0.928	1.096	0.273						
ixed			0.315	0.080	0.006	0.158	0.472	3.935	0.000						

We can run an analysis for math only (that is, selecting math for studies that report an effect size for math, and omitting studies that do not)

Right-click on the Outcome column and click [Select by outcome]

🕂 Compre	hensive meta analys	is - [An	alysis	5]												
<u>F</u> ile <u>E</u> dit	F <u>o</u> rmat <u>V</u> iew Con	nputati	onal o	options Ana	lyses <u>H</u> elp											
🔶 Data er	ntry t⊒ Next tab	ole	#	- High resolutio	n plot 🛛 🔁	Select by	+ Effect	measure: Sto	I diff in means	• • 🗐 🛛		‡E. ₹	🖓 🖞			
Model	Study name	Outo	:ome			Statis	tics for each	study				Std diff	in means and 9	15% CI		
				Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00	
	Cooper, 2008	Math		0.372	0.160	0.026	0.058	0.687	2.318	0.020				-		
	Hedges, 2006	Math		0.300	0.222	0.049	-0.135	0.735	1.350	0.177			++-	-		
	Lipsey, 2012	Math		0.182	0.146	0.021	-0.104	0.468	1.247	0.212			++			
	Rothstein, 2000	Math	41	Sort Lo-Hi h	v Outcome	0.026	0.108	0.734	2.633	0.008				-		
	Wilson, 2010	Math	21			0.092	-0.262	0.928	1.096	0.273						
Fixed			Āŧ	Sort HI-Lo b	y Outcome	0.006	0.158	0.472	3.935	0.000						
			P	Select by Ou	itcome											
			.00	Set de simal		1										
				Set decimal:	•	-										
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1																

Select Math

T Compre	hensive meta analys	is - [Analysis]]		
<u>F</u> ile <u>E</u> dit	Format <u>V</u> iew Con	nputational c	ptions Analys	es <u>H</u> e	elp
+ Data en	try t⊒ Next tab	ile 井	High resolution p	plot	🔁 Select by 🕇 🕂 Effect measure: Std diff in means 🚽 🗐 🔲 🔡 🎞 🌐 🔛 📮 👌 😲
Model	Study name	Outcome	Std diff in S means	Standa	Statistics for each study Statistics for each study Statistics for each study Statistics for each study O O O O O O O O O O O O O O O O O O O
	Cooper, 2008 Hedges, 2006 Lipsey, 2012 Rothstein, 2000	Math Math Math Math	0.372 0.300 0.182 0.421	0 0 0	Include the following outcomes
	Wilson, 2010	Math	0.333	0	Math
Fixed R8	andom Both models				For studies with multiple outcomes Use the mean of the selected outcomes Use all of the selected outcomes, assuming independence Use the first outcome, based on this sequence Math Move up Move down Cancel Apply Dk
Fixed Ra	andom Both models		lative analusio	ماج 🗋	u datione
Dasic stat	s one study removi	ea Lumu	llauve analysis	Laic	

The program shows an analysis for Math.

Note that the variance for the summary effect is 0.006

🕂 Compre	hensive meta analysi	s - [Analysis]												
<u>F</u> ile <u>E</u> dit	Format <u>V</u> iew Com	putational o	ptions Ana	lyses <u>H</u> elp											
🔶 Data en	try t⊒ Next tab	le 井	High resolution	n plot 🛛 🔁	Select by	+ Effect	measure: Sto	I diff in means	• 🔳 🗖] 🔡 🎞	‡ ⊑ ₹	0 1			
Model	Study name	Outcome			Statis	stics for each	study				Std dif	if in means and 9	5% CI		
			Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00	
	Cooper, 2008 Hedges, 2006 Lipsey, 2012 Rothstein, 2000 Wilson, 2010	Math Math Math Math Math	0.372 0.300 0.182 0.421 0.333	0.160 0.222 0.146 0.160 0.304	0.026 0.049 0.021 0.026 0.092	0.058 -0.135 -0.104 0.108 -0.262	0.687 0.735 0.468 0.734 0.928	2.318 1.350 1.247 2.633 1.096	0.020 0.177 0.212 0.008 0.273				- - -		
Random			0.315	0.080	0.006	0.158	0.472	3.935	0.000			+			
Fixed Ra	ndom Both models														
Basic stat	s One study remove	ed Cumu	lative analysis	Calculat	ions	,									

Follow the same steps to run an analysis for Reading

Note that the variance for the summary effect is 0.006

🕂 Compre	hensive meta analysi	is - [Analysis]												
<u>F</u> ile <u>E</u> dit	F <u>o</u> rmat <u>V</u> iew Com	nputational o	options Ana	lyses <u>H</u> elp											
+ Data en	try t⊐ Next tab	le 井	High resolutio	n plot 🛛 🔁	Select by	+ Effect	measure: Sto	l diff in means	- 🔳 🗌		‡ ⊑ ₹	🜔 👔			
Model	Study name	Outcome			Stati	stics for each	study				Std diff	f in means and 95%	K CI		
			Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p.Value	-2.00	-1.00	0.00	1.00	2.00	
	Cooper, 2008 Hedges, 2006 Lipsey, 2012 Rothstein, 2000 Wilson, 2010	Reading Reading Reading Reading Reading	0.389 0.399 0.300 0.273 0.398	0.159 0.223 0.146 0.159 0.319	0.025 0.050 0.021 0.025 0.102	0.077 -0.038 0.014 -0.039 -0.228	0.701 0.836 0.586 0.584 1.024	2.445 1.788 2.053 1.717 1.246	0.014 0.074 0.040 0.086 0.213				-		
Random		-	0.335	0.080	0.006	0.178	0.492	4.177	0.000			-+-			
Fixed Ra	ndom Both models														
Basic stat	s One study remove	ed Cumu	ulative analysis	Calcula	tions										

Suppose we want to run an analysis for math and for reading

- Check Math
- Check Reading
- Uncheck Music
- Select Use all of the selected outcomes, assuming independence

As we shall see momentarily, this analysis, which includes information from both math and reading, is incorrect. We need to split this into two separate analyses.

👬 Compre	hensive meta	a analysis - [Analy	sis]						
<u>F</u> ile <u>E</u> dit	F <u>o</u> rmat <u>V</u> ie	w Computationa	al options A	nalyses <u>H</u> e	lp				
🔶 Data en	itry t∓	Next table	🕂 High resol	ution plot	Select by	+ Effe	ect measure: s	Std diff in m	neans - 🗐 🔲 🏥 🏗 🌲 🕒 🏌 🔍
Model	Study name	Outcome			Stati	stics for each	study		Std diff in means and 95% Cl
			Std diff in	Standard	Variance	Lower limit	Upper limit	Z-Value	Select by
	Cooper,	Math	0.372	0.160	0.026	0.058	0.687	2.31	Chulina Buthanna Madarita
	Cooper,	Reading	0.389	0.159	0.025	0.077	0.701	2.44	
	Hedges,	Math	0.300	0.222	0.049	-0.135	0.735	1.35	i Include the following outcomes
	Hedges,	Reading	0.399	0.223	0.050	-0.038	0.836	1.78	s []
	Lipsey,	Math	0.182	0.146	0.021	-0.104	0.468	1.24	Math Select all
	Lipsey, Diathatain	Reading	0.300	0.145	0.021	0.014	0.586	2.05	Music Clear all
	Rothstein	Reading	0.421	0.160	0.026	.0.100	0.734	2.03	Reading
	Wilson.	Math	0.333	0.304	0.023	-0.262	0.928	1.09	
	Wilson,	Reading	0.398	0.319	0.102	-0.228	1.024	1.24	4
Fixed			0.325	0.057	0.003	0.214	0.436	5.73	
									For studies with multiple outcomes Use the mean of the selected outcomes Use all of the selected outcomes, assuming independence Use the first outcome, based on this sequence Cancel Apply Ok

Basic stats One study removed Cumulative analysis Calculations

Select Computationa	l options >	Mixed and	random	effects	options
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🕂 Compre	hensive met	a analysis - [Analy	sis]												
<u>F</u> ile <u>E</u> dit	F <u>o</u> rmat <u>V</u> ie	ew Computation	al options Anal	yses <u>H</u> elp											
+ Data en	try t7	Ne + Effect me	asure	+	elect by	🕇 🕂 Effe	ct measure:	Std diff in me	ans 🔹 🔳		3 E -	E 🚹 🔍			
Model	Study name	[] CI Level 9	95%	•	Statis	stics for each	shurlu				Std dif	fin means and	95% CI		
		Select by									010 0				
		Group by			ariance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00	
	Cooper,	M. Compare	aroups		0.026	0.058	0.687	2.318	0.020			+-	-		
	Cooper,	Re 🔽 🗖	5		0.025	0.077	0.701	2.445	0.014				-		
	Hedges,	M. L IVIXED an	d random effect	s options	0.049	-0.135	0.735	1.350	0.177				-		
	Hedges,	Reading	0.399	0.225\$	0.050	-0.038	0.836	1.788	0.074			+-+	-		
	Lipsey,	Math	0.182	0.146	0.021	-0.104	0.468	1.247	0.212			++			
	Lipsey,	Reading	0.300	0.146	0.021	0.014	0.586	2.053	0.040				-		
	Rothstein,	Math	0.421	0.160	0.026	0.108	0.734	2.633	0.008				-		
	Rothstein,	Reading	0.273	0.159	0.025	-0.039	0.584	1.717	0.086			++-	-		
	Wilson,	Math	0.333	0.304	0.092	-0.262	0.928	1.096	0.273			-+			
	Wilson,	Reading	0.398	0.319	0.102	-0.228	1.024	1.246	0.213			+++			
Random			0.325	0.057	0.003	0.214	0.436	5,736	0.000						

Select "Do not assume a common among-study variance"

- Data ei	itry t∓	Next table	High resolu	ition plot	Select by	+ Effe	ct measure: \$	Std diff in me	neans YE L == ↓↓ ∓ E -E 3 Q
Model	Study name	Outcome			Statis	tics for each :	study		Std diff in means and 95% Cl
			Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	
	Cooper,	Math	0.372	0.160	0.026	0.058	0.687	2.318	Mixed and random effects options
	Cooper,	Reading	0.389	0.159	0.025	0.077	0.701	2.445	5
	Hedges,	Math	0.300	0.222	0.049	-0.135	0.735	1.350	Combining studies within a subgroup
	Hedges,	Reading	0.399	0.223	0.050	-0.038	0.836	1.788	
	Lipsey,	Math	0.182	0.146	0.021	-0.104	0.468	1.247	Assume a common among-study variance component across subgroups
	Lipsey,	Reading	0.300	0.146	0.021	0.014	0.586	2.053	(pool within-group estimates of tau-squared).
	Rothstein,	Math	0.421	0.160	0.026	0.108	0.734	2.633	
	Rothstein,	Reading	0.273	0.159	0.025	-0.039	0.584	1.717	Do not assume a common among-study variance component across subgroups (do
	Wilson,	Math	0.333	0.304	0.092	-0.262	0.928	1.096	inot pool within-group estimates of tau-squared). This is the option used by RevMan.
	Wilson,	Reading	0.398	0.319	0.102	-0.228	1.024	1.246	6
andom			0.325	0.057	0.003	0.214	0.436	5.736	· · · · · · · · · · · · · · · · · · ·
								_	Combining subgroups to yield an overall effect
								_	Combine subgroups using fixed effect model
									C Combine subgroups using random effects model
								_	
								_	Cancel Apply Ok

Select Computational options > Group by > Outcome

Leave the two check-boxes unchecked

t Compre	hensive met	a analysis - [Analy	sis]													
<u>F</u> ile <u>E</u> dit	F <u>o</u> rmat <u>V</u> ie	ew Computation	al options	Analyses	<u>H</u> elp											
🔶 Data en	itry t7	Ne + Effect me	asure		•	elect by .	🕇 🕂 Effe	ect measure:	Std diff in mea	ans 📲		1 ₽ E ₹	0 1			
Model	Study name	[] CI Level 9	95%			Statis	tics for each	study				Std diff i	in means and 95	5% CI		
		Select by				ariance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00	
	Cooper	Group by	·			0.026	0.059	0.697	2 210	0.020	1	1				
	Cooper,	Be	groups			0.025	0.030	0.701	2.445	0.014						
	Hedges,	M. S Mixed an	d random	effects op	tions	0.049	-0.135	0.735	1.350	0.177			+	-		
	Hedges,	Reading	0.3	99 C).223	0.050	-0.038	0.836	1.788	0.074				-		
	Lipsey,	Math	0.1	82 0	0.146	0.021	-0.104	0.468	1.247	0.212			+			
	Lipsey,	Reading	0.3	00 (21	0.146	0.021	0.014	0.586	2.053	0.040						
	Hothstein,	Math	0.4	21 U 70 O	J.160 150	0.026	0.108	0.734	2.633	0.008				-		
	noinsiein, Míleon	n eading Misth	0.2	73 U 22 D	1.103	0.020	-0.033	0.004	1.717	0.000				_		
	Wilson	Beading	0.3	98 C	1319	0.032	-0.202	1 024	1.030	0.273						
Fixed	willouri,	ricdding	0.3	25 0	1.057	0.003	0.214	0.436	5,736	0.000			-			
Compret	nensive meta	analysis - [Analysis]	ntions Arr	alwaa List	-											
<u>File</u> Edit	Format View	Computational o	ptions Ana	aiyses <u>H</u> el	р											
 Data ent 	ry t구 N	lext table 🕀	High resoluti	ion plot	Select t	oy +	Effect meas	ure: Std diff in	means 🔻]‡E.	1 🕄				
Model	Study name	Outcome	Std diff in	Standard	Sta	atistics for	each study	5	- Mahar	2.00	Std d	iff in means and 9	100	2.00		
	Course a	4-11-	means	error	valiance				p-value	-2.00	-1.00	0.00	1.00	2.00		
	Cooper, r	Reading	0.372	0.160	0.02	26 U 25 D	1.058 U 1.077 D	0.687 Z.3 0.701 2.4	45 0.02	4			_			
	Hedges, N	lath	0.300	0.222	0.04	49 -0	.135 C).735 1.3	50 0.17	7			-			
	Hedges, F	Reading	0.399	0.223	0.05	50 -0	.038 0	0.836 1.7	88 0.07	4			-			
	Lipsey, N	dath .	0.182	0.146	0.02	21 -0).104 C	0.468 1.2	47 0.21	2		++		_		
	Lipsey, F	Reading	0.300	0.146	0.02	21 C).014 C).586 2.P	Group b	y						
	Rothstein, F	Reading	0.421	0.160	0.02	26 U 25 -0	1.108 U 1.039 D	0.734 Z. 1584 11	~ ·	,						
	Wilson, N	lath	0.333	0.304	0.09	-0 -0 92 -0).262 C	.928 1.	Run a se	parate analy	sis for each	n level of				
	Wilson, F	Reading	0.398	0.319	0.10	02 -0	.228 1	.024 1.:								
Fixed			0.325	0.057	0.00	03 ().214 0	0.436 5.1	Outcome			•				
									Also ru	in analysis acro:	ss levels of ou	utcome				
										are effect at diffe	erent levels of	outcome				
														— II.		
											Cancel	Rese	et O	k 🔤		
								L.		_	_					

🕂 Compre	hensive met	a analysis -	[Analysis]													
<u>F</u> ile <u>E</u> dit	Format Vie	ew Comput	ational options A	nalyses <u>H</u>	elp											
🔶 Data en	itry t∓	Next table	井 High resol	lution plot	🔁 Select by .	🕇 🕂 Effe	ect measure:	Std diff in me	ans 🛛 🔳] ≇ E _	t 👔 🗘				
Model	Group by Outcome	Study name	Outcome			Stati	stics for each	study				Std dif	f in means and 9	5% CI		
				Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00	
	Math Cooper, Math 0.372 0.160 0.026 0.058 0.687 2.318 0.020 Math Looper, Math 0.372 0.160 0.026 0.058 0.687 2.318 0.020															
1	Math Cooper, Math 0.372 0.160 0.026 0.058 0.687 2.318 0.020 Math Hedges, Math 0.300 0.222 0.049 -0.135 0.735 1.350 0.177															
	Math	Lipsey,	Math	0.182	2 0.146	0.021	-0.104	0.468	1.247	0.212			++			
1	Math	Rothstein,	Math	0.421	0.160	0.026	0.108	0.734	2.633	0.008				-		
1	Math	Wilson,	Math	0.333	3 0.304	0.092	-0.262	0.928	1.096	0.273			++			
Random	Math			0.315	5 0.080	0.006	0.158	0.472	3.935	0.000						
	Reading	Cooper,	Reading	0.389	9 0.159	0.025	0.077	0.701	2.445	0.014						
1	Reading	Hedges,	Reading	0.399	9 0.223	0.050	-0.038	0.836	1.788	0.074			+	-		
1	Reading	Lipsey,	Reading	0.300	0.146	0.021	0.014	0.586	2.053	0.040						
1	Reading	Rothstein,	Reading	0.273	3 0.159	0.025	-0.039	0.584	1.717	0.086			<u></u>			
1	Reading	Wilson,	Reading	0.398	3 0.319	0.102	-0.228	1.024	1.246	0.213				_		
Random	Reading			0.335	5 0.080	0.006	0.178	0.492	4.177	0.000						

The analysis for math is the same as the one we saw before, with a variance of 0.006 The analysis for reading is the same as the one we saw before, with a variance of 0.006

Each of these analyses is valid, as the variance is based on the actual number of students in the studies.

However, consider what happens if we also compute an overall effect size

Click Computational options > Group by

Add a check-mark as shown

🕂 Compre	hensive met	a analysis -	[Analysis]											_		
<u>F</u> ile <u>E</u> dit	F <u>o</u> rmat <u>V</u> ie	ew Comput	tational options A	Analyses <u>H</u> e	elp											
+ Data er	try t구	Next table	井 High reso	lution plot	Belect by	+ Effe	ect measure:	Std diff in me	ans 🔹 🔳] ‡ E	2 👔 🗜	3			
Model	Group by Outcome	Study name	Outcome			Stati	stics for each	study				Std o	liff in means and	1 95% CI		
				Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	0 -1.00	0.00	1.00	2.00	
	Math Math Math Math	Cooper, Hedges, Lipsey, Bothstein	Math Math Math Math	0.372 0.300 0.182 0.421	0.160 0.222 0.146 0.160	0.026 0.049 0.021 0.026	0.058 -0.135 -0.104 0.108	0.687 0.735 0.468 0.734	2.318 1.350 1.247 2.633	0.020 0.177 0.212 0.008				_		
Bandom	Math	Wilson,	Math	0.333	0.304	0.092	-0.262	0.928	1.096	0.273						
	Reading Reading Reading Reading Reading	Cooper, Hedges, Lipsey, Rothstein, Wilson,	Reading Reading Reading Reading Reading	0.389 0.399 0.300 0.273 0.398	0.159 0.223 0.146 0.159 0.319	0.025 0.050 0.021 0.025 0.102	0.077 -0.038 0.014 -0.039 -0.228	0.1 C 0.1 0.1 0.1	Bun a sepa	 arate analys	sis for e	ach level of				
Random	Reading	WING I,		0.335	0.080	0.006	0.178	0.	Compare	analysis acros	s levels c rent leve Car	ls of outcome	Reset	Ok		

🕂 Compre	hensive met	a analysis - [[Analysis]													
<u>F</u> ile <u>E</u> dit	Format <u>V</u> ie	w Comput	ational options A	nalyses <u>H</u> e	elp											
🔶 Data er	ntry t∓	Next table	井 High resol	ution plot	Select by .	🕂 Effe	ect measure:	Std diff in mea	ans 🛛 🔳] ∄ E -	E 🚹 🔍				
Model	Group by Outcome	Study name	Outcome			Stati	stics for each	study				Std diff	in means and 95	% CI		
				Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00	
	Math Math Math	Cooper, Hedges, Lipsey,	Math Math Math	0.372 0.300 0.182	0.160 0.222 0.146	0.026 0.049 0.021	0.058 -0.135 -0.104	0.687 0.735 0.468	2.318 1.350 1.247	0.020 0.177 0.212			++-			
	Math	Wilson,	Math	0.421	0.160	0.026	-0.262	0.734	2.633	0.008				_		
Handom	Math Reading Reading Reading Reading Reading	Cooper, Hedges, Lipsey, Rothstein, Wilson,	Reading Reading Reading Reading Reading	0.315 0.389 0.399 0.300 0.273 0.398	0.080 0.159 0.223 0.146 0.159 0.319	0.006 0.025 0.050 0.021 0.025 0.102	0.158 0.077 •0.038 0.014 •0.039 •0.228	0.472 0.701 0.836 0.586 0.584 1.024	3.935 2.445 1.788 2.053 1.717 1.246	0.000 0.014 0.074 0.040 0.086 0.213						
Random Random	Reading Overall			0.335	0.080	0.006	0.178	0.492	4.177 5.736	0.000			+			
											I					

The program now computes the overall effect size. Where the variance for reading was 0.006 and the variance for math was 0.006, the variance for the overall effect is shown as 0.003.

This would be the correct value if the math studies and the reading studies were based on different sets of students, and (it follows) the correlation between the two effect sizes was zero. Indeed, this is the assumption that we made when we said "Assuming independence". However, it's very unlikely that this assumption is valid. To the extent that the true correlation us greater than 0.0, the information provided by math will overlap with the information provided by reading, and the true variance will be greater than 0.003. In the extreme, if the actual correlation is 1.0, the true variance will be 0.006.

As we see here, when we assume independence the program assumes the correlation between effect sizes for math and reading is 0.0. We can also tell the program NOT to treat these as independent, but rather to compute a composite score for each study (using the mean of math and reading), assuming that the correlation between them is 1.0.

First, turn off grouping

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	Hedges,	Math	0.300	0.222	0.049	-0.135	0.735	1.350	0.177				-			
	Hedges,	Reading	0.399	0.223	0.050	-0.038	0.836	1.788	0.074				_			
	Lipsey,	Math	0.182	0.146	0.021	-0.104	0.468	1.247	0.212			+				
	Lipsey,	Reading	0.300	0.146	0.021	0.014	0.586	2.053	0.040			_ ⊢ +-	-			
1	Rothstein,	Math	0.421	0.160	0.026	0.108	0.734	2.633	0.008			+	-			
	Rothstein,	Reading	0.273	0.159	0.025	-0.039	0.584	1.717	0.086			+++	-			
	Wilson,	Math	0.333	0.304	0.092	-0.262	0.928	1.096	0.273							
1	Wilson,	Reading	0.398	0.319	0.102	-0.228	1.024	1.246	0.213							
Random			0.325	0.057	0.003	0.214	0.436	5.736	0.000			+				
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We see that the variance, based on a correlation of zero between effects for math and effects for reading, is still 0.003

Click Select by Outcome

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Check math Check reading Un-check Music

Select Use the mean of the selected outcomes

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	Wilson,	Math	0.333	0.304	0.092	-0.262	0.928	1.096	0.273								
	Wilson,	Reading	0.398	0.319	0.102	-0.228	1.024	1.246	0.213								
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	Lipsey,	Combined	0.241	0.146	0.021	-0.045	0.527	1.651	0.099			++-			
	Rothstein,	Combined	0.347	0.159	0.025	0.035	0.659	2.177	0.030				·		
1	Wilson,	Combined	0.365	0.312	0.097	-0.245	0.976	1.173	0.241			+++	_		
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	Hedges, 2006 Lipson, 2012	Combined	0.350	0.223	0.050	-0.087	0.786	1.570	0.116				_			
	Rothstein, 2000	Combined	0.241	0.140	0.021	0.045	0.527	2.177	0.030				_			
	Wilson, 2010	Combined	0.365	0.312	0.097	-0.245	0.976	1.173	0.241							
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- > The program computes a composite score for each study using the mean of reading and math
- The program assumes that the correlation between reading and math is 1.0, and so the variance of the composite is the same as the variance of either outcome alone
- > Therefore, the variance of the summary score is still 0.006

In sum,

If we tell the program to treat effect size for math and reading as independent, the program assumes the correlation between them is 0, which over-estimates the precision of the summary effect (since the correlation is probably higher than 0).

If we tell the program to form a composite for math and reading, the program assumes the correlation between them is 1.0, which under-estimates the precision of the summary effect (since the correlation is probably less than 1.0).

Between the two, it's probably better to use the composite approach. This could be considered the more conservative approach in the sense that it under-estimates the precision.

Also, this approach is likely to yield a pretty good estimate of the correct variance if most studies contribute only one effect size (and a few contribute two), and/or the actual correlation is near 1.0. For example, this would be the case if the different outcomes are scores on various math tests, where some schools use A, others B, others C, others A and B, others B and C, and so on.

However, there are cases where we want to get the most precise estimate possible for the variance. And, if studies contribute more than two effects and we treat the correlation as 1.0, we will be seriously underestimating the precision of the summary effect size.

In these cases we can step outside CMA, compute composite effects with a variance based on any correlation, and then copy these values back into CMA

While we may not know the actual correlation, this process allows us to use correlations that are more plausible than 0 or 1. For example, if we expect that the correlation falls in the range of 0.50 to 0.80 we may elect to use 0.80 (which yields the highest estimate of the variance), or perhaps 0.75 (which is near the upper end of the range.

The procedure for computing the composite score and variance is as follows

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8		Cooper	0.370312	0.026	0.159722		2	0.427	0.025	0.159	0.013	Coop	ber 0.427	0.013	
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11		Hedges	0.297179	0.048	0.220078		2	0.322	0.049	0.220	0.024	Hedg	ges 0.322	0.024	
12			0.345845	0.049	0.220511										
13															
14		Lipsey	0.181092	0.021	0.145207		2	0.265	0.021	0.146	0.011	Lipse	≥y 0.265	0.011	
15			0.348602	0.021	0.145817										
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17		Rothstein	0.419051	0.025	0.159145		2	0.368	0.025	0.159	0.013	Roth	stein 0.368	0.013	
18			0.316669	0.025	0.158355										
19															
20		Wilson	0.326841	0.089	0.298138		2	0.285	0.093	0.305	0.046	Wils	on 0.285	0.046	
21			0.243817	0.097	0.311142										
22															

Open the spreadsheet Computing composite score and variance

- Enter the correlation between the two effect sizes in cell D2 (Here, 0.0)
- Copy the effect size and variance for each study from CMA to Excel, in columns C and D
- Start a new spreadsheet in CMA and copy the data from columns N and O

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5	5 Wilson	0.285	0.046			Auto			0.285	0.046					
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l			Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00	
E		Cooper	0.427	0.114	0.013	0.204	0.650	3.745	0.000				-		
L		Hedges	0.322	0.155	0.024	0.018	0.626	2.079	0.038				-		
L		Lipsey	0.265	0.105	0.011	0.059	0.471	2.527	0.012						
L		Rothstein	0.368	0.114	0.013	0.145	0.591	3.228	0.001				.		
L		Wilson	0.285	0.214	0.046	-0.135	0.705	1.329	0.184				-		
F	Random		0.340	0.057	0.003	0.229	0.452	5.973	0.000			+			
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Here, the correlation was 0.0 and the variance is 0.003

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8		Cooper	0.370312	0.026	0.159722		2	0.427	0.025	0.159	0.025	Coop	er 0.42	0.025		
9			0.483984	0.025	0.159182											
10																
11		Hedges	0.297179	0.048	0.220078		2	0.322	0.049	0.220	0.049	Hedg	es 0.322	2 0.049		
12			0.345845	0.049	0.220511											
13																
14		Lipsey	0.181092	0.021	0.145207		2	0.265	0.021	0.146	0.021	Lipse	y 0.265	0.021		
15			0.348602	0.021	0.145817											
16				0.005				0.050	0.005	0.450	0.005			0.005		
1/		Rothstein	0.419051	0.025	0.159145		2	0.368	0.025	0.159	0.025	Roths	stein 0.368	, 0.025		
18			0.316669	0.025	0.158355											
19		Milese	0.226041	0.000	0.000100		2	0.205	0.000	0.205	0.000	14/1		0.000		
20		wiison	0.326841	0.089	0.298138		2	0.285	0.093	0.305	0.093	vviiso	0.28	0.093		
21			0.243817	0.097	0.311142											
22																

Open the spreadsheet Computing composite score and variance

- Enter the correlation between the two effect sizes in cell D2 (Here, 1.0)
- Copy the effect size and variance for each study from CMA to Excel, in columns C and D
- Start a new spreadsheet in CMA and copy the data from columns N and O

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	Study name Hedges's g Variance Group-A N (Optional) Group-B N (Optional) Effect direction (Optional) Std diff in means Variance Hedges's g Variance Difference in means Variance M N 1 Cooper 0.427 0.025 Auto 0.427 0.025															
1	Cooper	g [Uptional] [Uptional] [Uptional] [uncertainwork] [uncertainwork] <th[uncert< td=""></th[uncert<>														
2	Hedges	0.322	0.049			Auto			0.322	0.049						
3	Eipsey	0.265	0.021			Auto			0.265	0.021						
4	Rothstein	0.368	0.025			Auto			0.368	0.025						
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Model	Study name			Stati	tics for each	study				Hed	ges's g and 95	% CI			
		Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00		
	Cooper Hedges Lipsey Rothstein	0.427 0.322 0.265 0.368 0.368	0.158 0.221 0.145 0.158 0.205	0.025 0.049 0.021 0.025	0.117 -0.112 -0.019 0.058 0.212	0.737 0.756 0.549 0.678	2.701 1.455 1.829 2.327 0.935	0.007 0.146 0.067 0.020 0.250							
Random	WIISON	0.340	0.079	0.006	0.313	0.883	4.290	0.000							

Here, the correlation was 1.0 and the variance is 0.006

	<u>- 7 - 1</u>	[1] ▼ ₹					Compu	uting compo	site scores a	nd variance	based on corre	elation.xlsx - Microso	ft Excel		
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6		ES	Y	v	s		Count	Mean	vbar	sbar	Vmean				
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8		Cooper	0.370312	0.026	0.159722		2	0.427	0.025	0.159	0.022	Cooper	0.427	0.022	
9			0.483984	0.025	0.159182										
10															
11		Hedges	0.297179	0.048	0.220078		2	0.322	0.049	0.220	0.041	Hedges	0.322	0.041	
12			0.345845	0.049	0.220511										
13															
14		Lipsey	0.181092	0.021	0.145207		2	0.265	0.021	0.146	0.018	Lipsey	0.265	0.018	
15			0.348602	0.021	0.145817										
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17		Rothstein	0.419051	0.025	0.159145		2	0.368	0.025	0.159	0.021	Rothstein	0.368	0.021	
18			0.316669	0.025	0.158355										
19															
20		Wilson	0.326841	0.089	0.298138		2	0.285	0.093	0.305	0.079	Wilson	0.285	0.079	
21			0.243817	0.097	0.311142										
22															
22															

Open the spreadsheet Computing composite score and variance

- Enter the correlation between the two effect sizes in cell D2 (Here, 0.7)
- Copy the effect size and variance for each study from CMA to Excel, in columns C and D
- Start a new spreadsheet in CMA and copy the data from columns N and O

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	Study name	Hedges's g	Variance	Group-A N (Optional)	Group-B N (Optional)	Effect direction	Std diff in means	Variance	Hedges's g	Variance	Difference in means	Variance	м	N	0
	Cooper	0.427	0.022			Auto			0.427	0.022					
	2 Hedges	0.322	0.041			Auto			0.322	0.041					
	3 Lipsey	0.265	0.018			Auto			0.265	0.018					
	1 Rothstein	0.368	0.021			Auto			0.368	0.021					
	5 Wilson	0.285	0.079			Auto			0.285	0.079					
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Model	Study name			Statistics for each study					Hedges's g and 95% Cl					
		Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	-2.00	-1.00	0.00	1.00	2.00	
	Cooper	0.427	0.148	0.022	0.136	0.718	2.879	0.004				-		
1	Hedges	0.322	0.202	0.041	-0.075	0.719	1.590	0.112			+	-		
1	Lipsey	0.265	0.134	0.018	0.002	0.528	1.975	0.048						
1	Rothstein	0.368	0.145	0.021	0.084	0.652	2.539	0.011				-		
1	Wilson	0.285	0.281	0.079	-0.266	0.836	1.014	0.311			-+	- 1		
Random		0.340	0.073	0.005	0.196	0.484	4.632	0.000						
1														

Here, the correlation was 1.0 and the variance is 0.005

So it turns out in this case that the variance was not too much larger if we assumed a correlation of 1.0 rather than 0.70, but (as outlined earlier) this will not always be the case.

A similar situation exists if we want to assess the difference between effect sizes for math and reading. We would assume independence, group by outcome, and test the difference.

However, there is a critical difference here. When we compute an overall effect, the higher correlation yields largest variance for the overall effect. By contrast, when we compute a difference, the lower correlation yield the largest variance for the difference.

Thus, for computing an overall effect the composite (with a correlation of 1.0) is the "conservative" estimate. By contrast, for the difference, "Assuming independence" is the "conservative" estimate.