# **Comprehensive Meta Analysis Version 2.0**

This manual will continue to be revised to reflect changes in the program. It will also be expanded to include chapters covering conceptual topics. Upgrades to the program and manual will be available on our download site.



# Comprehensive Meta Analysis Version 2

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Group meetings to develop the program



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## Introduction

The program installation will create a shortcut labeled Comprehensive Meta Analysis V2 on your desktop and also under "All programs" on the Windows Start menu.

It will also install several data files for use with this guide. These files will be installed in "Demo Files", beneath the program directory, which (by default) will be C:\Program Files\Comprehensive Meta Analysis Version 2. Within "Demo Files", select files from the language directory appropriate for your computer's language settings.

To uninstall the program use the Windows Control panel, select "Add or Remove Programs", and remove "Comprehensive Meta Analysis Version 2"

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# Section 1. Basic data entry and analysis

This section shows how to set up a spreadsheet for data entry and run the basic analyses.

### The tutorial



The program includes a tutorial which may be opened from the **Help** menu. The tutorial covers the same material that is explained on the following pages.

#### Overview

The program uses a spreadsheet for data entry, but requires the user to identify specific columns to hold the study names and the effect size data. This process is explained here.

#### Create a column for Study Names

#### Select Insert... Column for... Study names.

Comprehensive meta analysis - [Data]		X
Limit Comprehensive meta analysis - [Data]         File Edit Format View Insert Identify Computational         Run analyses → %       Image: Composition of the composi	al options Analyses Help Study names Subgroups within study Comparison names Outcome names Time point names ∑ Effect size data Moderator variable Moderator variable Moderator variable	
14	>	*

The program will insert a column for study names as shown below.

Compret	nensive m	eta analys	is - [Data]								
<u>F</u> ile <u>E</u> dit Fo	rmat <u>V</u> iew	Insert Ide	ntify Compu	utational opti	ons Analyse	s <u>H</u> elp					
Run analyses	• ◆ ∿ [	ן 🚔 🛥 נ	8 3	6 🖻 🛍	0 🔁 🕨	_ <b>`</b> =\ <b>`</b> ≣	.00 +.0 +. +.0 .00 -	i 🗉 🚺	→ + ✓		, 🔍
Stuc	ly name 🛛	В	С	D	E	F	G	Н	I	J	ĸ
1		$\overline{\ }$									
3	The p	orogram	n inserts	s this co	olumn.						
5											
7											
9											
10											<b>N</b>

## Create columns for effect size data

#### Select Insert... Column for... Effect size data.

Comprehensive m	neta analysis - [Data]					-	. 🗆 🗙
Image: Study name         Study name           1         2           3         4           5         6           7         8           9         10           11         12           13         13	Insert Identify Computationa         Insert Identify Computationa         III Column for         I Blank column         I Blank column         I Blank row         I Copy of selected column         → Blank row         I Copy of selected row(s)         I Study	al options Analyses <u>H</u> elp Study names Subgroups within study Comparison names Outcome names Time point names <b>∑</b> Effect size data Moderator variable	-00 *.00 * G	H H Sele Colu Effe	→ + ✓ I ct Insel imn for ct size	□ 21 2 J rt data.	
14 15 16 17	III						~

This will launch a wizard that allows the user to select the desired format (or formats).

#### Effect size wizard (Screen 1)

🛱 Insert columns for effect size data	$\overline{\mathbf{X}}$
<image/>	Welcome         If you have already computed the effect size (such as the standardized mean difference or the Log odds ratio) for each study, you may enter this information directly.         Or, you may provide summary data (such as the number of events or the means and standard deviations), and the program will compute the effect size automatically.         Use this wizard to specify the type of data you plan to enter, and the program will create the required columns.         The program allows you to enter effect size data in more than one format. You will create one set of effect size columns now, and may add additional sets at any time.         Image: Show common formats only         Image: Show all 100 formats
Tell me more Cancel	< Back Next> Finish

The first screen in the wizard (above) offers an overview of the options for entering effect size data, as follows:

"If you have already computed the effect size (such as the standardized mean difference or the log odds ratio) for each study, you may enter this information directly.

"Or, you may provide summary data (such as the number of events or the means and standard deviations), and the program will compute the effect size automatically.

"Use this wizard to specify the type of data you plan to enter, and the program will create the required columns.

"The program allows you to enter effect size data in more than one format. You will create one set of effect size columns now, and may add additional sets at any time.

#### Effect size wizard (Screen 2)



The second screen of the wizard is shown here, and allows the user to select the class of data entry types:

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

For the running example of the BCG data, select the first option.

## Effect size wizard (Screen 3)

Comprehensive me	eta analysis - [Data]	
<u>File E</u> dit Format <u>V</u> iew	Insert Identify Computational options Analyses Help	
Run analyses → 🍾 🛛	🛱 Insert columns for effect size data	9
Study name	Click on the icons to select the data entry format	ĸ
1 Aronson, 1948		
First, click in sequence on two group icc opened here.	Two groups or correlation Dichotomous (number of events) Unmatched groups, prospective (e.g., controlled trials, cohort studies) In Unmatched groups, prospective (e.g., controlled trials, cohort studies) In Events and sample size in each group In Events and sample size in each group In Events and non-events in each group In Event rate and sample size in each group In Event rate and sample size in each group In Event rate and total sample size In the provide the provide trials of the provide tr	hoose format and
12	Matched groups, prospective (e.g., crossover trials or pre-post designs)	on click Einich
13	Computed effect sizes	en click finish.
14	Continuous (means)	
15	Bates (events bulberson years)	
15	Survival (time to event)	
18		
19		
20		
21		
22	You have selected Events and sample size in each group	
23	Lick Finish to create the columns	
24		
<	Tell me more     Cancel     < Back     Mext >	Finish

The third screen shows the list of formats arranged hierarchically. In the running example, drill down in the hierarchy to select the following.

- Dichotomous (number of events)
  - Unmatched groups, prospective (e.g., controlled trials, cohort studies)
    - Events and sample size in each group

At this point, the **Finish** button will be activated. Click on it to create the columns for data entry.

T Comprehensive meta anal	ysis - [Data]											
<u>File Edit Format View Insert 1</u>	dentify Computational options Ana	lyses <u>H</u> elp										
Run analyses 🔸 🏷 🗋 🚅 🖷	i 🖬 🎒 🐰 🖻 🛍 🖉 💈	<b>`-`</b> = <b>`</b> ≡ <b>`</b> ;;;	$\stackrel{\leftrightarrow}{\vdash} \boxdot \checkmark \rightarrow + \checkmark$	✓ □   ੈ ↓ ¾ ↓ ↓ ↓								
Study name Group-A Events	Group-A Group-B Group-I Total N Events Total N	roup-A Group-B Group-B Total N Odds ratio Log odds ratio Std Err I J K										
1 Aronson, 1948												
2												
4												
5												
6	Group names for cohort of	r prospective studies	-									
8	Name for first group (e.g., Trea	ted) G	iroup-A									
9	Name for accord group (a.g.	Control)	iroup-B									
10	Name foi second group (e.g.,	Junital) ja										
11												
12	Binary outcome in cohort	or prospective studies										
14	Name for events (e.g., Dead)	E	vents	osirod modify the								
15	Mana far yan ayanta (a.a. Ali			ault names for data								
16	IName for non-events (e.g., All	ve) jn	uer opt	auit Haines IUI uata								
17			ent	ry columns.								
18		Cancel Apply	Ok									
20												
21												
22												
23												
24												
<												
Cohort 2x2 (Events)												

## Modify data entry column names

The wizard will close and the program will automatically offer this dialog for modifying effect size format column names. If, for example, you elect to substitute "Treated" for "Group-A" and "Control" for "Group-B", you will create column names such as "Treated events" and "Control events".

The modifications made here will be applied not only to the format selected, but also to columns in any related format (in this case, in formats of the "cohort or prospective studies" type). The dialog gives name override suggestions consistent with the format type but will accept any user-entered value.

#### Enter effect size data

<b>₽</b> C	Comprehensive meta analysis - [Data]											
Eile	Edit Format View	<u>I</u> nsert Ide	entify Com	putational o	ptions Ana	lyses <u>H</u> elp						
Run	analyses → 🏷 [	נ 🚔 🐔	8	ቆ 🖻 🛍	l 0 2	<b>`</b> - <b>`</b> =	•≡	3 # 9 🛛	$\downarrow \rightarrow +$	✓ 🗌 ≜↓	<b>≩</b> ↓ 🛈	
	Study name	Treated Events	Treated Total N	Control Events	Control Total N	Odds ratio	Log odds ratio	Std Err	I	J	к	
1	Aronson, 1948											
2			1									
3			/									-
4			/									- 1
5		Enter	data he	re								
<u>ь</u> 7				10.		Pr	ogram	compute	es effec	t		
						si	zo and c	lienlave	it horo	-		
						31		ispiays	It nere			
10												~
<	1111										>	
Coh	ort 2x2 (Events)											

When the group names dialog closes, the spreadsheet looks like this. White columns are used for entering data. Yellow columns display the computed effect size. Note that the entry column names have been modified ("Treated" and "Control" in place of the defaults, "Group-A" and "Group-B").

📑 c	🗄 Comprehensive meta analysis - [Data]											
Eile	Eile Edit Format View Insert Identify Computational options Analyses Help											
Run	$Run\ analyses\ \rightarrow\ \&\ \square\ \not\cong\ \textcircled{\ log}\ \not\cong\ \textcircled{\ log}\ &\&\ \textcircled{\ log}\ &\&\ \textcircled{\ log}\ &\&\ \swarrow\ &\&\ &\swarrow\ &\boxtimes\ &\swarrow\ &\swarrow\ &\swarrow\ &\swarrow\ &\swarrow\ &\swarrow\ &\swarrow\ &\boxtimes\ &\swarrow\ &\boxtimes\ &\boxtimes\ &\boxtimes\ &\boxtimes\ &\boxtimes\ &\boxtimes\ &\boxtimes\ &\boxtimes\ &\boxtimes\ &\boxtimes$											
	Study name	Treated Events	Treated Total N	Control Events	Control Total N	Odds ratio	Log odds ratio	Std Err	I	J	к 🧖	
1	Aronson, 1948	4	123	11	139	0.391	-0.939	0.598				
2												
3												
4												
5												
6												
7												
8												
9												
10											<b>~</b>	
<											>	
Coh	ort 2x2 (Events)											

In the white columns enter the "Number of Events" and "Total N" for the treated group (4, 123) and the control group (11, 139).

The program automatically computes the odds ratio (0.391) as well as the log odds ratio and its standard error (-.939, .598) and displays these in the yellow columns.

#### View computational formulas

<b>-</b> † C	omp	rehensive	meta analys	is - [Data	]										
Eile	<u>E</u> dit	Format <u>V</u> ie	ew <u>I</u> nsert Ide	ntify Com	putational o	ptions Ana	alyses <u>H</u> elp								
$Run \ analyses \rightarrow \And \square \cong \textcircled{fill} \blacksquare \textcircled{g} \And \textcircled{h} \textcircled{h} @ \textcircled{g} \land \neg = \curlyvee \textcircled{fill} \downarrow ??                                $											Z↓ 🤇	)			
		Study name	Treated Events	Treated Total N	Control E vents	Control Total N	Odds ratio	Log	) odds atio	Std Err	I.	J		К	^
1	Aror	nson, 1948	4	123	11	139	0.39	1	-0.939	0.598					
2	🔁 Data entry assistant														
4		Data entry Odds ratio													
5			Double-click on cell to view its												
6		Starting	Starting with												
		Cells in 2	x2 table				for	npu		nai					
9		Where c	ells are given as				101	nuia	1.						
10		B = Trea	ted Total N - Ti	reated Eve	nts										
11		C = Cont	rol Events	wheel Europ	ha.										
12		D = CON	IUI TULAIN -CL	inuoi Even	13										
13		A = 4	4 - 110					≡							
14		C = 11	- 4 = 113												
15		D = 139	- 11 = 128												
17		LoaDdd	:Batio = Log((A *	D17(B * C	n										
18		LogOdd	Variance = (1 /	A+1/B+	Ű/C+1/[	))									
19		LogUdd: Odds rat	:Se = Sqr(LogOc io = Exp(LogOc	ldsVariance IsBatio)	:]										
20				ion radioj											
21		LogOdd:	Ratio = Log((4 × Variance = (1 //	128) / (119	3 × 11)) = -0.9 1711 ± 1712	)39 9) = 0 357		~							
22		Logoda	wanance - (174	+ 1/113 +	1711 7 1712	oj = 0.337		_							
23							< Home >							_	<b>_</b>
<	_		1												>
Coh	ort 2	x2 (Events)	IJ												

This dialog displays the formulas used to compute the effect size and, when pertinent, standard error, for a given cell's index. It also displays the formulas used to derive related indices. In this case it traces the computation of odds ratio as well as its related index, log odds ratio.

Note that actual numeric values are substituted for variable names at the bottom of the display, clarifying the steps which lead to the final results. (The formula views are currently implemented for most, but not all, effect size entry formats.)

You can view the formula for any effect size index displayed on the spreadsheet by clicking on the appropriate tab at the top of this dialog. Here there is only one tab, **Odds ratio**. (Clicking on the **Data entry** tab offers a view of one row's values and an alternate mode of data entry.)

# Diagnose data entry problems

Ele	Edit Format View	Insert Ide	entify Com	putational o	ptions Ana	lyses <u>H</u> elp						
Run	analyses 🔸 📎	0 😅 👘		2 10 10	02	( /- /=	1 1 2 20	LL T	$\downarrow \rightarrow +$	1 2	t Xt Q	1
	Study name	Treated Events	Treated Total N	Control Events	Control Total N	Odds ratio	Log odds ratio	Std Err	1	J	к	-
1	Aronson, 1948	4	0	11	139							
2 3 4 5 6 7 8	Trei	ated Events	cannot exc	eed Treated	Total N							
9 10 <1 Cob	ort 2x2 (Events)					-					>	~

When the data are not valid, the effect size results can't be computed. To diagnose the problem, simply move the mouse over any of the cells highlighted in red. The related problem description displays in a pop-up.

### Bookmark entered data

🔂 Comprehensive meta analysis - [C:\Program Files\Comprehensive Meta Analysis Version 2\BCG.c 🖃 🗖 🔀													
Eile Edit Format View Insert Identify Tools Computational options Analyses Help													
Run analyses 🔶 🛇 🗅 😅 📽 🖬 🚭 👗 🗈 🛍 🖉 ≻ート= 🏣 🕫 🐹 ∺ 👻 → + 🗸 🗔 출↓ 🚛 😳													
Study name         Treated Events         Treated Total N         Control Events         Control Total N         Odds ratio         Log odds ratio         Std Err         I													
1 Aronson, 1948 4 123 11 139 0.391 -0.939 0.598													
2 New Study, 2000	5	150	10	200	0.655	-0.423	0.559						
3													
4													
Cohort 2x2 (Events)													

It is sometimes helpful to bookmark the current data entry state. This step allows you to discard subsequent changes and return to the bookmarked state.

First, click on the **Bookmark** icon, circled above. In this example, the icon was clicked before entry of the second study.

To restore the bookmarked state, click on **Edit... Restore data**. After a confirmation prompt, the data are restored, as displayed in the image below.

🛃 Comprehensive meta analy	sis - [C:\P	rogram Fi	les\Comp	rehensive	e Meta Ana	lysis Versio	on 2\BCG.o	cma] 🗧	. 🗆 🗙			
Eile Edit Format View Insert Identify Tools Computational options Analyses Help												
$Run\ analyses\ \rightarrow\ \&\ \square\ \underrightarrow{Pi}\ \rightleftarrows\ \textcircled{A}\ \blacksquare\ \textcircled{B}\ $												
Study name	Treated Events	Treated Total N	Control Eivents	Control Total N	Odds ratio	Log odds ratio	Std Err	I	,			
1 Aronson, 1948	4	123	11	139	0.391	-0.939	0.598					
2												
3												
4									<b>`</b>			
<									>			
Cohort 2x2 (Events)												

### Customize effect size index display

<b>-†</b> C	omprehensive m	eta analy:	sis - [Data	]						_ 🗆 🗙			
Eile	<u>E</u> dit Format <u>V</u> iew	<u>I</u> nsert Id	entify Com	putational o	ptions Ana	lyses <u>H</u> elp							
Run	analyses → 🏷 [	נ 🚰 🛱	8	ሯ 🖻 🛍	0	<b>▶</b> —▶=	• <b>≡</b>   <b>;</b> 00	+.0	8 ☆ ⊡ 🚺 → + 🗸 🗌 💱	₹↓ 🔍			
	Study name	Treated Events	Treated Total N	Control E vents	Control Total N	Odds ratio	Log odd ratio	ds A I	Std Fr I I	к 🦳			
1	Aronson, 1948	4	123	11	139	0.391	-0.3	އ Z	Sort A-2 Sort 7-0				
2								AT	Column properties				
3     Column properties       4     Data entry assistant													
5								Σ	Formulas				
7									Show all selected indices				
8								000	Show only the primary index				
9								85	Set primary index to Log odds ratio				
11 Customize display													
Coh	ort 2x2 (Events)												

By default the program will display one or two indices (in this case, odds ratio and log odds ratio), which are based on the format selected for data entry. However, the user can customize the screen to display other indices as well.

Right-click on the yellow columns to open the pop-up menu (below). Then click **Set primary index** or **Customize display** to launch the index dialog box shown below. (Note that indices in the same color group are compatible with each other. Entry formats associated with indices in one of the color groups can't be combined in an analysis with formats whose indices belong to another color group).

Use the following as the primary index	_
Odds ratio	•
Display columns for these indices	
<ul> <li>✓ Odds ratio</li> <li>✓ Log odds ratio</li> <li>Peto odds ratio</li> <li>Log Peto odds ratio</li> <li>Log risk ratio</li> <li>Risk ratio</li> <li>Risk ratio</li> <li>Risk difference</li> <li>Std diff in means</li> <li>Hedges's g</li> <li>Difference in means</li> <li>Std Paired Difference</li> <li>Correlation</li> <li>Fisher's Z</li> </ul>	
<ul> <li>Rate ratio</li> <li>Log rate ratio</li> <li>Rate difference</li> <li>Hazard ratio</li> </ul>	
<ul> <li>✓ Also show standard error</li> <li>✓ Also show variance</li> </ul>	
<ul> <li>Show the primary index only</li> <li>Show all selected indices</li> </ul>	_
Cancel	

#### Open data set

Before proceeding to the analysis screen, the user would need to enter data for all studies.

As a time-saving device a copy of this data set has been included on the CD. To open this data set select **File... Open** and then drill down to the location of the data set.

By default, the data set will be in the directory C:\Program Files\Comprehensive Meta Analysis Version 2\Demo Files. The data set name is BCG.

# Launch analysis module

🗄 Comprehensive meta analysis - [C:\Program Files\Comprehensive Meta Analysis Version 2\BCG.cma] 📃 🗖 🔀														
Eile	Edit Format View	Insert Ide	ntify Comp	outational op	tions Ana	lyses <u>H</u> elp								
Run	analyses 📌 🗞 [	ן 🔐 🛥 נ	86.	አ 🖻 🛍	0 -	Run analyse	s .00 +.0 +.0 .00		$\downarrow \rightarrow +$	✓ 🗌 🛔	. <u>z</u> t 🔍	)		
	Study name	Treated Events	Treated Total N	Control Events	Control Total N	Odds ratio	Log odds vatio	Std Err	I	J	к	^		
1	Aronson, 1948	4	123	11	139	0.391	-8,939	0.598				_		
2	Ferguson & Simes,	6			ام مم ا	utton to		the						
3	3 Rosenthal, 1960 3 CIICK ON EITNER DUITON TO JAUNCH THE													
4	4 Hart & Sutherland, 62 analysis.													
5 Frimodt-Moller, 33														
6 Stein & Aronson, 180 1541 372 1451 0.384 -0.958 0.100														
7	Vandiviere, 1973	8	2545	10	629	0.195	-1.634	0.476						
8	Madras, 1980	505	88391	499	88391	1.012	0.012	0.063						
9	Coetze & Berjak,	29	7499	45	7277	0.624	-0.472	0.239						
10	Rosenthal, 1961	17	1716	65	1665	0.246	-1.401	0.275						
11	Comstock, 1974	186	50634	141	27338	0.711	-0.341	0.112						
12	Comstock &	5	2498	3	2341	1.563	0.447	0.731						
13	Comstock, 1976	27	16913	29	17854	0.983	-0.017	0.268						
14														
15														
16														
17												_		
18											_	×		
<.											>	•		
Coh	ort 2x2 (Events)													

Note: The BCG meta analysis data set is the basis for this and other examples. It will be altered at certain points for the purposes of the presentation.

## Analysis

Late entry       t3 Next table       High resolution plot       Description       Descri	Comprehensive meta analysis - [Analysis]     Image: Computational options Analyses Help														
Model         Study name         Statistics for each study         Odds ratio         Odds ratio	<ul> <li>Data ent</li> </ul>	try t⊒ Next table	🛨 High i	resolution plot	t 🔁 Selec	ct by 🕇 🕂	Effect meas	ure: Odds ratio	·■□Ⅲ非₽₽≵						
Aronson, 1948         0.391         0.121         1.262         -1.571         0.116         Modify the analysis display with these icon           Rosenthal, 1960         0.250         0.069         0.908         -2.106         0.035         Modify the analysis display with these icon           Hart & Sutherland, 1977         0.233         0.176         0.308         -10.10         0.00         Modify the analysis display with these icon           FinodtMoller, 1973         0.803         0.514         1.256         -0.961         0.336         0.336           Vandvire, 1973         0.803         0.514         1.256         -0.961         0.336         0.908         -0.219         0.000           Vandvire, 1973         0.195         0.077         0.497         -3.429         0.001         0.449         0.449         0.449         0.449         0.449         0.449         0.449         0.449         0.449         0.449         0.449         0.449         0.449         0.444         0.422         -5.102         0.000         0.449         0.444         0.422         -5.102         0.000         0.444         0.422         -5.102         0.000         0.444         0.422         -5.102         0.000         0.444         0.422         -5.102	Model	Study name		Statis	tics for each :	study		0	)dds ratio and 95% confidence interva						
Aronson, 1948       0.391       0.121       1.262       -1.571       0.116         Ferguson & Simes, 1949       0.189       0.077       0.462       -3.652       0.000         Hark & Sutherland, 1977       0.250       0.069       0.908       -1.016       0.035         Hark & Sutherland, 1977       0.803       0.514       1.256       -0.961       0.336         Stein & Aronson, 1953       0.384       0.316       0.466       -9.627       0.000         Vandivise, 1973       0.195       0.077       0.497       -3.429       0.001         Madras, 1980       1.012       0.894       1.146       0.190       0.849         Coetes & Briak, 1961       0.246       0.144       0.422       -5.102       0.000         Comstock, 1974       0.711       0.571       0.886       -3.046       0.002       -         Set the computation model with these tabs.       0.647       0.595       0.702       -10.319       0.000       -         Set the computation model with these tabs.       Set the analysis display with the bottom tabs.       -       -       -       -			Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10 1.00 10.00 100.00						
Ferguson & Simes, 1949       0.189       0.077       0.462       -3.652       0.000       Modify the analysis display with these icon         Hart & Sutherland, 1977       0.233       0.176       0.308       -10.219       0.000         Frimodt-Moller, 1973       0.803       0.514       1.256       -0.961       0.336         Stein & Aronson, 1953       0.384       0.316       0.466       -9.627       0.000         Vandiviere, 1973       0.195       0.077       0.497       -3.429       0.001		Aronson, 1948	0.391	0.121	1.262	-1.571	0.116								
Rosenthal, 1960       0.250       0.069       0.908       -2.106       0.035         Hat & Sutherland, 1977       0.233       0.176       0.308       -10.219       0.000         Frimodt-Moller, 1973       0.803       0.514       1.256       -0.961       0.336         Stein & Aronson, 1953       0.384       0.316       0.466       -9.627       0.000         Wardiviere, 1973       0.195       0.077       0.4497       -3.423       0.001		Ferguson & Simes, 1949	0.189	0.077	0.462	-3.652	0.000		Modify the analysis						
Hart & Sutherland, 1977       0.233       0.176       0.308       -10.219       0.000         Frimodt-Moller, 1973       0.803       0.514       1.256       -0.961       0.336         Stein & Aronson, 1953       0.384       0.316       0.466       -9.627       0.000         Vandiviere, 1973       0.195       0.077       0.497       -3.429       0.001         Madras, 1980       1.012       0.884       1.146       0.190       0.849         Coetze & Berjak, 1968       0.624       0.391       0.996       -1.976       0.048         Rosenthal, 1951       0.246       0.144       0.422       -5.102       0.000         Comstock, 1974       0.711       0.571       0.886       -3.046       0.002         Comstock, 1976       0.983       0.582       1.661       -0.065       0.948         ed       0.647       0.595       0.702       -10.319       0.000       +         Set the computation model with these tabs.       with the bottom tabs.       +       -       -		Rosenthal, 1960	0.250	0.069	0.908	-2.106	0.035		display with these icone						
Frimodt-Moller, 1973       0.803       0.514       1.256       -0.961       0.336         Stein & Aronson, 1953       0.384       0.316       0.466       -9.627       0.000         Vandiviere, 1973       0.195       0.077       0.497       -3.429       0.001         Madras, 1980       1.012       0.894       1.146       0.190       0.849         Coetze & Berjak, 1968       0.624       0.391       0.996       -1.976       0.048         Rosenthal, 1951       0.246       0.144       0.422       -5.102       0.000         Comstock, 1974       0.711       0.571       0.886       -3.046       0.002       +         Comstock, 1976       0.983       0.582       1.661       -0.065       0.948       +         comstock, 1976       0.983       0.582       1.661       -0.085       0.948       +       +         sted       0.647       0.595       0.702       -10.319       0.000       +       +         Set the computation model       with the bottom tabs.       +        Set the bottom tabs.       +	Hart & Sutherland, 1977 0.233 0.176 0.308 -10.219 0.000 UISPIAY WITH THESE ICONS.														
Stein & Aronson, 1953       0.384       0.316       0.466       -9.627       0.000         Vandiviere, 1973       0.195       0.077       0.497       -3.423       0.001         Madras, 1980       1.012       0.894       1.146       0.190       0.849         Coetze & Berjak, 1968       0.624       0.391       0.995       -1.976       0.048         Coetze, 1974       0.711       0.577       0.886       -3.046       0.002	Frimodt-Moller, 1973 0.803 0.514 1.256 -0.961 0.336														
Vandiviere, 1973       0.195       0.077       0.497       -3.429       0.001         Madras, 1980       1.012       0.894       1.146       0.190       0.849         Coetze & Berjak, 1968       0.624       0.391       0.996       -1.976       0.048         Rosenthal, 1951       0.246       0.144       0.422       -5.102       0.000         Comstock, 1974       0.711       0.571       0.886       -3.046       0.002         Comstock, 1974       0.711       0.571       0.886       -3.046       0.002         Comstock, 1976       0.893       0.582       1.661       -0.065       0.948         ed       0.647       0.595       0.702       -10.319       0.000       +	Stein & Aronson, 1953 0.384 0.316 0.466 -9.627 0.000														
Madras, 1980       1.012       0.894       1.146       0.190       0.849         Coetze & Berjak, 1968       0.624       0.391       0.996       -1.976       0.048         Rosenthal, 1961       0.246       0.144       0.422       -5.102       0.000         Comstock, 1974       0.711       0.571       0.886           Comstock, 1974       0.711       0.571       0.886           Comstock, 1974       0.711       0.571       0.886           Comstock, 1976       0.983       0.582       1.661       -0.065       0.948	Vandiviere, 1973 0.195 0.077 0.497 -3.429 0.001														
Coetze & Berjak, 1968       0.624       0.391       0.996       -1.976       0.048         Rosenthal, 1961       0.246       0.144       0.422       -5.102       0.000         Comstock, 1974       0.711       0.571       0.886       -3.046       0.002         Comstock, 1974       0.711       0.571       0.886       -0.611       0.541         Comstock, 1976       0.983       0.582       1.661       -0.065       0.948         ed       0.647       0.595       0.702       -10.319       0.000       +         Set the computation model with these tabs.       Set the analysis display with the bottom tabs.       +	Madras, 1980 1.012 0.894 1.146 0.190 0.849														
Rosenthal, 1961       0.246       0.144       0.422       -5.102       0.000         Comstock, 1974       0.711       0.871       0.886       -3.046       0.002         Comstock, Webster,       1.553       0.373       6.548       0.611       0.541         Comstock, 1976       0.983       0.582       1.661       -0.065       0.948         ed       0.647       0.595       0.702       -10.319       0.000       +         Set the computation model with these tabs.       Set the analysis display with the bottom tabs.       +       +		Coetze & Berjak, 1968	0.624	0.391	0.996	-1.976	0.048								
Comstock, 1974       0.711       0.571       0.886       -3.046       0.002       +         Comstock, 1976       0.373       6.548       0.611       0.541       +       +         Comstock, 1976       0.393       0.582       1.661       -0.065       0.948       +         ed       0.647       0.595       0.702       -10.319       0.000       +         Set the computation model with these tabs.       Set the analysis display with the bottom tabs.       +       +		Rosenthal, 1961	0.246	0.144	0.422	-5.102	0.000								
Comstock & Webster, Comstock, 1976       1.563       0.373       6.548       0.611       0.541         Comstock, 1976       0.983       0.582       1.661       -0.065       0.948         ed       0.647       0.595       0.702       -10.319       0.000       →         Set the computation model with these tabs.		Comstock, 1974	0.711	0.571	0.886	-3.046	0.002		+						
Comstock, 1976         0.383         0.582         1.661         -0.065         0.948           ed         0.647         0.595         0.702         -10.319         0.000         →           Set the computation model with these tabs.         Set the analysis display with the bottom tabs.         →         →		Comstock & Webster,	1.563	0.373	6.548	0.611	0.541								
Set the computation model with these tabs. →		Comstock, 1976	0.983	0.582	1.661	-0.065	0.948								
Set the computation model with these tabs.       Set the analysis display with the bottom tabs.	ed		0.647	0.595	0.702	-10.319	0.000		+						
	Set the computation model with these tabs.     Set the analysis display with the bottom tabs.														
Red Random Both models	Fixed Random Both models														

The primary index from the Data Entry module (in this case odds ratio) is used for the initial Analysis display. The columns labeled **Statistics for each study** include the odds ratio and 95% confidence interval for each study. The last row in the spreadsheet shows the summary data. Under the fixed effect model the point estimate is 0.647 (0.595, 0.702).

The same information is captured by the Forest plot at the center of the screen. This plot shows each study as a point estimate with its lower and upper limit, and provides a sense of the study-to-study dispersion.

This screen may be customized in many ways, including the following (see toolbar):

- In the **Format** menu dropdown there are options to:
  - Display, hide and modify the appearance of the individual column blocks: Basic stats, Forest plot, Counts, Weights and Residuals.
  - Modify the appearance (font, decimal precision etc.) of the screen as a whole.
- From the **View... Columns** menu dropdown, the **Moderators** option will present a list of moderators. The user can select from the list and place the selected column where desired in the Analysis display.
- In the **Computational options** menu dropdown:
  - The **Group by...** entry allows the user to run the analysis grouped by a moderator (if moderators are included in the data set), and to compare the treatment effect across groups.

- A drop-down box allows the user to set the **Confidence level** (95% in this example).
- Right-clicking on a column's heading area offers a list of context-sensitive entries, including:
  - **Sort** options, both ascending and descending.
  - A **Customization** option which allows the user to modify an individual column's display (alignment, decimal precision etc.).
  - A **Scale** option (applicable to Forest plot) which allows the user to modify the display scale.

Select by ...

- to include in the analysis, based on study name or moderator variables.
- The **Effect measure** toolbar option displays a selection of available effect measures. In this example the program would allow the user to toggle between odds ratio, risk ratio, risk difference, and other measures of effect size.
- These toolbar icons allow the user to display and hide individual row results as well as overall results.
- These toolbar icons allow the user to display and hide the following column blocks: **Basic stats, Individual study counts, Forest plot, Weights** and **Residuals.** This set of icons is determined by the selected data view; only icons relevant to that view will display.
- Tabs at the bottom of the screen allow the user to select the computational model (in this example, fixed or random effects, or both).
- Tabs at the bottom of the screen allow the user to select data views that include analyses with **One study removed** as well as **Cumulative analyses**.

# View summary statistics

Compre	T Comprehensive meta analysis - [Analysis]													
Eile Edit I	F <u>o</u> rmat <u>V</u> iew Comput	ational options	s Analyses	<u>H</u> elp										
🔶 Data en	try t7 Next tabl	• 🗙 🏝	High resolutio	n plot 🛛 🔁	Select by	+ Effect	measure: (	Odds ratio	- 3		E E ì			
Model	Study name		Statis	tics for each s	study			Odds ratio an	d 95% confid	ence interval				
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00	10.00	100.00			
Aronson, 1948 0.391 0.17× 1.262 .1.571 0.116														
Ferguson & Simes, Rosenthal, 1960 Hart & Sutherland,														
	Frimodt-Moller, 1973	0.803	0.514	1.256	-0.961	0.000		· · ·						
	Stein & Aronson.	0.384	0.316	0.466	-9.627	0.000			+					
	Vandiviere, 1973	0.195	0.077	0.497	-3.429	0.001		+	_					
	Madras, 1980	1.012	0.894	1.146	0.190	0.849			+					
	Coetze & Berjak,	0.624	0.391	0.996	-1.976	0.048								
	Rosenthal, 1961	0.246	0.144	0.422	-5.102	0.000			-					
	Comstock, 1974	0.711	0.571	0.886	-3.046	0.002			+					
	Comstock &	1.563	0.373	6.548	0.611	0.541				—				
	Comstock, 1976	0.983	0.582	1.661	-0.065	0.948								
Fixed		0.647	0.595	0.702	-10.319	0.000			+					
Fixed Ba	andom Both models													
Pasio stat		u d Cumul	atiwa analwaia	Colouia	liono									
DasiC Stat	s one study terriove	a cumu	auve analysis	Calcula	uons									

The **Next table** button on the toolbar allows you to toggle between two windows, the analysis spreadsheet above and the table below (which provides more detail on the point estimate and heterogeneity).

The comprehensive meta analysis - [Analysis]													
<u>File E</u> dit F <u>o</u> rmat <u>V</u> iew Co	omputational options	Analyses H	elp										
← Data entry tJ Nex	kt table 🛛 🏪 Hig	gh resolution p	plot 🛛 🔁 S	elect by	+ Effect measur	re: Odds ratio	- 🔳 [		ī≇Ε.	t f			
											<u>^</u>		
Model Effect size and 95% interval Test of null (2-Tail) Heterogeneity Tau													
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	l-squared	Tau Square		
Fixed Random	13 13	0.647 0.474	0.595 0.325	0.702 0.690	-10.319 -3.887	0.000 0.000	163.165	12	0.000	92.645	0.3		
<		1111									~		
Fixed Random Both mo	odels												
Basic stats One study re	Basic stats One study removed Cumulative analysis Calculations												

#### View study weights

Comp	Comprehensive meta analysis - [Analysis]     File Edit Format View Computational options Analyses Help														
<u>File</u> <u>E</u> dit	Format View Computationa	al options Ar	alyses <u>H</u> elp												
🔶 Data e	ntry t⊒ Next table	井 High I	resolution plot	🔁 Selec	t by	+ Effect mea	asure: Odo	ls ratio	- 🔳 🗌	]        <b>  </b>	1 J				
Model	Study name	Stati	tics for each s	study		Odds ratio ar	id 95% con	fidence interv	al	Weight (Fixed)	Weight (Random)				
		Odds ratio	Lower limit	Upper limit	0.01	0.10	1.00	10.00	100.00	Relative weight	Relative weight				
	Aronson, 1948 Ferguson & Simes, 1949 Rosenthal, 1960 Hart & Sutherland, 1977 Firmodt-Moller, 1973 Stein & Aronson, 1953 Vandiviere, 1973 Madras, 1980 Coetze & Berjak, 1968 Rosenthal, 1961 Comstock, 1974	0.391 0.189 0.250 0.233 0.803 0.384 0.195 1.012 0.624 0.246 0.711	0.121 0.077 0.069 0.176 0.514 0.316 0.077 0.894 0.391 0.144 0.571	1.262 0.462 0.908 0.308 1.256 0.466 0.497 1.146 0.996 0.422 0.886		+++++++++++++++++++++++++++++++++++++++	+ - - + - + - + - + - +			0.50 0.86 0.41 8.79 3.44 18.03 0.79 44.58 3.14 2.37 14.26	5.11 6.43 4.62 9.56 8.84 9.82 6.23 9.98 8.73 8.37 9.76				
	Comstock & Webster, 1969 Comstock, 1976	0.983	0.373 0.582	6.548 1.661			-			0.33	4.10 8.44				
Fixed Random		0.647 0.474	0.595 0.325	0.702 0.690			+								
Fixed F Basic sta															

- Click on the **E** icon at the top of the screen to display **Study weights.** (The option is also accessible from the **View... Columns** menu dropdown.)
- Click on the **Both models** tab, circled at the bottom of the screen.

The spreadsheet now includes two rows at the bottom – labeled **Fixed** and **Random** 

At the right, the program shows the weight assigned to each study under the fixed or random effects model. Compare, for example, the fixed effect and random effects weights for the "Madras, 1980" study.

In this display, the **Z-value** and **p-value** columns and the **Events** / **Total** block have been hidden. To hide a block, click on its toggle icon at the top of the screen, or right-click on the block itself and turn off the toggle icon from the resulting dropdown list.

The dropdown list also allows the user to display or hide individual columns within a block. To hide individual columns in the 'Basic stats' block, as is done above, right-click on the block and select the 'Customize display' option. In the customization dialog, uncheck the column(s) to be hidden.

### View standardized residuals

Comp	T Comprehensive meta analysis - [Analysis]													
Eile Edit	Format View Computationa	al options An	alyses <u>H</u> elp								~			
🔶 Data e	entry the Next table	井 High I	resolution plot	🔁 Selec	t by	+ Effect m	easure: Od	ds ratio	•	□ == II <b>:</b> = E <b>(</b> =				
Model	Study name	Statis	stics for each	study		Odds ratio an	d 95% confi	dence inte	rval	Residual (Fixed)	Residual (Random)			
		Odds ratio	Lower limit	Upper limit	0.01	0.10	1.00	10.00	100.00	Std Residual	Std Residual			
Fixed	Aronson, 1948 Ferguson & Simes, 1949 Rosenthal, 1960 Hart & Sutherland, 1977 Frimodt-Moller, 1973 Stein & Aronson, 1953 Vandiviere, 1973 Madras, 1980 Coetze & Berjak, 1968 Rosenthal, 1961 Comstock, 1974 Comstock & Webster, 1969 Comstock, 1976	0.391 0.189 0.250 0.233 0.384 0.195 1.012 0.624 0.246 0.711 1.563 0.983 0.647 0.474	0.121 0.077 0.069 0.176 0.514 0.316 0.077 0.894 0.391 0.144 0.571 0.373 0.582 0.595 0.325	1.262 0.462 0.908 0.308 1.256 0.466 0.497 1.146 0.996 0.422 0.886 6.548 1.661 0.702 0.590				_		-0.84 -2.71 -1.45 -7.50 0.97 -5.79 -2.52 9.51 -0.15 -3.56 0.92 1.21 1.58	-0.23 -1.25 -0.73 -1.20 0.86 -0.36 -1.19 1.32 0.44 -1.03 0.70 1.28 1.15			
Fixed F Basic sta	Random         0.474         0.325         0.690          Image: Comparison of the comparison o													

Here, the user has clicked on the **Residuals** icon, circled at the top.

Note, once again, how the display clarifies the contrast in results between the fixed and random models.

← Data e	entry t⊒ Next table	井 High r	esolution plot	E Selec	t by 🕇	Effect measu	ure: Odds r	atio		de ratio wit	b one studu			
Model	Study name	S	ummary statis	tics with one s	tudy removed	t	Summary	anu 30% ini	removed	JOS TAUO WIU	n one study			
		Point	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00	10.00	100.00			
	Aronson, 1948	0.648	0.597	0.704	-10.234	0.000			+					
	Ferguson & Simes, 1949	0.653	0.601	0.710	-10.024	0.000			+					
	Rosenthal, 1960	0.649	0.597	0.705	-10.205	0.000			+					
Hart & Sutherland, 1977 0.713 0.654 0.778 -7.632 0.000 + Frimodt-Moller 1973 0.642 0.590 0.698 -10.320 0.000 +														
Frimodt-Moller, 1973 0.642 0.590 0.698 10.320 0.000 +														
Stein & Aronson, 1953 0.725 0.662 0.795 -6.882 0.000 +														
	Vandiviere, 1973	0.653	0.601	0.709	-10.054	0.000			+					
	Madras, 1980	0.451	0.403	0.504	-14.032	0.000			+					
	Coetze & Berjak, 1968	0.647	0.595	0.704	-10.129	0.000			+					
	Rosenthal, 1961	0.662	0.609	0.720	-9.649	0.000			+					
	Comstock, 1974	0.636	0.582	0.696	-9.902	0.000			+					
	Comstock & Webster, 1969	0.645	0.593	0.700	-10.372	0.000			+					
	Comstock, 1976	0.640	0.588	0.696	-10.440	0.000			+					
Fixed		0.647	0.595	0.702	-10.319	0.000			+					

#### View 'One study removed' results

In this view, each row displays <u>not</u> the results of a single study, but rather the <u>summary</u> values computed when that row's study is removed from the meta analysis. For example, the values in the first row, "Aronson, 1948", represent the summary computations for twelve studies, when "Aronson, 1948" is excluded.

Note that the **Both models** tab is not available in this display. The tab appears only when appropriate.

#### View cumulative analysis

Comprehensive meta analysis - [Analysis]													
<u>File</u> <u>E</u> dit I	Format <u>View</u> Computational	options Anal	yses <u>H</u> elp										
← Data en	try tJ Next table	井 High re	solution plot	E Select b	oy 🕇 🕇 E	ffect measure	e: Odds rat	io 🔹 🔳		f I 4			
Model	Study name	Su	mmary statistic	es for cumulativ	ve meta analy	sis	Cu	umulative summary	and 95% interval f	for odds ratio		Weight (Fixed)	
		Point	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00 10	0.00 1	00.00	Relative weight	
	Aronson, 1948 Ferguson & Simes, 1949 Stein & Aronson, 1953 Rosenthal, 1960 Rosenthal, 1961 Coetze & Berjak, 1968 Comstock & Webster, 1969 Frimodt-Moller, 1973 Vandiviere, 1973 Comstock, 1974 Comstock, 1976 Hart & Sutherland, 1977	0.391 0.247 0.372 0.369 0.353 0.379 0.386 0.421 0.413 0.492 0.511 0.451	0.121 0.121 0.308 0.306 0.296 0.322 0.328 0.361 0.355 0.434 0.452 0.403	1.262 0.503 0.449 0.444 0.421 0.447 0.455 0.491 0.480 0.557 0.556 0.504	-1.571 -3.856 -10.304 -10.500 -11.591 -11.545 -11.400 -11.035 -11.445 -11.147 -10.860 -14.032	0.116 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000		+++++++++++++++++++++++++++++++++++++++	- - - - - - -			0.50 1.36 19.39 19.81 25.31 25.64 29.08 29.87 44.13 46.62 55.42	
Fixed	Madras, 1980	0.647	0.595	0.702	-10.319	0.000			+			100.00	
Fixed Re Basic stats	Fixed     U.64/     U.595     U.702     -1U.319     U.000     +       Fixed     Random       Basic stats     One study removed     Cumulative analysis     Calculations												

The **Cumulative analysis** option displays results accumulated over successive studies. That is, the second row presents a summary analysis comprising the first two studies (in this case, "Aronson, 1948" and "Ferguson & Simes, 1949"), the third row presents a summary analysis comprising the first three studies, and so on through the final row. When the data are sorted by year, this would show the conclusions that could have been obtained at any point in time with each new study's appearance.

The Forest plot and the study weight block also display cumulative values.

Note that the studies have been sorted (by year in this case) in order to make the display more meaningful. The image below shows one way such a sort could be done.

	omprehensive meta ana	alysis - [C:	\Program	Files\Co	mprehens	ive Meta A	nalysis Ver	sion 2\BC	G.cma]		
Eile	Edit Format View Insert	Identify C	omputationa	al options	Analyses <u>H</u>	elp					
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	Study name	Treated Events	Treated Total N	Control Eivents	Control Total N	Odds ratio	Log odds ratio	Std Err	I.	J	
1	Aronson, 1948	4	123	11	139	0.391	-0.939	0.598	1948		
2	Ferguson & Simes, 1949	6	306	29	303	0.189	-1.666	0.456	1949		
3	Stein & Aronson, 1953	180	1541	372	1451	0.384	-0.958	0.100	1953		
4	Rosenthal, 1960	3	In	the D	ata Ent	rv modu	ile nonu	late <sup>58</sup>	1960		
5	Rosenthal, 1961	17					iic popu		1961		
6	Coetze & Berjak, 1968	29	a	colum	n with s		in ti	mis <sub>39</sub>	1968		
7	6     Coetze & Berjak, 1968     29     a column with sort values (in this or values (in this case, year) and click on the     39     1968       7     Comstock & Webster, 1969     5     case, year) and click on the     31     1969										
8	Frimodt-Moller, 1973	33	C	ircled i	con to	perform	the sor	t. 28	1973		~
						-					>
Coh	ort 2x2 (Events)										

#### View calculations

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← Data entry tJ Next table		井 High re	esolution plot	E Select	t by 🛛 🕇	Effect measu	ure: Odds ratio	, <del>,</del>	• 🗐 🖓 🕄 🖓 🖓 🖓					
Model	Study name					Calculati	ons (Fixed)							
		Point	Study Variance	Tau^2 Within	Tau^2 Between	Total Variance	IV-Weight	W	T*₩	T^2*₩	W^2			
	Aronson, 1948	-0.939	0.357	0.000	0.000	0.357	2.800	2.800	-2.628	2.467	7.841			
	Ferguson & Simes, 1949	-1.666	0.208	0.000	0.000	0.208	4.805	4.805	-8.005	13.339	23.085			
	Stein & Aronson, 1953	-0.958	0.010	0.000	0.000	0.010	100.956	100.956	-96.729	92.678	10192.196			
	Rosenthal, 1960	-1.386	0.433	0.000	0.000	0.433	2.307	2.307	-3.199	4.434	5.323			
	Rosenthal, 1961	-1.401	0.075	0.000	0.000	0.075	13.259	13.259	-18.578	26.032	175.795			
	Coetze & Berjak, 1968	-0.472	0.057	0.000	0.000	0.057	17.551	17.551	-8.280	3.906	308.034			
	Comstock & Webster, 1969	0.447	0.534	0.000	0.000	0.534	1.872	1.872	0.836	0.373	3.505			
	Frimodt-Moller, 1973	-0.219	0.052	0.000	0.000	0.052	19.249	19.249	-4.218	0.924	370.509			
	Vandiviere, 1973	-1.634	0.227	0.000	0.000	0.227	4.405	4.405	-7.197	11.758	19.405			
	Comstock, 1974	-0.341	0.013	0.000	0.000	0.013	79.839	79.839	-27.213	9.276	6374.340 5			
	Comstock, 1976	-0.017	0.072	0.000	0.000	0.072	13.960	13.960	-0.242	0.004	194.871			
	Hart & Sutherland, 1977	-1.456	0.020	0.000	0.000	0.020	49.226	49.226	-71.695	104.420	2423.212			
	Madras, 1980	0.012	0.004	0.000	0.000	0.004	249.566	249.566	3.000	0.036	62283.004			
		-10.031	2.063	0.000	0.000	2.063	559.795	559.795	-244.148	269.648	82381.121			
<		Ш									>			
Fixed Ra	indom													
Basic stats	One study removed	Cumulative a	analysis Ca	lculations										

This tab shows how data in each row are summed to yield totals, which are then used to compute the point estimates and standard errors.

This is intended both as a teaching tool and also to allow researchers to understand the precise formula being used. As development continues, the user will be allowed to open a box that shows the precise formula used for each computation, and how these values were inserted into that formula to yield the reported statistics.

# Select by...

🛱 Select by	
Studies Moderator	
Include the following studies	
_	
Aronson, 1948	Select all
Coetze & Berjak, 1968	Clear all
Comstock & Webster, 1969	
Comstock, 1974	
Comstock, 1976	
✓ Ferguson & Simes, 1943	
Hart & Sutherland 1977	
Madras 1980	
Resenthal 1960	
Rosenthal, 1961	
Stein & Aronson, 1953	
✓ Vandiviere, 1973	
	Cancel
	Apply
	Ok

Click on the **Select by...** icon to launch this dialog. Here you can change the set of studies to include in the meta analysis. If the data set included subgroups or moderator variables, they would appear here as well.

Click on **Apply** or **OK** to apply the changes.

#### Some tools for customizing the analysis display



Right-click on the Forest plot block and click on the **Scale** option to select a different scale setting for the Forest plot. The options for log scales appear when odds ratios, risk ratios, rate ratios, or hazard ratios are used as the effect size index. Otherwise, options for raw scales appear.



Click on the **Effect measure** option and select a setting in this dropdown to use an alternate measure for the meta analysis computations.



Click on the **Computational Options... Cl level** option and select a setting in this dropdown to change the confidence level used in the computations and the Forest plot.

# Section 2. Multiple data entry formats

If the effect size for all studies is in the same format (e.g., number of events and total N for treated and control groups, <u>or</u> the odds ratio and confidence interval) the user would create one set of columns for effect size data as described in the previous section.

In the event that some studies report the effect size in one format while others report it using another format, the user will need to create two (or more) sets of data entry columns. The options are explained in this section.

This section uses the "Strepokinase" example, which is patterned after a published meta analysis but includes fictional data.

For all studies in this meta analysis, patients who arrive at a hospital following a myocardial infarction are randomized to one of two groups: (A) standard treatment alone, or (B) standard treatment plus streptokinase.

Some studies report the number of events (deaths) and the total number of patients in each group. This data will be used to compute an odds ratio, with odds ratios less than one indicating that patients in the treated group were less likely to die.

Other studies report the odds ratio and the 95% confidence interval.

By default, data sets are copied to C:\Program Files\Comprehensive Meta Analysis Version 2\Demo Files.

The two datasets used in this section are StreptoMultiformat18 studies, which includes the 18 studies in the first format, and StreptoMultiformat22 studies, which includes all 22 studies.

## Overview

<b>-†</b> C	omprehensive m	neta analysi	s - [C:\Pr	ogram Fil	es\Compr	ehensive	Meta Ar	n <mark>alysis</mark> V	ersion 2	2\StreptoMult	iFormat22	Studies.cm	a] 📮	
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Run	analyses 🔸 🗞	🗅 🚅 👬 🖡		X 🖻 🛍	0 🖄	·•=	<b>*≣</b> ;00	:8 ∺ .	- 1	→ + ✓ 🗌		<b>.</b>		
	Study name	Data format	Treated Events	Treated Total N	Control Events	Control Total N	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	J
1	Fletcher	Cohort 2x2	1	12	4	11					0.159	-1.838	1.218	
2	Dewar	Cohort 2x2	4	21	7	21					0.471	-0.754	0.723	
3	1st European	Cohort 2x2	20	83	15	84					1.460	0.379	0.383	=
4	Heikinheimo	Cohort 2x2	22	219	17	207					1.248	0.222	0.339	
5	Italian	Cohort 2x2	19	164	18	157					1.012	0.012	0.350	
6	2nd European	Cohort 2x2	69	373	94	357					0.635	-0.454	0.180	
7	2nd Frankfurt	Cohort 2x2	13	102	29	104					0.378	-0.973	0.369	
8	1st Australian	Cohort 2x2	26	264	32	253					0.754	-0.282	0.280	
9	NHLBI SMIT	Cohort 2x2	7	53	3	54					2.587	0.950	0.719	
10	Valere	Cohort 2x2	11	49	9	42					1.061	0.060	0.509	
11	Frank	Cohort 2x2	6	55	6	53					0.959	-0.042	0.612	
12	UK Collab	Cohort 2x2	48	302	52	293					0.876	-0.133	0.219	
13	Klein	Cohort 2x2	4	14	1	9					3.200	1.163	1.214	
14	Austrian	Cohort 2x2	37	352	65	376					0.562	-0.576	0.221	
15	Lasierra	Cohort 2x2	1	13	3	11					0.222	-1.504	1.242	
16	N German	Cohort 2x2	63	249	51	234					1.215	0.195	0.215	
17	Witchitz	Cohort 2x2	5	32	5	26					0.778	-0.251	0.696	
18	2nd Australian	Cohort 2x2	25	112	31	118					0.806	-0.215	0.309	
19	3rd European	Odds ratio					0.416	0.242		0.950	0.416	-0.877	0.276	
20	ISAM	Odds ratio					0.872	0.599		0.950	0.872	-0.137	0.192	
21	GISSI-1	Odds ratio					0.807	0.721		0.950	0.807	-0.214	0.057	
22	ISIS-2	Odds ratio					0.746	0.676		0.950	0.746	-0.293	0.050	
23														~
1														>
Co	hort 2x2 (Events)	Odds ratio												
_	(, , , , , , , , , , , , , , , , , , ,													

The mechanism for entering effect size data in several formats is shown here. The spreadsheet includes a block of columns labeled 'Treated Events, Treated Total N', etc. And, a second block of columns labeled 'Odds ratio, Lower limit', etc.

For the first 18 studies the data are entered into the first block, and the second block is grayed out. For the next 4 studies the data are entered into the second block and the first block is grayed out. However, for all 22 studies the computed effect is displayed in the same columns (at the right). Since it is these columns which are used in the analysis, all studies can be included in the analysis without regard to the original format (with the caveat that the data provided allows us to compute the required effect size index).

- To create multiple effect size blocks, simply **Insert... Columns for... Effect size data** as many times as needed. Each time, the program will allow the user to select an additional format from the hierarchy.
- By default, the program shows only one data entry block at a time. If only one block is displayed, use the tabs at the bottom of the screen to switch between blocks.
- To view all the blocks (as above), right-click on the data entry column and use the pop-up menu.

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Run	analyses 🔸 🗞 [	ב 🚔 🛱		አ 🖻 🛍	0 12	<b>}-</b> }=	*≣ ¦ ≉% t.@	:#J	$\downarrow \rightarrow +$	✓ 🗌 🛔	<b>≩</b> ↓ 🔍		
	Study name	Treated Events	Treated Total N	Control Eivents	Control Total N	Odds ratio	Log odds ratio	Std Err	J	к	L	м	
1	Fletcher	1	12	4	11	0.159	-1.838	1.218					
2	Dewar	4	21	7	21	0.471	-0.754	0.723					≣
3	1st European	20	83	15	84	1.460	0.379	0.383					
4	Heikinheimo	22	219	17	207	1.248	0.222	0.339					
5	Italian	19	164	18	157	1.012	0.012	0.350					
6	2nd European	69	373	94	357	0.635	-0.454	0.180					
7	2nd Frankfurt	13	102	29	104	0.378	-0.973	0.369					
8	1st Australian	26	264	32	253	0.754	-0.282	0.280					
9	NHLBI SMIT	7	53	3	54	2.587	0.950	0.719					
10	Valere	11	49	9	42	1.061	0.060	0.509					
11	Frank	6	55	6	53	0.959	-0.042	0.612					
12	UK Collab	48	302	52	293	0.876	-0.133	0.219					
13	Klein	4	14	1	9	3.200	1.163	1.214					
14	Austrian	37	352	65	376	0.562	-0.576	0.221					
15	Lasierra	1	13	3	11	0.222	-1.504	1.242					
16	N German	63	249	51	234	1.215	0.195	0.215					
17	Witchitz	5	32	5	26	0.778	-0.251	0.696					
18	2nd Australian	25	112	31	118	0.806	-0.215	0.309					
19													
20													~
<												>	
Coh	ort 2x2 (Events)												

# Step-by-step instructions for multiple formats

Create the first block (for events and total N in each group) as described in the previous section, and enter data for the first 18 studies as shown here.

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Run	analyses → 🏷 [	ן 🚔 🛥 נ	8	X 🖻 🛍	0	<b>-</b> - <b>-</b>	•.• 00. +.0 •.• 00.	Ħ∃	$\downarrow \rightarrow +$	✓ 🗌 🋓	I II 🔍		
	Study name	Treated Events	Treated Total N	Control Events	Control Total N	Odds ratio	Log odds ratio	Std Err	J	К	L	м 🚔	
1	Fletcher	1	12	4	11	0.159	-1.838	1.218					
2	Dewar	4	21	7	21	0.471	-0.754	0.723					
3	1st European	20	83	15	84	1.460	0.379	0.383				=	
4	Heikinheimo	22	219	17	207	1.248	0.222	0.339					
5	Italian	19	164	18	157	1.012	0.012	0.350					
6	2nd European	69	373	94	357	0.635	-0.454	0.180					
- 7	2nd Frankfurt	13	102	29	104	0.378	-0.973	0.369					
8	1st Australian	26	264	32	253	0.754	-0.282	0.280					
- 9	NHLBI SMIT	7	53	3	54	2.587	0.950	0.719					
10	Valere	11	49	9	42	1.061	0.060	0.509					
11	Frank	6	57,		50	0.050	p.042	0.612					
12	UK Collab	48	30 <mark>2</mark>	↓ Sort A-Z			0.133	0.219					
13	Klein	4	1 2	Sort Z-A			.163	1.214					
14	Austrian	37	35	Column r	properties		).576	0.221					
15	Lasierra	1	1	Editarou	n names		.504	1.242					
16	N German	63	24 -	Lanc groo	phanes			0.215					
17	Witchitz	5	3	Data ent	ry assistan	t	0.251	0.696					
18	2nd Australian	25	11	Formulas			0.215	0.3	Right-	click in	data en	trv colu	mn
19				Incert of	w data ent	ry format	-		and ca		ort nor	u doto	~ m+
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Cob	ort 2x2 (Events)												
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# Create the second effect size entry block

To create the second block, simply repeat the procedure (Insert... Column for... Effect size data). Or, right-click on the data entry columns to launch a pop-up menu and select Insert new data entry format.
#### Select second effect size entry format



Note that the **Dichotomous (number of events)** book icon remains open from the selection of the first effect size entry format.

In this example we want to create a block of columns to enter the odds ratio and confidence interval. Drill down in the hierarchy to select the following:

- Dichotomous (number of events)
  - Computed effect sizes
    - Odds ratio and confidence limits

At this point, the **Finish** button will be activated. Click on it to create the columns for data entry.

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Run	analyses → 🏷 [	D 🚅 📸 I		X 🖻	2 2	<b>≻</b> ≻= >≣	.00 +.0 + +.0 .00 □	i • ↓ →	+ 🗸 [		•	
	Study name	Data format	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	Risk ratio	к	^
1	Fletcher	Cohort 2x2					0.159	-1.838	1.218	0.229		
2	Dewar	Cohort 2x2					0.471	-0.754	0.723	0.571		
3	1st European	Cohort 2x2					1.460	0.379	0.383	1.349		≡
4	Heikinheimo	Cohort 2x2					1.248	0.222	0.339	1.223		
5	Italian	Cohort 2x2					1.012	0.012	0.350	1.011		
6	2nd European	Cohort 2x2					0.635	-0.454	0.180	0.703		
7	2nd Frankfurt	Cohort 2x2					0.378	-0.973	0.369	0.457		
8	1st Australian	Cohort 2x2					0.754	-0.282	0.280	0.779		
9	NHLBI SMIT	Cohort 2x2					2.587	0.950	0.719	2.377		
10	Valere	Cohort 2x2					1.061	0.060	0.509	1.048		
11	Frank	Cohort 2x2					0.959	-0.042	0.612	0.964		
12	UK Collab	Cohort 2x2					0.876	-0.133	0.219	0.896		
13	Klein	Cohquana					3.200	1.163	1.214	2.571		
14	Austrian	Coha Us	e thes	se tabs	s to s	witch	0.562	-0.576	0.221	0.608		
15	Lasierra	Coho ho	twoon	form	ate		0.222	-1.504	1.242	0.282		
16	N German	Coho	IWCCI		113.		1.215	0.195	0.215	1.161		
17	Witchitz	Coho					0.778	-0.251	0.696	0.813		
18	2nd Australian	Cohon zxz					0.806	-0.215	0.309	0.850		
19	3rd European	Odds ratio	0.418	0.242		0.950	0.416	-0.877	0.276			
20	ISAM	Odds ratio	8.872	0.599		0.950	0.872	-0.137	0.192			
21	GISSI-1	Odds ratio	0.807	0.721		0.950	0.807	-0.214	0.057			
22	ISIS-2	Odds ratio	0.746	0.676		0.950	0.746	-0.293	0.050			
23												~
<												
Coh	ort 2x2 (Events)	Odds ratio	J									_

#### Enter data for second effect size

Data are now entered in the second effect size block for the final four studies.

Effect size index results are automatically calculated and display in the yellow columns. Note that it is <u>not</u> necessary to enter both 'Lower limit' and 'Upper limit' values in this format. (If both <u>are</u> entered, the program will check to ensure that the values are consistent. For example, if the 'Odds ratio' is 1.000 and the 'Lower limit' is 0.500, the 'Upper limit' must be 2.000. Currently, the program allows a small margin for rounding error. (This margin value can be modified through the **Computational options** on the top menu).

Since there is now more than one format, the program has added a column to identify the format for each row. The formats, **Cohort 2x2 (Events)** and **Odds ratio** are inserted by the program automatically when the user enters data.

- Right-click on the data entry columns and select **Show all data entry formats** to modify the display. If you elect to **Hide all data entry formats** they can be redisplayed by right-clicking on the tab at the bottom of the screen.
- Right-click on the yellow columns and add "Risk ratio" as an index. As shown above, this ratio will display for the first 18 studies (since it can be computed from the data provided) but not for the last four.

## View analysis

Comprehensive meta analysis - [Analysis]													
Eile Edit	Format <u>View</u> Con	nputational op	tions Analys	es <u>H</u> elp									
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Model	Study name		Statis	tics for each	study		Events	: / Total		Odd	ds ratio and 95%	s Cl	
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	Treated	Control	0.01	0.10	1.00	10.00	100.00
	Fletcher	0.159	0.015	1.732	-1.509	0.131	1/12	4711	- I	++			
	Dewar	0.471	0.114	1.942	-1.042	0.297	4/21	7/21		1 <u>-1</u> -			
	1st European	1.460	0.689	3.096	0.987	0.323	20/83	15/84				8	
	Heikinheimo	1.248	0.643	2.423	0.655	0.513	22/219	17 / 207					
	Italian	1.012	0.510	2.008	0.034	0.973	19/164	18/157					
	2nd European	0.635	0.447	0.903	-2.529	0.011	69/373	94 / 357					
	2nd Frankfurt	0.378	0.183	0.778	-2.640	0.008	13/102	29/104					
	1st Australian	0.754	0.436	1.306	-1.006	0.314	26 / 264	32 / 253					
	NHLBI SMIT	2.587	0.632	10.596	1.321	0.186	7/53	3/54					
	Valere	1.061	0.392	2.876	0.117	0.907	11 / 49	9/42					
	Frank	0.959	0.289	3.185	-0.068	0.946	6 / 55	6/53		2		3	
	UK Collab	0.876	0.570	1.346	-0.604	0.546	48 / 302	52 / 293					
	Klein	3.200	0.296	34.588	0.958	0.338	4/14	1/9		3			-
	Austrian	0.562	0.365	0.867	-2.609	0.009	37 / 352	65 / 376					
	Lasierra	0.222	0.019	2.533	-1.211	0.226	1/13	3/11					
	N German	1.215	0.797	1.853	0.906	0.365	63 / 249	51 / 234					
	Witchitz	0.778	0.199	3.044	-0.361	0.718	5/32	5/26		-		8	
	2nd Australian	0.806	0.440	1.477	-0.697	0.486	25/112	31/118					
	3rd European	0.416	0.242	0.715	-3.173	0.002				-			
	ISAM	0.872	0.599	1.269	-0.715	0.475					-+-		
	GISSI-1	0.807	0.721	0.903	-3.730	0.000					+		
	ISIS-2	0.746	0.676	0.823	-5.829	0.000					+		
Fixed		0.774	0.726	0.827	-7.672	0.000							
Random		0.783	0.693	0.884	-3.935	0.000					+		
Fixed R	Fixed Random Both models												
Basic stat	s One study rem	ioved Cu	umulative anal	lysis Cali	culations								

For an analysis using odds ratios (as shown here), data from all studies would be available. Note that **Events / Total** counts display where relevant.

For an analysis using risk ratios, only data from the first 18 studies would be available, since the data from the last 4 studies cannot be used to compute a risk ratio.

## Section 3. Working with moderator variables

The program allows you to create two types of moderator variables which can then be used in the analysis. This chapter will describe the use of categorical moderators. (Chapter 9, on 'Meta regression', describes the use of numeric moderators.)

Once a categorical moderator variable is defined the user will be able to group by that variable. The program will also offer options for fixed effect, multiple mixed effect models, and a fully random effects model.

These options, still in development, are explained in this section.

By default, data sets are copied to C:\Program Files\Comprehensive Meta Analysis Version 2\Demo Files. The dataset used in this section is StreptoModerator.

🗄 Comprehensive meta analysis - [C:\Program Files\Comprehensive Meta Analysis Version 2\StreptoMultiF 🗔 🔲 🔀											
Eile	Edit Format View	<u>I</u> nsert Ide	entify Computational options Analyses <u>H</u> elp								
Run	analyses 🔸 🗞	C 🛩 📸									
	Study name	Data format	Odds Lower Upper Confidence Odds ratio Limit Limit level Odds ratio ratio Std Err J K								
1	Fletcher	Cohort 2x2	B Caluma (amot								
2	Dewar	Cohort 2x2	C3 Column format								
3	1st European	Cohort 2x2	Name 79 0.383 DOUDIE-CIICK NE	ere to							
4	Heikinheimo	Cohort 2x2	22 0.339 launch the dial	og.							
5	Italian	Cohort 2x2	12 0.350								
6	2nd European	Cohort 2x2	Variable name Patient Type 54 0.180								
7	2nd Frankfurt	Cohort 2x2	73 0.369								
8	1st Australian	Cohort 2x2	Column function Moderator 32 0.280								
9	NHLBI SMIT	Cohort 2x2	Not specified 50 0.719								
10	Valere	Cohort 2x2	Subgroup within study								
11	Frank	Cohort 2x2	Decimals displayed Comparison								
12	UK Collab	Cohort 2x2	Outcome Select Moderator								
13	Klein	Cohort 2x2	Alignment Time point and enter a variable								
14	Austrian	Cohort 2x2	name								
15	Lasierra	Cohort 2x2	i name.								
16	N German	Cohort 2x2	<del>35 0.215</del>								
17	Witchitz	Cohort 2x2	51 0.696								
18	2nd Australian	Cohort 2x2	15 0.309								
19	3rd European	Odds ratio	77 0.276								
20	ISAM	Odds ratio	37 0.192								
21	GISSI-1	Odds ratio	Cancel 14 0.057								
22	ISIS-2	Odds ratio									
23											
रों											
Co	hort 2x2 (Events)	Odds ratio									

#### Create the moderator column

The program allows you to compare the effect size in two groups of outcomes. For example, you may want to compare the effect size in studies using acute patients with the effect size in studies using chronic patients. In order to group the studies for such a comparison you must first set up a moderator variable column.

- Double-click on an unassigned column header to launch the column format dialog. The dialog allows you to select a column function, in this case **Moderator**, and to enter a variable name, in this case, 'Patient Type'.
- Specify that the variable data type is **Categorical**.
- Click on **OK** to create the moderator column and to begin data entry.

## Enter moderator values

Comprehensive meta analysis - [C:\Program Files\Comprehensive Meta Analysis Version 2\StreptoModera [] [] [X]     Elle Edit Format View Insert Identify Computational options Analyses Help												
Run	analyses 🔸 📎	. 🗅 😅 🚟 🛚		X 🖻 🛍	0 🖄	▶ <b>_ </b> ▶ <u></u> =	•≡ 200 t.0	(i))	$\rightarrow$ +	✓ 🗌 🏄	<b>∡</b> ↓ ⊕	
	Study name	Data format	Treated Events	Treated Total N	Control Events	Control Total N	Odds ratio	Log odds ratio	Std Err	Patient Type	К	
1	Fletcher	Cohort 2x2	1	12	4	11	0.159	-1.838	1.218	Acute		
2	Dewar	Cohort 2x2	4	21	7	21	0.471	-0.754	0.723	Acute		
3	1st European	Cohort 2x2	20	83	15	84	1.460	0.379	0.383	Chronic		≣
4	Heikinheimo	Cohort 2x2	22	219	17	207	1.248	0.222	0.339	Chronic		
5	Italian	Cohort 2x2	19	164	18	157	1.012	0.012	0.350	Chronic		
6	2nd European	Cohort 2x2	69	373	94	357	0.635	-0.454	0.180	Acute		
7	2nd Frankfurt	Cohort 2x2	13	102	29	104	0.378	-0.973	0.369	Acute		
8	1st Australian	Cohort 2x2	26	264	32	253	0.754	-0.282	0.280	Acute		
9	NHLBI SMIT	Cohort 2x2	7	53	3	54	2.587	0.950	0.719	Chronic		
10	Valere	Cohort 2x2	11	49	9	42	1.061	0.060	0.509	Chronic		
11	Frank	Cohort 2x2	6	55	6	53	0.959	-0.042	0.612	Acute 🔺		
12	UK Collab	Cohort 2x2	48	302	52	293	0.876	-0.133	0.219	Acute T		
13	Klein	Cohort 2x2	4	14	1	9	3.200	1.163	1.214	Acute		
14	Austrian	Cohort 2x2	37	352	65	376	0.562	-0.576	0.221	Acute		
15	Lasierra	Cohort 2x2	1	13	3	11	0.222	-1.504	1.242	Chronic		
16	N German	Cohort 2x2	63	249	51	234	1.215	0.195	0.			
17	Witchitz	Cohort 2x2	5	32	5	26	0.778	-0.251	0, E	inter va	lues in	thi
18	2nd Australian	Cohort 2x2	25	112	31	118	0.806	-0.215	0, C	olumn.		
19	3rd European	Odds ratio					0.416	-0.877	0.			
20	ISAM	Odds ratio					0.872	-0.137	0.192	Chronic		
21	GISSI-1	Odds ratio					0.807	-0.214	0.057	Chronic		
22	ISIS-2	Odds ratio					0.746	-0.293	0.050	Chronic		
23												
- 21												<b>M</b>
Coh	ort 2x2 (Events	) Odds ratio									>	J

The moderator values, either "Acute" or "Chronic", are now entered for each study in the 'Patient Type' column. The toggle button circled above allows you to switch to dropdown data entry, so that you can enter "Acute" or "Chronic" by typing only the first letter of either word.

#### Select a grouping variable



Click on the **Computational options... Group by** selection to launch the **Group by** dialog.

🛱 Group by 🔀
Run a separate analysis for each level of
Patient Type
Also run analysis across levels of patient type
Compare effect at different levels of patient type
Reset Apply Ok

Select 'Patient Type' as the moderator.

In this example we will run an analysis within each patient level and an 'overall analysis' across all levels. Because the second box is checked, within-groups and between-groups heterogeneity values will be provided in the appropriate view (described below).

## Run Group by... analysis

Comprehensive meta analysis - [Analysis]												- 🗆 🗙
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🔶 Data er	ntry t∓	Next table	井 High res	olution plot	E Select by	/ 🕂 🕂 Eff	ect measure	Odds ratio	•		Ī∄E.	<u>í</u> f
Model	Group by Patient	Study name		Statis	stics for each s	tudy			Odds ratio a	and 95% confider	ice interval	
			Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00	10.00	100.00
	Acute	Fletcher	0.159	0.015	1.732	-1.509	0.131	1-			1	
	Acute	Dewar	0.471	0.114	1.942	-1.042	0.297		—			
	Acute	2nd European	0.635	0.447	0.903	-2.529	0.011					
	Acute	2nd Frankfurt	0.378	0.183	0.778	-2.640	0.008		-   -			
	Acute	1 st Australian	0.754	0.436	1.306	-1.006	0.314			-+-		
	Acute	Frank	0.959	0.289	3.185	-0.068	0.946					
	Acute	UK Collab	0.876	0.570	1.346	-0.604	0.546			-+-		
	Acute	Klein	3.200	0.296	34.588	0.958	0.338					-
	Acute	Austrian	0.562	0.365	0.867	-2.609	0.009					
	Acute	3rd European	0.416	0.242	0.715	-3.173	0.002					
Fixed	Acute	4.15	0.622	0.517	0.749	-5.010	0.000			+		
	Chronic	1st European	460	0.689	3.096	0.987	0.323					
	Chronic	Heikinheimo	1.24%	0.643	2.423	0.655	0.513					
	Chronic	NUIDICMIT	1.012		Summa	rv for e	each ai	quo				
	Chronic	Valore	2.007			,						
	Chronic	valete Lasierra	0.222		2533	.1 211	0.226					
	Chronic	N German	1 215	0.010	1 853	0.906	0.220			4.		
	Chronic	Witchitz	0.778	0.199	3.044	-0,-000	0.000					
	Chronic	2nd Australian	0.806	0.440	1.477	-0 c	umma	ru oor	see all	etudioe		
	Chronic	ISAM	0,872	0.599	1.269	<u></u>	oumma	iny acro	55 ali	Sludies		
	Chronic	GISSI-1	0.807	0.721	0.903	-3.						
	Chronic	ISIS-2	0.746	0,678	0.823	-5.829	0.000			+		
Fixed	Chronic		0.799	0.745	0.856	-6.313	0.000			+		
Fixed	Overall		0.774	0.726	0.827	-7.672	0.000			+		
Fixed B	andom Bot	h models										
Basic stat	te One shu	du removed	Cumulative on	alueie Ca	loulations							
Dasic sta	us one stu	ay temoved	Santalauve dri	uiyolo Ud	ICUIDUIS							

The pale yellow rows provide summaries at each level, "Acute" and "Chronic". The bold yellow 'Overall' row provides a summary for both levels.

#### Select a computational model

Select View... Analysis to switch to the 'Analysis' screen.



Click on the **Computational options... Mixed and random effects options** selection to launch the dialog.

🕏 Mixed and random effects options 🛛 🔀									
Combining studies within a subgroup									
<ul> <li>Assume a common among-study variance component across subgroups (pool within-group estimates of tau-squared).</li> </ul>									
Do not assume a common among-study variance component across subgroups (do not pool within-group estimates of tau-squared). This is the option used by RevMan.									
Combining subgroups to yield an overall effect									
Combine subgroups using fixed effect model									
C Combine subgroups using random effects model									
Cancel Apply Ok									

The options selected here will determine the model to be used for calculating group summary and overall summary values.

<u>File</u> <u>E</u> dit	: F <u>o</u> rmat <u>V</u> iew Compu	tational options	Analyses H	įelp							$\wedge$	
← Data	entry t⊒ Next tab	le 🏦 H	ligh resolution	plot 🔤 Se	elect by	+ Effect measure	re: Odds ratio	- 3 (		1 <b>≇</b> E	£  1	
	Groups		Effect siz	e and 95% i	nd 95% interval Test of null (2-Tail) Heterogeneity						V	Tau
-	Group	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
	Fixed effect analysi	s										
	Acute Chronic Total within	10 12	0.622 0.799	0.517 0.745	0.749 0.856	-5.010 -6.313	0.000 0.000	10.800 14.609 25.409	9 11 20	0.290 0.201 0.186	16.663 24.705	0.020 0.008
	Overall	22	0.774	0.726	0.827	-7.672	0.000	31.513	21	0.013	33.360	0.017
	Mixed effects analy	sis										
	Acute Chronic Total between	10 12	0.617 0.847	0.496 0.752	0.766 0.954	-4.359 -2.741	0.000 0.006	6.289	1	0.012		
	Overall	22	0.787	0.709	0.874	-4.497	0.000	🖪 Com	outationa	al options		
< Fixed	Random Both models		Ш				]	File Fon Mixed e used to fixed eff and yiel variance same fo within st subgrou	t size combine st ect model i: d the overa e (tau-squar r all subgrou ubgroups ar ps.	usis - A rando udies within e s used to con ill effect. The red) is NOT a ups - this valu nd NOT pool	m effects model is each subgroup. A hbine subgroups e study-to-study ssumed to be the ue is computed ed across	

#### View additional statistics by group

Click on the **Next table** toggle option to display this window, showing additional statistics at each level and overall. The within-groups and between-groups heterogeneity values are also broken out. In the report pop-up is a brief explanation of the assumptions which underlie the selected models. The circled icon allows the user to display and hide the report pop-up.

## Recode column values

T C	omprehensive met	a analysis -	[C:\Pr	ogram Files\Comprehensive Meta Analysis Vers	ion 2\S	Strepto 🗖 🗖 🔀
File	Edit Format View I	nsert Identify	<u>T</u> ools	Computational options Analyses <u>H</u> elp		
Run	analyses 🔸 🛇 🗋	🖻 🖷 🖬	<b>a</b> 3	೫ 🖻 🛍 🚈 ┝━ ┝☰ 🕫 ‰ 🛱 🔍 🗸	<b>→</b> +	✓ 🗌 🏦 🕌 🔍
	Data format	Treated Events	Treated Total N	d Control Control Ddds ratio Log odds S V Events Total N	itd Err	Patient K
1	Cohort 2x2 (Events)	1		1 Column format		Acute
2	Cohort 2x2 (Events)	4				Acute
3	Cohort 2x2 (Events)	20	N	Name Values	3	Chronic
4	Cohort 2x2 (Events)	22		[]	_ 1	Chronic
5	Cohort 2x2 (Events)	19		Values	<u> </u>	Chronic
6	Cohort 2x2 (Events)	69		Acute	=	Acute
7	Cohort 2x2 (Events)	13			. )	Acute
8	Cohort 2x2 (Events)	26			þ	Acute
9	Cohort 2x2 (Events)	7			9	Chronic
10	Cohort 2x2 (Events)	11			9	Chronic
11	Cohort 2x2 (Events)	6			2	Acute
12	Cohort 2x2 (Events)	48			9	Acute
13	Cohort 2x2 (Events)	4			ŀ	Acute
14	Cohort 2x2 (Events)	37				Acute
15	Cohort 2x2 (Events)	1				Chronic
16	Cohort 2x2 (Events)	63		1	ş	Chronic
17	Cohort 2x2 (Events)	5			þ	Chronic
18	Cohort 2x2 (Events)	25		Use drop-down box for data entry	9	Chronic
19	Odds ratio				5	Acute
20	Odds ratio			Remove selected values Recode	2	Chronic
21	Odds ratio			Remove unused values Cancel		Chronic
22	Odds ratio			Copy values from Ok		Chronic 💽
<		1111				>
Coh	ort 2x2 (Events)	Idds ratio			]	

The program offers a set of options for making general changes to the contents of a column. To make such changes to the 'Patient Type' column, you would double-click on the column header and select the **Values** tab in the dialog, as shown above.

You could then do the following:

- **Remove selected values** or **Remove unused values**. The removed values will no longer appear in the 'Patient Type' data entry dropdown.
- **Copy values from.** Copy values from another column so that they are available for selection in the 'Patient Type' data entry dropdown.
- **Recode.** Modify all instances of a value in the column. As an example, the following image shows how to change "Chronic" and "Acute" to "Chronic condition" and "Acute condition" throughout the 'Patient Type' column.

<b>•</b> † 0	omprehensive met	a analysis	- [C:\Program Files	\Comprehens	ive Meta Ana	alysis Ve	ersion 2\S	trepto	
Eile	Edit Format View I	nsert Identi	fy <u>T</u> ools Computationa	al options Analy	ses <u>H</u> elp				
Run	analyses → 🗞 🗅	🗠 😭 🗖	💷 V 🗗 🕋	<u>a ) _ ) _ (</u>	= .00 +.0 ·	++	$\rightarrow$ +	✓ 🗆 🗛	I ZI 🕕
			Column format					• [] 2	AT
	Data format	Treate Event Na	me Values				Std Err	Patient Type	к 🚔
1	Cohort 2x2 (Events)						1.218	Acute	
2	Cohort 2x2 (Events)		Current value	New valu	ie	<b>^</b>	0.723	Acute	_
3	Cohort 2x2 (Events)		Acute	Acute co	ndition		0.383	Chronic	=
4	Cohort 2x2 (Events)		Chronic	Chronic o	ondition	=	0.339	Chronic	
5	Cohort 2x2 (Events)		[Blank]	[Blank]		_	0.350	Chronic	
6	Cohort 2x2 (Events)					_	0.180	Acute	
7	Cohort 2x2 (Events)					_	0.369	Acute	
8	Cohort 2x2 (Events)					_	0.280	Acute	
9	Cohort 2x2 (Events)					-	0.719	Chronic	
10	Cohort 2x2 (Events)					-	0.509	Chronic	
11	Cohort 2x2 (Events)					-	0.612	Acute	
12	Cohort 2x2 (Events)						0.219	Acute	
13	Cohort 2x2 (Events)		1			×	1.214	Acute	
14	Cohort 2x2 (Events)						0.221	Acute	
15	Cohort 2x2 (Events)		Use drop-down box	for data entry			1.242	Chronic	
16	Cohort 2x2 (Events)						0.215	Chronic	
17	Cohort 2x2 (Events)						0.696	Chronic	
18	Cohort 2x2 (Events)				Cancel recr	ode	0.309	Chronic	
19	Odds ratio				Anderfect		0.276	Acute	
20	Odds ratio				Apply reco	ae	0.192	Chronic	
21	Odds ratio						0.057	Chronic	
22	Odds ratio				0.746	-0.293	0.050	Chronic	~
<									>
Coh	ort 2x2 (Events)	dds ratio							

Click on **Apply recode** to replace the current column values with new values.

## Section 4. Subgroups within studies

In the main example summary data were recorded for the full sample in each study.

The program also allows the user to record data for subgroups within the study. For example, if there were reason to believe that the treatment effect varied as a function of gender, some (or all) studies might report the treatment effect separately for males and females.

In this case we would enter the data for each study on two rows – one for males and one for females.

In the analyses we would want to do some (or all) of the following:

- Using subgroup as the unit of analysis, run an analysis grouped by gender. This would report the treatment effect for each gender, and assess the impact of gender on the treatment effect. We could also run an overall analysis.
- Using subgroup as the unit of analysis, run the analysis for either gender alone.
- If it emerged that the treatment effect was comparable for males and females, the researcher might elect to use study as the unit of analysis. This would require having the program collapse the rows for male and female within each study, and impute the values for the full group.

The program offers all of these options, which are outlined in this section.

By default, data sets are copied to C:\Program Files\Comprehensive Meta Analysis Version 2\Demo Files. The dataset used in this section is StreptoSubGroups.

Eile	Edit Format View	<u>I</u> nsert Identify C	omputationa	al options A	nalyses <u>H</u> e	elp	Anatysis re		reprosabo			
Run	analyses → 🏷 [	) 🛩 🖷 🖬 🖶	) 🔏 🗈	<b>B</b>  0 \$	20 <b>) 1</b> -	= * <b>=</b>   #	8 1.0 11	. ↓→	+ 🗸 🗌	( <b>=</b> )=		. [ ς
	Study name	Subgroup within study	Treated Events	Treated Total N	Control Events	Control Total N	Odds ratio	Log odds ratio	Std Err	J	К	
1	Fletcher	Both	1	12	4	11	0.159	-1.838	1.218			_
2	Damas	Female	2	10	4	10	0.375	-0.981	1.021			
3	Dewar	Male	2	11	3	11	0.593	-0.523	1.034			
4	1 - 1	Female	11	40	7	42	1.897	0.640	0.545			
5	ist European	Male	9	43	8	42	1.125	0.118	0.543			
6	11-11-1-1-1-1-1	Female	12	100	9	105	1.455	0.375	0.465			
- 7	reikinneimo	Male	10	119	8	102	1.078	0.075	0.495			
		-	19	164	18	157	1.012	0.012	0.350			
s w	ith identica	ale	37	150	46	177	0.932	-0.070	0.255			
ly r	names are		32	223	48	180	0.461	-0.775	0.255			
non	4		13	102	29	104	0.378	-0.973	0.369			
get		ale	12	135	16	124	0.659	-0.418	0.404			
13		Male	14	129	16	129	0.860	-0.151	0.389			
14	NHLBI SMIT	Both	7	53	3	54	2.587	0.950	0.719			
15	Valere	Both	11	49	9	42	1.061	0.060	0.509			
16	Frank	Both	6	55	6	53	0.959	-0.042	0.612			
17		Female	27	150	25	141	1.019	0.018	0.306			
18	OK COIIaD	Male	21	152	27	152	0.742	-0.298	0.317			
19	Klein	Both	4	14	1	9	3.200	1.163	1.214			
20	Austrian	Female	18	170	32	180	0.548	-0.602	0.316			
21	Austran	Male	19	182	33	196	0.576	-0.552	0.309			
22	Lasierra	Both	1	13	3	11	0.222	-1.504	1.242			
23	N German	Female	34	125	24	120	1.495	0.402	0.304			
24	n Goman	Male	29	124	27	114	0.984	-0.017	0.306			
25	Witchitz	Both	5	32	5	26	0.778	-0.251	0.696			
26	2nd Australian	Both	25	112	31	118	0.806	-0.215	0.309			
27	3rd European	Both	25	156	50	159	0.416	-0.877	0.277			
28	ISAM	Both	54	859	63	882	0.872	-0.137	0.192			
29	GISSI-1	Female	321	2939	381	2922	0.818	-0.201	0.081			
30	anoorn	Male	327	2921	377	2930	0.854	-0.158	0.081			
31	ISIS-2	Both	791	8592	1029	8595	0.746	-0.294	0.050			
1												>

## Create column for subgroups within study

#### Select Insert... Column for... Study names Select Insert... Column for... Subgroups within studies

In this example the study name "Dewar" extends across two rows to accommodate the two subgroups. This is controlled by toggling the **Merge** icon, circled on the toolbar.

## View analysis

	Comprehensive	meta analys	s - [Analysi	s]	
	<u>File E</u> dit F <u>o</u> rmat <u>Vi</u>	w Computatio	nal options Ar	alyses <u>H</u> elp	
	← Data entry	→ Next table	井 High	resolution plot 🛛 🖶 Select by 🔸 Effect measure: Odds ratio 🔹 🗐 🔛 🛱 🗜 .	🖓 🖞
	Model Study name	Subgroup within study	Odds ratio	Select by Moderator Moderator 10.00 10.00	100.00
	Dewar Dewar 1st Europear 1st Europear Heikinheimo	Female Male Female Male Female	0.375 0.593 1.897 1.125 1.455 1.079	Image: Select all image: Select	
Right-clicl Select by study to la	k here and c Subgroup v aunch the di	noose vithin alog.	1.078 1.012 0.932 0.461 0.378 0.659		
	NHLBI SMIT Valere Frank UK Collab UK Collab UK Collab Klein Austrian Austrian Lasierra N German Witchitz 2nd Australia 3rd Europear ISAM GISSI-1 GISSI-1 ISIS-2 Fixed	Both Both Both Female Male Both Female Male Both Female Both Both Both Female Both Female Male Both Both	0.860 2.587 1.051 0.959 1.019 0.742 3.200 0.548 0.576 0.222 1.495 0.984 0.778 0.806 0.416 0.872 0.818 0.854 0.872 0.818 0.854 0.854 0.874	Cancel Apply Ok U/35 U.837 -/.33U U.000 +	
	Fixed Random B	oth models	0.704	uras usar 7,330 0,000 - *	<b>~</b>
	Basic stats One s	tudy removed	Cumulative	analysis Calculations	

At the top of the dialog box, use check-marks to select which subgroups should be included in the analysis.

At the bottom of the dialog box, specify whether to use subgroup within study or study as the unit of analysis.

If subgroup is the unit of analysis, you may use the **Group by** button and run an analysis using gender as the moderator variable.

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•T Com	prehensive m	ieta analysi	is - [Analysi			
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← Data	entry t∓	Next table	井 High I	esolution plot 🛛 🔁 Select by 🕇 🕂 Effect measure: Odds ratio 🔹 🗨 🚍	_ ≝∏ <b>₽</b> ⊑_	🖓 🖞   🗄
Model	Study name	Subgroup within study	Odds ratio	Select by     Studies Subgroups Moderator	95% CI 10.00 1	00.00
	1st Australian 1st European 2nd Australian 2nd European 2nd Frankfurt 3rd European Austrian Dewar Fletcher Frank GISSI-1 Heikinheimo ISAM ISIS-2 Italian Klein Lasierra N German NHLBI SMIT UK Collab Valere	Combined Combined Both Both Combined Combined Combined Both Both Both Both Both Both Both Both	0.754 1.460 0.806 0.635 0.378 0.416 0.562 0.471 0.159 0.856 1.248 0.872 0.746 1.012 3.200 0.222 1.215 2.587 0.876 1.061 0.776	Both     Select all     Clear all     Use subgroup within study as the unit of analysis     Use study as the unit of analysis		
Fixed			0.783			
				Cancel		
Fixed	Random Bot	h models				
Basic s	t <b>ats</b> One stu	dy removed	Cumulative	analysis Calculations		

## Use study as the unit of analysis

This analysis is run according to the selection: Use study as the unit of analysis.

Those studies with multiple subgroups display the term 'Combined' in the **Subgroups** within study column. Those studies that had initially been entered on one line as "Both" are displayed here as they had been entered, since there is no imputation required.

#### Multiple sets of subgroups

The program can accommodate studies which report treatment effect for more than one set of subgroups.

For instance, certain studies may report results by age level as well as by gender. Such subgroup sets are not independent; they share subjects. It is therefore necessary to limit the analysis to one set at a time.

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Run	analyses 🔸 📎	D 🚅 📆 🖬 🗧	\$ X 🖻	<b>E</b> 27	<b>}_}=</b>	•≣ ÷® t	\$8 👬 🔻 🗸	$\downarrow \rightarrow +$	I =	≡ <u></u> <u></u> ‡	🗱 🔍
	Study name	Subgroup within study	Treated Eivents	Treated Total N	Control Eivents	Control Total N	Odds ratio	Log odds ratio	Std Err	J	* <b>^</b>
1	Fletcher	Both	1	12	4	11	0.159	-1.838	1.218		
2	Dewar	40 and Under	4	11	3	11	1.524	0.421	0.923		
3	Dewar	Female	2	10	4	10	0.375	-0.981	1.021		
4	Dewar	Male	2	11	5	11	0.267	-1.322	0.989		
5	Dewar	Over 40	4	10	4	10	1.000	0.000	0.913		
6	1st European	40 and Under	11	43	8	42	1.461	0.379	0.526		
7	1st European	Female	11	40	7	42	1.897	0.640	0.545		
8	1st European	Male	9	43	10	42	0.847	-0.166	0.521		
9	1st European	Over 40	15	40	15	42	1.080	0.077	0.459		~
<											>
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As an example, to accommodate both age and gender subgroup sets, first enter the data as shown above.

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Run	analyses 🔸 🗞	) 🚅 👬 🖬 🖉	) 🐰 🖻	<b>E</b>	<b>≻-</b> *=	È *** ;	:8 ∺ 🔽 🗸	$\downarrow \rightarrow +$	/ □(□	=) <b>≜</b> ↓ }	Z↓ 🔍
	Study name	Subgroup within study	Treated Events	Treated Total N	Control Eivents	Control Total N	Odds ratio	Log odds ratio	Std Err	J	k <b>~</b>
1	Fletcher	Both	1	12	4	11	0.159	-1.838	1.218		
2	Dewar	40 and Under	4	11	3	11	1.524	0.421	0.923		
3	Dewar	Female	2	10	4	10	0.375	-0.981	1.021		
4	Dewar	Male	2	11	5	11	0.267	-1.322	0.989		
5	Dewar	Over 40	4	10	4	10	1.000	0.000	0.913		
6	1st European	40 and Under	11	43	8	42	1.461	0.379	0.526		
7	1st European	Female	11	40	7	42	1.897	0.640	0.545		
8	1st European	Male	9	43	10	42	0.847	-0.166	0.521		
9	1st European	Over 40	15	40	15	42	1.080	0.077	0.459		~
<		L.									>
Coh	Cohort 2x2 (Events)										

To merge contiguous study names, click on the circled icon.

## Filter subgroup sets for analysis

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🔶 Data er	ntry t⊒ I	Next table	井 High	Studies Subgroups Moderator		]
0				Studies Subgroups Moderator		
Model	Study name	Subgroup within studu	Statis	Include the following subgroups		
		within study	Odds ratio	<ul> <li>✓ 40 and Under</li> <li>✓ Both</li> </ul>	Select all Clear all	ю
	Fletcher Dewar Dewar	Both 40 and Over 40	0.159 1.524 1.000	☐ Female Male ✓ Over 40		
	1st 1st	40 and Over 40	1.461 1.080			
Fixed			1.091			
				<ul> <li>Use subgroup within study as the unit of analysis</li> <li>Use study as the unit of analysis</li> </ul>	Apply	
Fixed R	andom Both	models				

In the **Select by...** dialog, uncheck those subgroups which don't belong to the set you wish to include in the current analysis. In this example, the gender subgroups, 'Male' and 'Female', are excluded from the analysis.

This approach should also be used to manage multiple sets of comparisons, outcomes or time points.

## Section 5. Multiple outcomes within studies

In the initial example, we assumed that we needed to record one treatment effect for each study. However, there are situations where the user will want to record more than one treatment effect per study. These are outlined here.

- More than one comparison per study. Assume that some (or all) studies report the treatment effect for Control vs Treatment-A and also Control vs Treatment-B. We would want to record each treatment effect, and then use this information in the analysis.
- More than one outcome per study. Assume that some (or all) studies report the treatment effect for more than one dependent variable – for example, the impact of the treatment in preventing myocardial infarction and also its impact in preventing death. We may want to run one analysis for the first outcome and a separate analysis for the second.
- More than one time point. Assume that studies record the treatment effect at six months and also at one year. We would want to record both, and then run the analysis on one or the other.

This synopsis is meant only to introduce the topic of multiple, non-independent data points. The ability of the program to work with these will be much more extensive than alluded to here.

In this example we limit ourselves to the simplest case, where the user selects one item of information from each study. This example focuses on outcomes, but the same options are available for comparisons or time points.

A separate section in this document addresses the use of multiple subgroups within studies.

By default, data sets are copied to C:\Program Files\Comprehensive Meta Analysis Version 2\Demo Files. The dataset used in this section is StreptoOutcomes.

## Create the outcome column

🛃 Comprehensive meta analysis - [Data]	Comprehensive meta analysis - [Data]										
Eile Edit Format View Insert Identify Comput	nal options Analyses <u>H</u> elp										
Run analyses → 🏷 [] 📶 Column for	• Study names $\downarrow^{00}_{+0}$ $\downarrow^{00}_{+0}$ $\uparrow^{00}_{+1}$ $\downarrow \downarrow \rightarrow + \checkmark \square \uparrow^{00}_{+1}$ $\downarrow^{00}_{+1}$										
Study name Blank column	Subgroups within study odds odds Std Err I J K L M										
1 2 Blank row B Copy of selected row	Outcome names										
4 <b>™</b> ≣ Study	Effect size data     Moderator variable										
6 7 8	First, insert a column for Study name Then, insert a column for Outcome	es.									
9 10 11	name.										
11		>									
Cohort 2x2 (Events)											

Select Insert... Column for... Study names. Select Insert... Column for... Outcome name.

## Enter outcome values

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	Study name	Outcome	Treated Events	Treated Total N	Control E vents	Control Total N	Odds ratio	Log odds ratio	Std Err	J		К	^
1	Fletcher	Death	1	12	4	11	0.159	-1.838	1.218				
2	Fletcher	Myocardial	2	12	4	12	0.400	-0.916	0.987				
3	1st Myocardial	Myocardial	51	277	87	327	0.623	-0.474	0.199				
4	Dewar	Death	4	21	7	21	0.471	-0.754	0.723				
5	Dewar	Myocardial	4	24	8	22	0.350	-1.050	0.705				
6	1st European	Death	20	83	15	84	1.460	0.379	0.383				
7	1st European	Myocardial	18	88	14	87	1.341	0.293	0.394				≡
8	Heikinheimo	Death	22	219	17	207	1.248	0.222	0.339				
9	Heikinheimo	Myocardial	23	244	16	200	1.197	0.180	0.340				
10	Italian	Death	19	164	18	157	1.012	0.012	0.350				
11	Italian	Myocardial	21	177	14	147	1.279	0.246	0.365				
12	2nd European	Death	69	373	94	357	0.635	-0.454	0.180				
13	2nd Frankfurt	Death	13	102	29	104	0.378	-0.973	0.369				
14	1st Australian	Death	26	264	32	253	0.754	-0.282	0.280				
15	1st Australian	Myocardial	29	277	29	248	0.883	-0.124	0.279				
16	NHLBI SMIT	Death	7	53	3	54	2.587	0.950	0.719				
17	Valere	Death	11	49	9	42	1.061	0.060	0.509				
18	Frank	Death	6	55	6	53	0.959	-0.042	0.612				
19	UK Collab	Death	48	302	52	293	0.876	-0.133	0.219				
20	UK Collab	Myocardial	44	280	51	297	0.899	-0.106	0.225				
21	Klein	Death	4	14	1	9	3.200	1.163	1.214				
22	Klein	Myocardial	5	15	1	8	3.500	1.253	1.201				
23	Austrian	Death	37	352	65	376	0.562	-0.576	0.221				
24	Austrian	Myocardial	41	341	62	388	0.719	-0.330	0.217				
25	Lasierra	Death	1	13	3	11	0.222	-1.504	1.242				
26	N German	Death	63	249	51	234	1.215	0.195	0.215				
27	Witchitz	Death	5	32	5	26	0.778	-0.251	0.696				
28	Witchitz	Myocardial	4	28	5	24	0.633	-0.457	0.738				
29	2nd Australian	Death	25	112	31	118	0.806	-0.215	0.309				
30	2nd Myocardial	Myocardial	8	47	7	57	1.465	0.382	0.560				
31	3rd European	Death	25	156	50	159	0.416	-0.877	0.277				
32	ISAM	Death	54	859	63	882	0.872	-0.137	0.192				
33	GISSI-1	Death	628	5860	758	5852	0.807	-0.215	0.057				
34	ISIS-2	Death	791	8592	1029	8595	0.746	-0.294	0.050				-
	1010 -												
Coh	Cohort 2x2 (Events)												

In this example some studies contain both outcomes, some only one.

#### View analysis for one outcome



Note that only one outcome displays in the **Outcome** column. That is the only outcome selected in the dialog.

With the settings provided in the **Group by** dialog, you can also produce analyses which group results by outcome across multiple outcomes.

## Section 6. Importing data from other programs

The data entry screen is a spreadsheet, and the user may cut and paste data from most programs, such as Excel, STATA, or SPSS, which are able to display the data in spreadsheet form.

To import data

- Switch to the other program and display the data in the Grid View.
- Copy the data to the Windows clipboard (CTRL-C)
- Switch to this program and paste the data into the spreadsheet (CTRL-V)

One step remains – the user must identify the column with the study names, and the columns with the effect size data. Instructions follow.

By default, data sets are copied to C:\Program Files\Comprehensive Meta Analysis Version 2\Demo Files.

The Excel spreadsheet is BCG.xls. The CMA data file is BCG.cma.

## Import data from Excel

⊠≀	Aicrosoft Excel - BCGImportD	)emo									
8	<u>File E</u> dit <u>V</u> iew Insert F <u>o</u> r	mat <u>T</u> ools	<u>D</u> ata <u>W</u> indo	w <u>H</u> elp				Type a c	juestion for hel	P	з×
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	A	В	С	D	E	F	G	Н		J	
		Treated		Control							
1	Study	Events	Treated N	Events	Control N						- 1
2	Aronson, 1948	4	123	11	139						_
3	Ferguson & Simes, 1949	6	306	29	303						- 1
4	Rosenthal, 1960	3	231	11	220						
5	Hart & Sutherland, 1977	62	13,598	248	12,867						
6	Frimodt-Moller, 1973	33	5,069	47	5,808						
7	Stein & Aronson, 1953	180	1,541	372	1,451						
8	Vandiviere, 1973	8	2,545	10	629						
9	Madras, 1980	505	88,391	499	88,391						
10	Coetze & Berjak, 1968	29	7 ,499	45	7,277						
11	Rosenthal, 1961	17	1,716	65	1,665						
12	Comstock, 1974	186	50,634	141	27,338						
13	Comstock & Webster, 1969	5	2,498	3	2,341						
14	Comstock, 1976	27	16,913	29	17,854						
15											
16											
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10	Sheet1 / Sheet2 / Sh	neet3 /								•	Ē
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The program allows you to import data already stored on an Excel spreadsheet. It provides simple procedures to assign the imported data to population and effect size entry columns in the Data Entry module.

The Excel spreadsheet above contains the BCG data used in an earlier sequence.

Copy the Excel data into a buffer (using 'Ctrl-C', for instance).

(The same approach will work with SPSS, STATA, and most programs that can display the data in a grid).

Paste data into the data entry	<i>module</i>
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<b>.</b>	T Comprehensive meta analysis - [Data]									
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1	Study	Treated Events	Treated N	Control Events	Control N				≡	
2	Aronson, 1948	4.000	123.000	11.000	139.000					
3	Ferguson & Simes, 1949	6.000	306.000	29.000	303.000					
4	Rosenthal, 1960	3.000	231.000	11.000	220.000					
5	Hart & Sutherland, 1977	62.000	13598.000	248.000	12867.000					
6	Frimodt-Moller, 1973	33.000	5069.000	47.000	5808.000					
7	Stein & Aronson, 1953	180.000	1541.000	372.000	1451.000					
8	Vandiviere, 1973	8.000	2545.000	10.000	629.000					
9	Madras, 1980	505.000	88391.000	499.000	88391.000					
10	Coetze & Berjak, 1968	29.000	7499.000	45.000	7277.000					
11	Rosenthal, 1961	17.000	1716.000	65.000	1665.000					
12	Comstock, 1974	186.000	50634.000	141.000	27338.000					
13	Comstock & Webster, 1969	5.000	2498.000	3.000	2341.000					
14	Comstock, 1976	27.000	16913.000	29.000	17854.000					
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Switch to Comprehensive Meta Analysis and use 'Ctrl-V' to paste the data into the spreadsheet.

# Assign column header titles

<b>.</b>	T Comprehensive meta analysis - [Data]									
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Run	analyses 🔸 🏷 🗋 🚅 🖡	ii 🖬 🎒 🐰	Þa 🛍 🖉	∕≣ ) •=	••• ••• ]≣•	4⊡ ↓	$\rightarrow + \checkmark$	∕□ ≜↓	<b>z</b> t 🔍	
	А	В	С	D	E	F	G	н		
1	Study	Treated Events	Treated N	Control Events	Control N				≡	
2	Aronson, 1948	4.000	123.000	11.000	139.000					
3	Ferguson & Simes, 1949	6.000	306.000	29.000	303.000					
4	Rosenthal, 1960	3.000	231.000	11.000	220.000					
5	Hart & Sutherland, 1977	62.000	13598.000	248.000	12867.000					
6	Frimodt-Moller, 1973	33.000	5069.000	47.000	5808.000					
7	Stein & Aronson, 1953	180.000	1541.000	372.000	1451.000					
8	Vandiviere, 1973	8.000	2545.000	10.000	629.000					
9	Madras, 1980	505.000	88391.000	499.000	88391.000					
10	Coetze & Berjak, 1968	29.000	7499.000	45.000	7277.000					
11	Rosenthal, 1961	17.000	1716.000	65.000	1665.000					
12	Comstock, 1974	186.000	50634.000	141.000	27338.000					
13	Comstock & Webster, 1969	5.000	2498.000	3.000	2341.000					
14	Comstock, 1976	27.000	16913.000	29.000	17854.000					
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In this example the top row of the data file contains titles ("Study", etc). Click on **Format** and select **Use first row as labels.** 

🕂 C	Comprehensive meta analysis - [Data]										
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	Study	Treated Events	Treated N	Control Events	Control N	>	G	н			
1	Aronson, 1948	4.888	123.000	11.000	139.000					≡	
2	Ferguson & Simes, 1949	6.000	306.000	29.000	303.000						
3	Rosenthal, 1960	3.000	231.000	11.000	220.000						
4	Hart & Sutherland, 1977	62.000	13598.000	248.000	12867.000						
5	Frimodt-Moller, 1973	33.000	5069.000	47.000	5808.000						
6	Stein & Aronson, 1953	180.000	1541.000	372.000	1451.000						
7	Vandiviere, 1973	8.000	2545.000	10.000	629.000						
8	Madras, 1980	505.000	88391.000	499.000	88391.000						
9	Coetze & Berjak, 1968	29.000	7499.000	45.000	7277.000						
10	Rosenthal, 1961	17.000	1716.000	65.000	1665.000						
11	Comstock, 1974	186.000	50634.000	141.000	27338.000						
12	Comstock & Webster, 1969	5.000	2498.000	3.000	2341.000						
13	Comstock, 1976	27.000	16913.000	29.000	17854.000						
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## Assign a 'Study name' column

Comprehensive meta	analysis - [Data]				<
Elle       Edit       Format       View       Implementation         Run analyses       →       \box       \box       \box       \box       Tr         1       Aronson, 1948       2       Ferguson & Simes,       3       Rosenthal, 1960       4       Hart & Sutherland,         2       Double-click on columneader to launch the double       \box       \box       \box       \box	S Column format Name Values Variable name Column function In ialog.	Study name Study name Study name Subgroup within study Comparison Outcome	F	+ ✓ □ H	
9 Coetze & Berjak, 10 Rosenthal, 1961 11 Comstock, 1974 12 Comstock & 13 Comstock, 1976 14 15 16 17 18		Moderator Cancel			~

Double-click on the header for the "Study" column and identify the function of the column as 'Study name'.

Note: This is required even though the column is named "Study".

## Identify the effect size columns

<b>₽</b> C	omprehensive m	neta analysis -	[Data]										JX
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	Study	Treated Events	Treated N		Subgroups with Comparison nar	in study nes	ŀ	F		G	н	1	P
1	Aronson, 1948	4.000	123		Outcome names	S							
2	Ferguson & Simes,	6.000	306		Time point name	es							
3	Rosenthal, 1960	3.000	231	2	Effect size data	N .							
4	Hart & Sutherland,	62.000	13598	4	Mederator varia	bla k							
5	Frimodt-Moller,	33.000	5069	+	Moderator varia	DIE							
6	Stein & Aronson,	180.000	1541		372.000	1451							
7	Vandiviere, 1973	8.000	2545		10.000	629							
8	Madras, 1980	505.000	88391		499.000	88391							
9	Coetze & Berjak,	29.000	7499	$\square$	45.000	7277							
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13	Comstock, 1970	27.000	10313	_		17854							
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#### Select Identify... Column for... Effect size data

Be sure to use **Identify** to identify the existing columns, rather than **Insert**, which would create new columns.

The program will launch the effect size entry wizard. The function is identical to that for creating a new spreadsheet, until the last panel of the wizard. There, instead of <u>creating</u> the columns, the program will ask you to <u>identify</u> their location.

#### Select effect size entry format



The third screen shows the list of formats arranged hierarchically. In the running example, drill down in the hierarchy to select the following:

#### • Dichotomous (number of events)

# Unmatched groups, prospective (e.g., controlled trials, cohort studies) Events and sample size in each group

At this point, the Next button will be activated. Click on it to proceed to the final screen.

## Assign effect size entry columns



Select a column title from the dropdown in order to assign that column's data to the corresponding effect size entry column.

Then, click Finish.

## All imported columns assigned

📑 c	omprehensive meta ana	lysis - [Dat	a]								X
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Run	analyses 🔸 🏷 🗋 🚘 🖣	i 🖪 🎒	ሯ 🖻 🕻	108	₫   • •=	= ▶≣  ;%	₩ 🖬 🖃	$\downarrow \rightarrow +$	- 🗸 🗌	<b>≜</b> ↓ <mark>Z</mark> ↓	0
	Study	Treated Events	Treated Total N	Control Events	Control Total N	Odds ratio	Log odds ratio	Std Err	I	J	^
1	Aronson, 1948	4	123	11	139	0.391	-0.939	0.598			≡
2	Ferguson & Simes, 1949	6	306	29	303	0.189	-1.666	0.456			
3	Rosenthal, 1960	3	231	11	220	0.250	-1.386	0.658			
4	Hart & Sutherland, 1977	62	13598	248	12867	0.233	-1.456	0.143			
5	Frimodt-Moller, 1973	33	5069	47	5808	0.803	-0.219	0.228			
6	Stein & Aronson, 1953	180	1541	372	1451	0.384	-0.958	0.100			
7	Vandiviere, 1973	8	2545	10	629	0.195	-1.634	0.476			
8	Madras, 1980	505	88391	499	88391	1.012	0.012	0.063			
9	Coetze & Berjak, 1968	29	7499	45	7277	0.624	-0.472	0.239			
10	Rosenthal, 1961	17	1716	65	1665	0.246	-1.401	0.275			
11	Comstock, 1974	186	50634	141	27338	0.711	-0.341	0.112			
12	Comstock & Webster, 1969	5	2498	3	2341	1.563	0.447	0.731			
13	Comstock, 1976	27	16913	29	17854	0.983	-0.017	0.268			
14											
15											~
<										2	>
Coh	ort 2x2 (Events)										

The study names and effect size entry columns are now appropriately assigned. The effect size results are automatically calculated and display in the yellow columns.

At this point, the program behaves exactly as if the spreadsheet had been created from scratch.

	A	В	С	D	E	F	G	Н	Γ
1		Vert	oal Scores		Mat	h Scores			Γ
2	Study name	Std Mean Diff	N1	N2	Std Mean Diff	N1	N2		Γ
3	Cooper, 1990	0.4	20	20	0.3	22	22		Γ
4	Hedges, 1992	0.45	40	40	0.4	60	60		Γ
5	Smith, 1994	0.7	40	44	0.55	50	50		Γ
6	Jones, 1996	0.55	35	35	0.51	25	30		Γ
7	Franklin, 1996	0.47	40	40	0.5	22	22		Γ
8									
0									Г

#### Importing data with multiple outcomes per row

Data are often stored as above, one row per study, with multiple outcomes per row. The following steps explain how to export this data and format it so that it fits the structure of the Data Entry module.

<b>⊡</b> C	omprehensive	meta analysis	- [Data]				
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Run	analyses 🔸 📎	🗅 🚅 🖷 🗖	l 🚭 🐰	🖻 🛍 🛛	) 🚈 🕨	•⊨•≣	*** *** 1
	А	В	С	D	E	F	G
1		Verbal Scores					
2	Study name	Std Mean Diff	N1	N2			
3	Cooper, 1990	0.400	20.000	20.000			
4	Hedges, 1992	0.450	40.000	40.000			
5	Smith, 1994	0.700	40.000	44.000			
6	Jones, 1996	0.550	35.000	35.000			
7	Franklin, 1996	0.470	40.000	40.000			
8							
9		Math Scores					
10		Std Mean Diff	N1	N2			
11	Cooper, 1990	0.300	22.000	22.000			
12	Hedges, 1992	0.400	60.000	60.000			
13	Smith, 1994	0.550	50.000	50.000			
14	Jones, 1996	0.510	25.000	30.000			
15	Franklin, 1996	0.500	22.000	22.000			
16							
17							
18							
		1111					

First, paste the Excel data directly onto the Data Entry spreadsheet.

Then cut and paste the data into vertical blocks, one for each outcome.

<b>;</b>	omprehensive m	neta analysis - [D	ata]									_ 🗆 🔀
Eile	<u>E</u> dit Format <u>V</u> iew	Insert Identify C	Computational	options Analys	es <u>H</u> elp							
Run	analyses 🔸 🗞	D 🚅 👬 🖬 🗧	3 🕺 🕹 🛍	20	<b>}- }= }≣</b>	*** *** ⊡	$\downarrow \rightarrow +$	<ul> <li>✓</li> <li>□</li> </ul>	∎ ≡ ≜↓ 3	KL 🔍		
	Study name	Outcome	Std diff in means	Group-A Sample size	Group-B Sample size	Effect direction	Std diff in means	Std Err	Hedges's g	Std Err	Difference in means	Std Err 📤
1	Cooper, 1990	Verbal Scores	0.400	20	20	Auto	0.400	0.319	0.392	0.313		Ξ
2	Hedges, 1992	Verbal Scores	0.450	40	40	Auto	0.450	0.226	0.446	0.224		
3	Smith, 1994	Verbal Scores	0.700	40	44	Auto	0.700	0.225	0.694	0.223		
4	Jones, 1996	Verbal Scores	0.550	35	35	Auto	0.550	0.244	0.544	0.241		
5	Franklin, 1996	Verbal Scores	0.470	40	40	Auto	0.470	0.227	0.465	0.224		
6												
7												
8	Cooper, 1990	Math Scores	0.300	22	22	Auto	0.300	0.303	0.295	0.298		
9	Hedges, 1992	Math Scores	0.400	60	60	Auto	0.400	0.184	0.397	0.183		
10	Smith, 1994	Math Scores	0.550	50	50	Auto	0.550	0.204	0.546	0.202		
11	Jones, 1996	Math Scores	0.510	25	30	Auto	0.510	0.275	0.503	0.271		
12	Franklin, 1996	Math Scores	0.500	22	22	Auto	0.500	0.306	0.491	0.301		
13												
14												
्य												5
				,								
Inde	epenaent groups (	sta airrerence)										

- Click on Identify... Column for... Study names to assign that column.
- Click on Insert... Column for... Outcome names to create that column. Populate the column with the appropriate outcome value, "Verbal Score" or "Math Score".
- Identify the effect size format columns via Identify... Columns... For effect size data. Within the effect size identification wizard, select the appropriate format, in this case: Continuous (means)... Unmatched groups...Cohen's d (standardized by pooled within-groups SD) and sample size

<b>i</b> t c	omprehensive m	ieta analysis - [D	ata]									_ 🗆	×
Eile	<u>E</u> dit Format <u>V</u> iew	Insert Identify (	Computational (	options Analys	es <u>H</u> elp								
Run	analyses 🔸 🗞 [	) 🛩 👬 🖬 (é	3 X 🗈 🕻	3 0 🖄	)= <b>,</b> =, −,	*** *** ⊡	$\downarrow \rightarrow +$	<ul> <li>✓</li> <li>□</li> </ul>		)† 💿 🗌			
	Study name	Outcome	Std diff in means	Group-A Sample size	Group-B Sample size	Effect direction	Std diff in means	Std Err	Hedges's g	Std Err	Difference in means	Std Err	
1	Cooper 1990	Verbal Scores	0.400	20	20	Auto	0.400	0.319	0.392	0.313			≡
2	Cooper, 1330	Math Scores	0.300	22	22	Auto	0.300	0.303	0.295	0.298			
3	Franklin 1996	Verbal Scores	0.470	40	40	Auto	0.470	0.227	0.465	0.224			
4	Trankiin, 1550	Math Scores	0.500	22	22	Auto	0.500	0.306	0.491	0.301			
5	5 6 Hedges, 1992	Verbal Scores	0.450	40	40	Auto	0.450	0.226	0.446	0.224			
6		Math Scores	0.400	60	60	Auto	0.400	0.184	0.397	0.183			
7	Jamas 1990	Verbal Scores	0.550	35	35	Auto	0.550	0.244	0.544	0.241			
8	Junes, 1336	Math Scores	0.510	25	30	Auto	0.510	0.275	0.503	0.271			
9	Craith 1004	Verbal Scores	0.700	40	44	Auto	0.700	0.225	0.694	0.223			
10	511ll01, 1554	Math Scores	0.550	50	50	Auto	0.550	0.204	0.546	0.202			
11													
12													
13													
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		1	· · · · · ·									>	
Inde	pendent groups (	std difference)											

Click on the study names column and then on the ascending sort icon, circled above. The data are now sorted by study name so that multiple outcomes for a given study display on contiguous rows.

The Merge icon has been clicked so that contiguous study names are merged.

(Note that ascending and descending sorts can be performed on any column. To order studies by date, you could enter study dates into an unassigned column or a moderator column and then sort on that column.)

le	Edit Format	: <u>V</u> iew <u>I</u> nsert Ide	entify <u>T</u> oo	ls Computation	al options A	Analyses <u>H</u> e	lp				
un	analyses →	N 🗋 🚅 🖷		x 🖻 🛍	⁄酒 > >	= *= +%	3 t‰ ∺ 🔸	$\downarrow \rightarrow + \checkmark$		t 🔍	
	А	В	С	D	E	F	G	Н	1	J	
1	Study name	Treated Events	Total N	Control Events	Control N	Odds ratio	Lower Limit	Confidence level			
2	Fletcher	1	12	4	11						
3	Dewar	4	21	7	21						
4	1st	20	83	15	84						
5	Heikinheim	22	219	17	207						
6	Italian	19	164	18	157						
7	2nd	69	373	94	357						
8	2nd	13	102	- 29	104						
9	1st	26	264	32	253						
10	NHLBI	7	53	3	54						
11	Valere	11	49	9	42						
12	Frank	6	55	6	53						
3	UK Collab	48	302	52	293						
14	Klein	4	14	1	9						
15	Austrian	37	352	65	376						
16	Lasierra	1	13	3	11						
17	N German	63	249	51	234						
18	Witchitz	5	32	5	26						
19	2nd	25	112	31	118						
20	3rd					0.416	0.242	0.950			
21	ISAM					0.872	0.599	0.950			
22	GISSI-1					0.807	0.721	0.950			1
23	ISIS-2					0.746	0.676	0.950			

## Import data with multiple effect size entry formats

When the study results to be imported require multiple entry formats, paste the data into the Data Entry module as above, with the second format's columns to the right of the first format's columns.

To assign the imported data shown above, follow these steps:

- Click on **Format** and select **Use first row as labels** (keep in mind that the column names must be unique).
- Double-click on the header for the "Study" column and identify the function of the column as 'Study name'.
- For rows 2 19, select **Identify...** Column for... Effect size data and assign the data columns to the Events and sample size in each group entry format.
- For rows 20 23, select Identify... Column for... Effect size data and assign the data columns to the Odds ratio and confidence limits entry format. (Note that Upper limits values are missing from the pasted data. The Identify... function will automatically create an empty Upper limits column.)

The data will display, fully formatted as it does in chapter 2 (which discusses multiple data entry formats).

# Section 7. Saving and loading files

This section shows how to save and reload your data sets.
#### Save the data set

Comprehensive meta analysis - [Dat	a]			
Eile Edit Format View Insert Identify Co	mputational options	Analyses <u>H</u> elp		
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Study name Freated Events	Save in:	CMADataSetFile	s 🔻 🗲 🔁	r* =-
1 Aronson, 1948         4           2 Ferguson & Simes, 1948         6           3 Rosenthal, 1960         3	Recent			=
Click on the Save icon to launch the file save dialog.	Desktop			
s         Coetze         Berjak, 1968         29           10         Rosenthal, 1961         17           11         Comstock, 1974         186	My Documents		Enter a file name to	1
12 Comstock & Webster, 1959 5 13 Comstock, 1976 27 14			save the file in the desired directory.	
16 16 17	wy Computer			
19 20	My Network Places	File name: B Save as type: (	CGStudies .cma)	▼ Save ▼ Cancel ✓
Cohort 2x2 (Events)				

In order to save your data for future use, click on the file save icon to launch the save dialog. Here you can enter a file name for the data set.

The file type is '.cma'.

#### Open and load the saved data set



Use this file open dialog to locate, select and download previously saved data sets.

# Section 8. Publication-quality graphics

The program enables you to create and easily format publication-quality graphics. The Graphics module will allow you to print the graphics, export them to common presentation formats, such as Word or PowerPoint, or save them in formats such as "PDF" or "WMF".

Please note that, in this release, only the exports to Word and PowerPoint and the save as "WMF file" are operational.

# Modify analysis display

Compre	hensive meta analysis -	[Analysis]								_		
<u>File</u> <u>E</u> dit F	File Edit Format View Computational options Analyses Help											
+ Data ent	← Data entry t과 Next table 井 High resolution plot 🗗 Select by + Effect measure: Odds ratio 🔹 🗐 📳 👯 İI 🕸 E										t I	
Model	Study name		Statistics for each study Odv							e interval		
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	0.01	0.10	1.00	10.00	1(	
	Aronson, 1948 Ferguson & Simes, 1949 Resembled, 1960	0.391 0.189	0.121 0.077	1.262 0.462	-1.571 -3.652 2.105	0.116			-			
	Rosenthal, 1960 Hart & Sutherland, 1977 Frimodt-Moller, 1973		0.083 0.176 0.514	0.308	0.308 -10.219 0.0 1.256 -0.961 0.3	0.000		Right-click on display				
	Stein & Aronson, 1953         0.384         0.316           Vandiviere, 1973         0.195         0.077					Jpper limit Jpper limit		Custo	omize k	basic s	tats	
<	nders Beth models			22 s	how/hide bas	ic stats		to lau	nch its			
Basic stats	One study removed	Cumulative an	alysis Ca	Iculatio 🕋 🕻	Customize bas	ic stats		custo	mizatio	on dialo	og.	

Compr	ehensive meta analysis -	[Analysis]							_	
Eile Edit I	Format <u>Vi</u> ew Computational o try 1구 Next table	ptions Analy	yses <u>H</u> e solution p	elp plot <b>F</b>	Select by 🕂 Effect mea	isure: Odds rat	io		∃11 <b>‡</b> E	t f
Model	Study name	Odds ratio	Lower	Statistics	for each study tomize display		Odds ratio	and 95% confi	dence interval 10.00	100.0
	Aronson, 1948 Ferguson & Simes, 1949 Rosenthal, 1960 Hart & Sutherland, 1977	0.391 0.189 0.250 0.233		Sh IZ	ow All columns in this block	Decimals	Alignmen	t -		
	Frimodt-Moller, 1973 Stein & Aronson, 1953 Vandiviere, 1973 Madras, 1980 Coetze & Berjak, 1968	0.803 0.384 0.195 1.012 0.624		ব	Odds ratio Standard error	Auto 💌	Auto Auto	•		
olumns raphical nchecke ustomiz	not desired for display are ther d in the ation dialog,	46 11 63 83 47		ם ק ח	Variance Lower limit Upper limit Z-Value	Auto	Auto Auto Auto			
Fixed R Basic stat	andom Both models s One study removed I	Cumulative an	alysis		p-Value Cancel Apply ations	Auto V	Auto			>

Modify the analysis display for graphics presentation.

# Launch graphics module

Compre	ehensive meta analysis -	[Analysis]	
<u>File E</u> dit f	Format View Computational of	options Analyses <u>H</u> elp	
+ Data en	try 📃 Meta-analysis grid	d solution plot 🛛 🖶 Select by 🔸 Effect measure: Odds ratio 🔹 🗐 🔛 🖽 🖽 🗜 🗉	t f
	Meta-analysis sta	tistics	
Model	High resolution pla	ot tistics for each study Udds ratio and 95% confidence interval	
	Columns	wer limit Upper limit 0.01 0.10 1.00 10.00 100.00	
	Rows		
	Fergus C Show details and	cautions 8 0.077 0.462	
	Rosenthal, 1960		
	Hart & Sutherland, 1977		
	Frimodt-Moller, 1973	resolution plot.	
	Stein & Aronson, 1953	+ +	
	Vandiviere, 1973 Madras 1990		
	Maulas, 1300 Coetze & Beriak, 1968		
	Bosenthal 1961		
	Comstock, 1974	0.711 0.571 0.886 +	
	Comstock & Webster, 1969	1.563 0.373 6.548	
	Comstock, 1976	0.983 0.582 1.661	
Fixed		0.647 0.595 0.702 +	
Fixed Ba	andom Both models		
Basic stat	s One study removed	Cumulative analysis Calculations	
- Jusic stat	a one study tellioved	Cumulative analysis Calculations	



# Format graphics display

The graphic first displays in a default mode. Right-clicking on any segment of the display will drop down a list of context-sensitive formatting options. Clicking on the **Format** icon circled on the toolbar will drop down the list below, displaying a more comprehensive set of adjustment options.

Format
Font: Arial 🔹
竝 Set scale 🔹 🕨
Header
Title and subtitle
Study and summary symbols
▶ Spacing and forest plot width
💴 Labels
Line thickness
Footer

Change	computational	model
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Cor	mputational option	ns Colors <u>H</u> elp									
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	Random effects										
	Both models										
					Meta	Analysi	s				
	Mod	del <u>Study</u> r	name	Stati	stics for each	study		Odds ratio	and 95% CI		
				Odds ratio	Lower	Upper limit					
		Ar	onson, 1948	0.391	0.121	1.262			+ 1	1	
		Ferguson &	Simes, 1949	0.189	0.077	0.462		+			
		Ros	enthal, 1960	0.250	0.069	0.908		+	·		
		Hart & Suth	erland, 1977	0.233	0.176	0.308		-			
		Frimodt-I	Moller, 1973	0.803	0.514	1.256			+		
		Stein & Ar	onson, 1953	0.384	0.316	0.466					
		Van	dMere, 1973	0.195	0.077	0.497		+			
		M	ladras, 1980	1.012	0.894	1.146					
		Coetze &	Berjak, 1968	0.624	0.391	0.996			1		
		Ros	enthal, 1961	0.246	0.144	0.422					
		Cor	nstock, 1974	0.711	0.571	0.886					
		Comstock & W	ebster, 1969	1.563	0.373	6.548			<b>├</b> •──		
		Cor	nstock, 1976	0.983	0.582	1.661		<u> </u>	<u>+</u> ∣		
	Fb	ed		0.647	0.595	0.702		- I •	I I	1	
							0.01	0.1	1 10	100	
								Favours A	Favours B		
	Met	a Analysis									

Click on the **Computational options** button to vary the model used for determining summary results (**Fixed effect, Random effects** or **Both models**).

In the Forest plot the studies are represented by symbols whose area is proportional to the study's weight in the analysis.

Fixed effect Random effects Both models Model Statistics for each study Model Model Model Statistics for each study Model Model Model Model Statistics for each study Model Model Model Model Statistics for each study Model Mo	
Model         Study name         Statistics for each study         Odds ratio and 95% CI           Model         Study name         Statistics for each study         Odds ratio and 95% CI           Model         Study name         Statistics for each study         Odds ratio and 95% CI           Aronson, 1948         0.391         0.121         1.262           Ferguson & Simes, 1949         0.189         0.077         0.462           Rosenthal, 1960         0.250         0.069         0.908           Hart & Subreriand, 1977         0.233         0.176         0.308           FrimotH-Molier, 1973         0.803         0.514         1.256           Stein & Arronson, 1953         0.384         0.316         0.466           VandNiere, 1973         0.195         0.077         0.497           Madras, 1960         0.246         0.391         0.996           Cotzze & Berjak, 1968         0.624         0.394         1.465           Cotzze & Berjak, 1968         0.624         0.144         0.422	Keset all
Model         Study name         Statistics for each study         Odds ratio and 95% CI           Model         Study name         Statistics for each study         Odds ratio and 95% CI           Model         Study name         Cower         Upper           Aronson, 1948         0.391         0.121         1.262           Ferguson & Simes, 1949         0.189         0.077         0.462           Rosenthal, 1960         0.250         0.069         0.908           Hart & Suberland, 1977         0.233         0.176         0.308           Filmodt-Moller, 1973         0.803         0.514         1.256           Stein & Aronson, 1953         0.384         0.316         0.466           VandMere, 1973         0.195         0.077         0.497           Madras, 1960         0.226         0.996         Image           Filmodt-Moller, 1973         0.195         0.077         0.497           Madras, 1960         1.012         0.894         1.146           Coetze & Berjak, 1968         0.624         0.391         0.996           Rosenthal, 1961         0.246         0.144         0.422	•
Models         Meta Analysis           Model         Study name         Statistics for each study         Odds ratio and 95% CI           Odds         Lower         Upper         Immit         Upper           Aronson, 1948         0.391         0.121         1.262           Ferguson & Simes, 1949         0.189         0.077         0.462           Rosenthal, 1960         0.250         0.069         0.908           Hairt & Suberland, 1977         0.233         0.176         0.305           Frimoti-Moller, 1973         0.803         0.514         1.256           Steln & Aronson, 1983         0.384         0.316         0.466           VandMere, 1973         0.195         0.077         0.497           Madras, 1960         0.226         0.396         Immit           Rosenthal, 1961         0.246         0.391         0.996	
Model         Study name         Statistics for each study         Odds ratio and 95% CI           Model         Study name         Statistics for each study         Odds ratio and 95% CI           Aronson, 1948         0.391         0.121         1.262           Ferguson & Simes, 1949         0.199         0.077         0.462           Rosenthal, 1960         0.250         0.069         0.908           Hairt & Sutheriand, 1977         0.233         0.174         0.308           Frimodt-Moller, 1973         0.803         0.514         1.256           Stein & Aronson, 1953         0.384         0.316         0.466           VandMere, 1973         0.195         0.077         0.497           Madras, 1980         1.012         0.894         1.146           Coetze & Bergiak, 1968         0.624         0.391         0.996           Rosenthal, 1961         0.246         0.144         0.422	
Model         Study name         Statistics for each study         Odds ratio and 95% CI           Model         Study name         Statistics for each study         Odds ratio and 95% CI           Aronson, 1948         0.391         0.121         1.262           Ferguson & Simes, 1949         0.189         0.077         0.462           Ferguson & Simes, 1949         0.250         0.069         0.908           Hart & Sutheriand, 1960         0.250         0.699         0.908           Frimodt-Moller, 1973         0.803         0.514         1.256           Stein & Aronson, 1953         0.384         0.316         0.466           VandMere, 1973         0.195         0.077         0.497           Madras, 1960         1.012         0.894         1.146           Coetze & Berjik, 1966         0.624         0.391         0.996           Rosenthal, 1961         0.246         0.144         0.422	
Meta Analysis           Model         Study name         Statistics for each study         Odds ratio and 95% CI           Odds         Lower         Upper           Aronson, 1948         0.391         0.121         1.262           Ferguson 8. Simes, 1949         0.189         0.077         0.462           Rosenthal, 1960         0.250         0.069         0.908           Hart & Sutheriand, 1977         0.233         0.514         1.256           Frimodt-Moller, 1973         0.803         0.514         1.256           VandMere, 1973         0.195         0.077         0.497           Madras, 1980         1.012         0.894         1.146           Coetze & Berjisk, 1968         0.624         0.391         0.996           Rosenthal, 1961         0.246         0.144         0.422	
Model         Study name         Statistics for each study         Odds ratio and 95% CI           Odds         Lower         Upper           aronson, 1948         0.391         0.121         1.262           Ferguson & Simes, 1949         0.189         0.077         0.462           Rosenthal, 1960         0.250         0.069         0.906           Hairt & Sutherland, 1977         0.233         0.176         0.308           Frimodet-Molles         Frimodet-Molles         Image: State 1         Image: State 1           VandMere, 1973         0.195         0.077         0.497           Madras, 1980         1.012         0.896         Image: State 1           Rosenthal, 1961         0.246         0.144         0.422	
Odds ratio         Lower limit         Upper limit           Aronson, 1948         0.391         0.121         1.262           Ferguson & Simes, 1949         0.189         0.077         0.462           Rosenthal, 1960         0.250         0.069         0.908           Hart & Sutheriand, 1977         0.233         0.176         0.308           Frimodt-Moller, 1973         0.803         0.514         1.256           VandMere, 1973         0.195         0.077         0.497           Madras, 1980         1.012         0.894         1.146           Coetze & Berjak, 1968         0.624         0.391         0.996           Rosenthal, 1961         0.246         0.144         0.422	
Aronson, 1948 0.391 0.121 1.262 Ferguson & Simes, 1949 0.189 0.077 0.462 Rosenthal, 1960 0.250 0.069 0.908 Hart & Sutherland, 1977 0.233 0.176 0.308 Frimoed-Moller, 1973 0.803 0.514 1.256 Stein & Aronson, 1953 0.384 0.316 0.466 VandMere, 1973 0.195 0.077 0.497 Madras, 1980 1.012 0.894 1.146 Coetze & Berjak, 1966 0.624 0.391 0.996 Rosenthal, 1961 0.246 0.144 0.422	
Ferguson & Simes, 1949       0.189       0.077       0.462         Rosenthal, 1960       0.250       0.069       0.908         Hart & Sutherland, 1977       0.233       0.176       0.308         Frimodt-Moller, 1973       0.803       0.514       1.256         Stein & Aronson, 1953       0.384       0.316       0.466         VandMere, 1973       0.195       0.077       0.497         Madras, 1980       1.012       0.894       1.146         Coetze & Bergiak, 1966       0.624       0.391       0.996         Rosenthal, 1961       0.245       0.144       0.422	1
Rosenthal, 1960     0.250     0.069     0.908       Hairt & Sutherland, 1977     0.233     0.176     0.308       Frimode-Moller, 1973     0.803     0.514     1.256       Stein & Aronson, 1953     0.384     0.316     0.466       VandMere, 1973     0.195     0.077     0.497       Madras, 1980     1.012     0.894     1.146       Coetze & Berjak, 1968     0.624     0.391     0.996       Rosenthal, 1961     0.246     0.144     0.422	
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Frimodt-Moller, 1973     0.803     0.514     1.256        Stein & Aronson, 1953     0.384     0.316     0.466       VandMere, 1973     0.195     0.077     0.497       Madras, 1980     1.012     0.894     1.146       Coetze & Berjak, 1968     0.624     0.391     0.996       Rosenthal, 1961     0.246     0.144     0.422	
Stein & Aronson, 1953         0.384         0.316         0.466           VandMere, 1973         0.195         0.077         0.497           Madras, 1980         1.012         0.894         1.146           Coetze & Berjiak, 1968         0.624         0.391         0.996           Rosenthal, 1961         0.246         0.144         0.422	
Validitiere, 1973         0.195         0.077         0.197           Madras, 1980         1.012         0.894         1.146           Coetze & Berjak, 1968         0.624         0.391         0.996           Rosenthal, 1961         0.246         0.144         0.422	
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Rosenthal, 1961 0.246 0.144 0.422	
Comstock 1974 0.711 0.571 0.886	
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Comstock 1976 0.983 0.582 1.661 -	
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The weights assigned under the random effects model above are more balanced than those under the fixed effects model shown on the previous page. Under random effects, the smaller studies get more weight and the larger studies get less weight.

When the **Both models** option is selected, the weight symbols for each study will be identical in size.

Please note that the summary results for a particular model will only display if that model has first been selected in the Analysis module. In this case, the **Both models** tab was selected in the Analysis module before entering the Graphics module, enabling the display here of both fixed and random models.

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Ferguson & Simes,	1949	0.189	0.077	0.462		
Rosenthal,	1960	0.250	0.069	0.908		
Hart & Sutherland,	1977	0.233	0.176	0.308		
Frimodt-Moller,	1973	0.803	0.514	1.256		
Stein & Aronson,	1953	0.384	0.316	0.466		
Vandiviere,	1973	0.195	0.077	0.497		

## Select color scheme for presentation format

The color scheme can be further modified by clicking on the **Colors for slides** option. Clicking on the **Colors** button, circled below, will drop down a list which offers more extensive color editing options. In the image below, the background color has been changed via the **Color for background** list option.

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#### Format text



### Export to file



In this case, the graphics image has been exported to PowerPoint which opens automatically and displays the converted graphic.

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Rosenthal, 1960

# Section 9. Meta regression

This module allows you to run a regression analysis to estimate the impact of continuous study moderators on overall heterogeneity.

By default, data sets are copied to C:\Program Files\Comprehensive Meta Analysis Version 2\Demo Files. The dataset used in this section is BCGLatitude.

### Define a moderator

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1	Aronson, 1948	4			1	1		44	
2	Ferguson & Simes,	6					<b>_</b>	55	
3	Rosenthal, 1960	3		Name				42	=
4	Hart & Sutherland,	62	1					52	
5	Frimodt-Moller,	33						13	
6	Stein & Aronson,	180		Variable name	Latitude			44	
7	Vandiviere, 1973	8						19	
8	Madras, 1980	505	8	Column function	Moderator		▼	13	
9	Coetze & Berjak,	29		Data tune	Decimal		•	27	
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In order to perform a meta-regression you must first create a continuous moderator and define it as decimal or numeric. In this example, using the BCGLatitude data set, the impact of a study location's latitude will be examined.

⊢ Data entry 1,1 Next table Model Study name		<u>‡</u> -ні	Meta reg	n bias ression	elect by + Effect measure: Log odds ratio								
Model	study name	Log odds ratio	<ul> <li>Data ent</li> <li>Standard error</li> </ul>	ry Variance	Lower limit Upper limit Z-Value p-Value				-1.00 -0.50 0.00 0.50 1.0				
	Aronson, 1948	-0.939	0.598	0.357	-2.110	0.233	-1.571	0.116					
	Ferguson & Simes, 1949	-1.666	0.456	0.208	-2.560	-0.772	-3.652	0.000					
	Rosenthal, 1960	-1.386	0.658	0.433	-2.677	-0.096	-2.106	0.035			-		
	Hart & Sutherland, 1977	-1.456	0.143	0.020	-1.736	-1.177	-10.219	0.000					
	Frimodt-Moller, 1973	-0.219	0.228	0.052	-0.666	0.228	-0.961	0.336					
	Stein & Aronson, 1953	-0.958	0.100	0.010	-1.153	-0.763	-9.627	0.000	+				
	Vandiviere, 1973	-1.634	0.476	0.227	-2.568	-0.700	-3.429	0.001					
	Madras, 1980	0.012	0.063	0.004	-0.112	0.136	0.190	0.849			+		
	Coetze & Berjak, 1968	-0.472	0.239	0.057	-0.940	-0.004	-1.976	0.048					
	Rosenthal, 1961	-1.401	0.275	0.075	-1.939	-0.863	-5.102	0.000					
	Comstock, 1974	-0.341	0.112	0.013	-0.560	-0.121	-3.046	0.002		++-	-		
	Comstock & Webster, 1969	0.447	0.731	0.534	-0.986	1.879	0.611	0.541					
	Comstock, 1976	-0.017	0.268	0.072	-0.542	0.507	-0.065	0.948			-		
Fixed		-0.436	0.042	0.002	-0.519	-0.353	-10.319	0.000		-+-			

# Launch the Meta regression module

Select **Meta regression** from the **Windows** option dropdown. The effect size index used in the Analysis module (log odds ratio here) will also be used in the regression analysis.

## Select the moderator

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		No predictor Latitude	

Select the moderator to be used as the covariate in the regression analysis. The dropdown list will contain all available numeric moderators.

#### View the regression scatter plot



After selection of the moderator, the program displays the regression line and scatter plot of studies. In the default presentation, all studies are represented by circles of identical size, regardless of their individual weighting in the analysis. (Note the circled **One size** option.)

## Adjust scatter plot display



Click on the **Proportional** option to view the same graph, but this time with each study represented by a circle proportional to its weight in the analysis. This view identifies which studies have the greatest impact on the slope of the regression line.

## Select the regression model

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	Point estimate	Standard error	Lower limit	Upper limit	Z-value	p-Value			
Slope	-0.03310	0.00282	-0.03862	-0.02758	-11.75030	0.00000			
Intercept	0.39490	0.08239	0.23342	0.55639	4.79296	0.00000			
T au-squared	0.04799								
	Q	df	p-value						
Model	138.06950	1.00000	0.00000						
Residual	25.09542	11.00000	0.00883						
Total	163.16492	12.00000	0.00000						

Click on the **Computational options** button and select from among the three available models, **Fixed effect, Method of moments, Unrestricted ML** (maximum likelihood). Each of the displays in this module reflects the model chosen. Basic meta regression results are given in the display above, which is invoked by clicking on the **Table** toggle button.

#### View iterations

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Unre <del>stricted ME (17)</del>	न्त्र.03271139287	0.00339125578	-9.64580525981	0.37035141769	0.10677081283					
Unrestricted ML (18)	°0.03271392453	0.00338673977	-9.65941487776	0.37051546682	0.10658783905					
Unrestricted ML (19)	-0.03271587611	0.00338326637	-9.66990847184	0.37064190746	0.10644703668					
Unrestricted ML (20)	-0.03271738159	0.00338059159	-9.67800478533	0.37073943390	0.10633856582					
Unrestricted ML (21)	-0.03271854359	0.00337852985	-9.68425469472	0.37081470195	0.10625493028					
Unrestricted ML (22)	-0.03271944086	0.00337693948	-9.68908122150	0.37087281800	0.10619040059					
Unrestricted ML (23)	-0.03272013394	0.00337571199	-9.69280970176	0.37091770647	0.10614058629					
Unrestricted ML (24)	-0.03272066945	0.00337476418	-9.69569064634	0.37095238758	0.10610211619					
Unrestricted ML (25)	-0.03272108329	0.00337403206	-9.69791713391	0.37097918811	0.10607239761					
Unrestricted ML (26)	-0.03272140316	0.00337346640	-9.69963808898	0.37099990220	0.10604943411					
Unrestricted ML (27)	-0.03272165042	0.00337302926	-9.70096844640	0.37101591414	0.10603168695					
Unrestricted ML (28)	-0.03272184157	0.00337269139	-9.70199694934	0.37102829256	0.10601796920	=				
Unrestricted ML (29)	-0.03272198936	0.00337243021	-9.70279214222	0.37103786273	0.10600736482					
Unrestricted ML (30)	-0.03272210363	0.00337222830	-9.70340698271	0.37104526219	0.10599916648					
Unrestricted ML (31)	-0.03272219198	0.00337207219	-9.70388239485	0.37105098357	0.10599282786					
Unrestricted ML (32)	-0.03272226030	0.00337195149	-9.70425000871	0.37105540758	0.10598792683					
Unrestricted ML (33)	-0.03272231313	0.00337185817	-9.70453427422	0.37105882851	0.10598413721					
Unrestricted ML (34)	-0.03272235398	0.00337178600	-9.70475409295	0.37106147385	0.10598120686					
Unrestricted ML (35)	-0.03272238557	0.00337173020	-9.70492407836	0.37106351947	0.10597894091					
Unrestricted ML (36)	-0.03272241000	0.00337168705	-9.70505552924	0.37106510136	0.10597718867					
Unrestricted ML (37)	-0.03272242890	0.00337165368	-9.70515718201	0.37106632465	0.10597583366					
Unrestricted ML (38)	-0.03272244350	0.00337162787	-9.70523579203	0.37106727064	0.10597478583	~				
<						>				

Click on **View... Show Iterations** to display the iterations needed by the unrestricted maximum likelihood algorithm to bring successive 'Tau-squared' variance values into virtual convergence, at which point the final meta-regression values have been attained. As the above display makes clear, the model required 38 iterations in this case to arrive at final results.

## View data and residuals

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	1.00000	-1.43044	0.02031	12.00000	17 97291	219 / 2717	2130.72411
	1.00000	-0.21314	0.00100	44.00000	71 91961	5172 42002	2164 46275
	1.00000	-1.63378	0.00331	19.00000	4 32884	18 73885	82 24794
	1.00000	0.01202	0.022701	13,00000	124 90460	15601 15843	1623 75977
	1.00000	-0.47175	0.05698	27.00000	16 39982	268 95415	442 79519
	1.00000	-1 40121	0.03030	42 00000	12 59115	158 53701	528 82822
	1.00000	-0.34085	0.01253	18 00000	60 51 700	3662 30737	1089 30601
	1.00000	0.44663	0.53416	33,00000	1 85818	3 45283	61 31990
	1.00000	-0.01734	0.07164	33.00000	13.22152	174.80861	436.31018
	13.00000				374.51219	27106.56157	10277.23467

Click on **View... Show Calculations** to display the calculations involved in producing the regression analysis results.

# Section 10. Publication Bias

This module offers multiple methods for detecting the presence of publication bias and assessing its impact on the analysis.

By default, data sets are copied to C:\Program Files\Comprehensive Meta Analysis Version 2\Demo Files. The dataset used in this section is StreptoModerator.

## Funnel plot



To launch the Publication Bias module from the Analysis module, click on **Analyses... Publication bias.** 

The default display, a funnel plot, has two modes, one which plots a study's effect size against its standard error (above) and another which plots effect size against precision, the inverse of standard error (next page).

Toolbar icons allow the user to alter the color scheme and other plot attributes.



The plot by precision is the traditional form. Note that large studies appear toward the top of the graph, and tend to cluster near the mean effect size. Smaller studies appear toward the bottom of the graph, and (since there is more random variation in the small studies) are dispersed across a range of values. This pattern tends to resemble a funnel, which is the basis for the plot's name.

In the absence of publication bias the studies will be distributed symmetrically about the combined effect size. By contrast, in the presence of bias, the bottom of the plot would tend to show a higher concentration of studies on one side of the mean than the other. This would reflect the fact that smaller studies (which appear toward the bottom) are more likely to be published if they have larger than average effects, which makes them more likely to meet the criterion for statistical significance.

#### Duval and Tweedie's trim and fill

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Duval and Tweedie's trim and fill										
		Fi	xed Effects		Ran	idom Effect	\$	Q Value		
	Studies Trimmed	Point Estimate	Lower Limit	Upper Limit	Point Estimate	Lower Limit	Upper Limit			
Observed values Adjusted values	1	-0.25556 -0.25663	-0.32085 -0.32190	-0.19027 -0.19136	-0.24513 -0.24873	-0.36721 -0.37160	-0.12304 -0.12587	31.51262 32.88028		
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To left of mean				Duv	Duval and Tweedle's Trim and Fill					
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<ul> <li>To ngrit or mean</li> <li>Look for missing studies using which model?</li> <li>Not specified</li> <li>Fixed effect model</li> </ul>				studies to be dispersed equally on either side of the overall effect. Therefore, if the funnel plot is actually asymmetric, with a relatively high number of small studies (representing a large effect size) falling toward the right of the mean effect and relatively few falling toward the left, we are concerned that these left-hand studies may actually exist and are microine from the applying						
C Random effects model				Duva	l and Tweed	ie develope	d a metho	d that allows us to impute	~	

The **View** option drops down a selection of methods for assessing publication bias, including the Trim and Fill procedure, shown here.

Trim and Fill builds on the key idea behind the funnel plot; that in the absence of bias the plot would be symmetric about the summary effect. If there are more small studies on the right than on the left, the concern is that studies may be missing from the left. The Trim and Fill procedure imputes these missing studies, adds them to the analysis, and then re-computes the summary effect size.

By default, the tool will look for missing studies to the left of the summary effect. The user can reverse the search direction by selecting the appropriate setting.

The report icon (circled above) launches a description of the statistical test and an explanation of the actual results it yields.

In our example there is one imputed missing study. In addition, the report tells us that:

"Under the fixed effect model the point estimate and 95% confidence interval for the combined studies is -0.25556 (-0.32085, -0.19027). Using Trim and Fill the imputed point estimate is -0.25663 (-0.32190, -0.19136).

Under the random effects model the point estimate and 95% confidence interval for the combined studies is -0.24513 (-0.36721, -0.12304). Using Trim and Fill the imputed point estimate is -0.24873 (-0.37160, -0.12587)."



To view Trim and Fill's imputed studies on the funnel plot, click on the toggle icon circled above. In our example the data point for one imputed study is highlighted in black (near bottom left of plot).

#### Begg and Mazumdar rank correlation

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Begg and Mazumdar rank correlation		Begg and Mazumdar Rank Correlation Test
Kendall's S statistic (P-Q)	-5.00000	The classic case of publication bias is the case depicted by the funnel plot. Large studies tend to be included in the analysis regardless of their treatment effect whereas
Kendall's tau without continuity correction Tau 2-value for tau P-value (1-tailed) P-value (2-tailed) Kendall's tau with continuity correction Tau 2-value for tau P-value (1-tailed) P-value (2-tailed)	-0.02165 0.14099 0.44394 0.88789 -0.01732 0.11279 0.45510 0.91020	<ul> <li>In the analysis regardless of their dealers in the relation they show a relatively large treatment effect. Under these circumstances there will be an inverse correlation between study size and effect size.</li> <li>Begg and Mazumdar suggested that this correlation can serve as a test for publication bias. Concretely, they suggest that we compute the rank order correlation (Kendall's tau b) between the treatment effect and the standard error (which is driven primarily by sample size).</li> <li>This approach is limited in some important ways. A significant correlation suggests that bias exists but does not directly address the implications of this bias. Conversely, a non-significant correlation may be due to low statistical power, and cannot be taken as evidence that bias is absent.</li> <li>In this case Kendall's tau b (corrected for ties, if any) is -0.01732, with a 1-tailed p-value (recommended) of 0.45510 or a 2-tailed p-value of 0.91020 (based on continuity-corrected normal approximation).</li> </ul>

Begg and Mazumdar's rank correlation test reports the rank correlation (Kendall's tau) between the standardized effect size and the variances (or standard errors) of these effects. Tau would be interpreted much the same way as any correlation, with a value of zero indicating no relationship between effect size and precision, and deviations from zero indicating the presence of a relationship.

If asymmetry is caused by publication bias we would expect to see high standard errors (small studies) associated with larger effect sizes. If larger effects are represented by low values, tau would be positive, while if larger effects are represented by high values, tau would be negative. Since asymmetry could appear in the reverse direction, the significance test is two-sided.

In our example Kendall's tau b (corrected for ties, if any) is -0.01732, with a 1-tailed p-value (recommended) of 0.45510 or a 2-tailed p-value of 0.91020.

Note that the **Next table** button allows you to toggle among all the available publication bias tests.

## Egger's regression intercept

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Egger's regression inte	rcept						
Intercept	0.09631						
Standard error	0.35766						
95% lower limit (2-tailed)	-0.64975						
95% upper limit (2-tailed)	0.84237						
df	20.0000						
P-value (1-tailed)	0.39524						
P-value (2-tailed)	0.79048						
Publication bias report File Edit Format View							
Egger's Test of the Intercep	t	^					
Egger suggests that we assess this standardized effect (effect size divide captured by the slope of the regressi	same bias by using precision (the inverse of the standard error) to predict the ad by the standard error). In this equation, the size of the treatment effect is ion line (B1) while bias is captured by the intercept (B0).						
This approach may offer a number of advantages over the rank correlation approach. Under some circumstances this may be a more powerful test. Additionally, this approach can be extended to include more than one predictor variable, which means that we can simultaneously assess the impact of several factors, including sample size, on the treatment effect.							
In this case the intercept (B0) is 0.0 tailed p-value (recommended) is 0.39	)9631, 95% confidence interval (-0.64975, 0.84237), with t=0.26928, df=20. The 1- 3524, and the 2-tailed p-value is 0.79048.	~					

Egger's linear regression method, like the rank correlation test, quantifies the bias captured by the funnel plot. While Begg and Mazumdar's test uses ranks, Egger's method uses the actual values of the effect sizes and their precision.

In the Egger test, the standardized effect (effect size divided by standard error) is regressed on precision (inverse of standard error). Small studies generally have a precision close to zero, due to their high standard error. In the absence of bias we would expect to see such studies associated with small standardized effects. We would expect to see large studies associated with large standardized effects. This would create a regression line whose intercept approached the origin.

If the intercept deviates from this expectation, publication bias may be the cause. This would occur, for instance, when small studies are disproportionately associated with larger effect sizes.

As was true for the rank correlation test, the significance test should be two-tailed.

In our example the intercept (B0) is 0.09631, 95% confidence interval (-0.64975, 0.84237), with t=0.26928, df=20. The one-tailed p-value is 0.39524, and the two-tailed p-value is 0.79048.

### Fail-safe N

Comprehensive meta analysis - [Publication bias]		🛱 Publication bias report	X				
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Classic fail-safe N		Classic fail-safe N	^				
Z-value for observed studies	-4.84927	One concern of publication bias is that some non-					
P-value for observed studies	0.00000	that these studies, if included, would nullify the					
Alpha	0.05000	observed effect.	≡				
Tails	2.00000	Robert Rosenthal suggested that rather than simply					
Z for alpha	1.95996	speculate about the impact of the missing studies,					
Number of observed studies	22.00000	we compute the number of studies that would be required to nullify the effect. If this number is relatively					
Number of missing studies that would bring p-value to > alpha	113.00000 Edit	small then there is indeed cause for concern. However, if this number is large, we can be confident that the treatment effect, while possibly inflated by the exclusion of some studies, is nevertheless not nil.					
Orwin's fail-safe N		He suggested that this analysis be called a 'File- drawer' analysis, file drawers being the presumed location of the missing studies. Harris Cooper					
Log odds ratio in observed studies	-0.25556	proposed the term 'Fail-Safe N', a reference to the					
Criterion for a 'trivial' log odds ratio	-0.10000	number of missing studies that would nullify the effect.					
Mean log odds ratio in missing studies	0.10000						
Number missing studies needed to bring log odds ratio over -0.1	18.00000	This approach is limited in two important ways. First, it assumes that the effect in the hidden studies is nil, rather than considering the possibility that some of the studies could have shown an effect in the reverse direction. Therefore, the number of studies useries d					
	Edit	arection. Therefore, the humber of studies required					

Rosenthal's Fail-safe N test computes the number of missing studies (with mean effect of zero) that would need to be added to the analysis to yield a statistically non-significant overall effect.

The user can edit the Alpha and Tails parameters

In our example Rosenthal's fail-safe N is 113. This means that we would need to locate and include 113 'null' studies in order for the combined 2-tailed p-value to exceed 0.050. Put another way, there would be need to be 5.1 missing studies for every observed study for the effect to be nullified.

The Orwin variant of this test addresses two problems with Rosenthal's method; that it focuses on statistical rather than clinical significance, and that it assumes a nil overall effect in the missing studies.

Orwin's test allows you to select both the smallest effect value deemed to be clinically important and a value other than nil for the mean effect in the missing studies. To vary these values, edit the relevant parameters, which in our example are **Criterion for a 'trivial' log odds ratio** and **Mean log odds ratio in missing studies**.

In our example Orwin's fail-safe N is 18. This means that we would need to locate 18 studies with mean log odds ratio of 0.1 to bring the combined log odds ratio over -0.1 (see the Orwin parameter settings in the image).

# Section 11. Data Entry Templates

This module describes the basic templates provided to facilitate data entry.

## View templates

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A B C D	🔁 Welcome
1 2 3 4 5	What would you like to do?
6	C Run the tutorial
7	C Start a blank spreadsheet
8	Start a new spreadsheet using a template
10	C Open an existing file
11	C Import data from another program
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14	More files
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26	Chan this distant has been been been been been been been bee
27	Show this dialog when I start the program
28	Close OK
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32	

To expedite data entry, the program provides templates which contain pre-established columns for study names and commonly used entry formats.

To view the templates, click on the option selected above in the **Welcome** dialog.

## Select a template

Open database		? 🔀
Look in:	Templates 💌 🔶 📸 📰 🗸	
Recent Desktop	Correlation and sample size.cmt Events and non events in each group.cmt Events and sample size in each group.cmt Mean SD and sample size in each group.cmt	
My Documents		
My Computer		
My Network Places	File name:     Correlation and sample size       Files of type:     (*.cmt)	Open Cancel

Select the template which fits your data format. Note the file extension of 'cmt', indicating template.

Additional templates will be included in future releases.

## Enter data

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Study name	Correlation	Sample size	Effect direction	Correlation	Std Err	Fisher's Z	Std Err	I	J		
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The data entry module displays the pre-established columns associated with the selected template.

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•										
	Study name	e Correlation	Sample size	Effect direction	Correlation	Std Err	Fisher's Z	Std Err	I	
1	Smith, 1990	0.450	40	Auto	0.450	0.131	0.485	0.164		-
2	Jones, 1992	0.510	55	Auto	0.510	0.103	0.563	0.139		
3	Wolf, 1995	0.470	50	Auto	0.470	0.114	0.510	0.146		
4	Johnson, 1996	0.410	45	Auto	0.410	0.128	0.436	0.154		=
5		Cause file								1
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2				1						

Enter data, modify as desired, and save as a normal data set (with extension 'cma'.) The newly created data set can be re-opened and modified.

The template remains intact and can be re-selected to begin entry of a new data set.