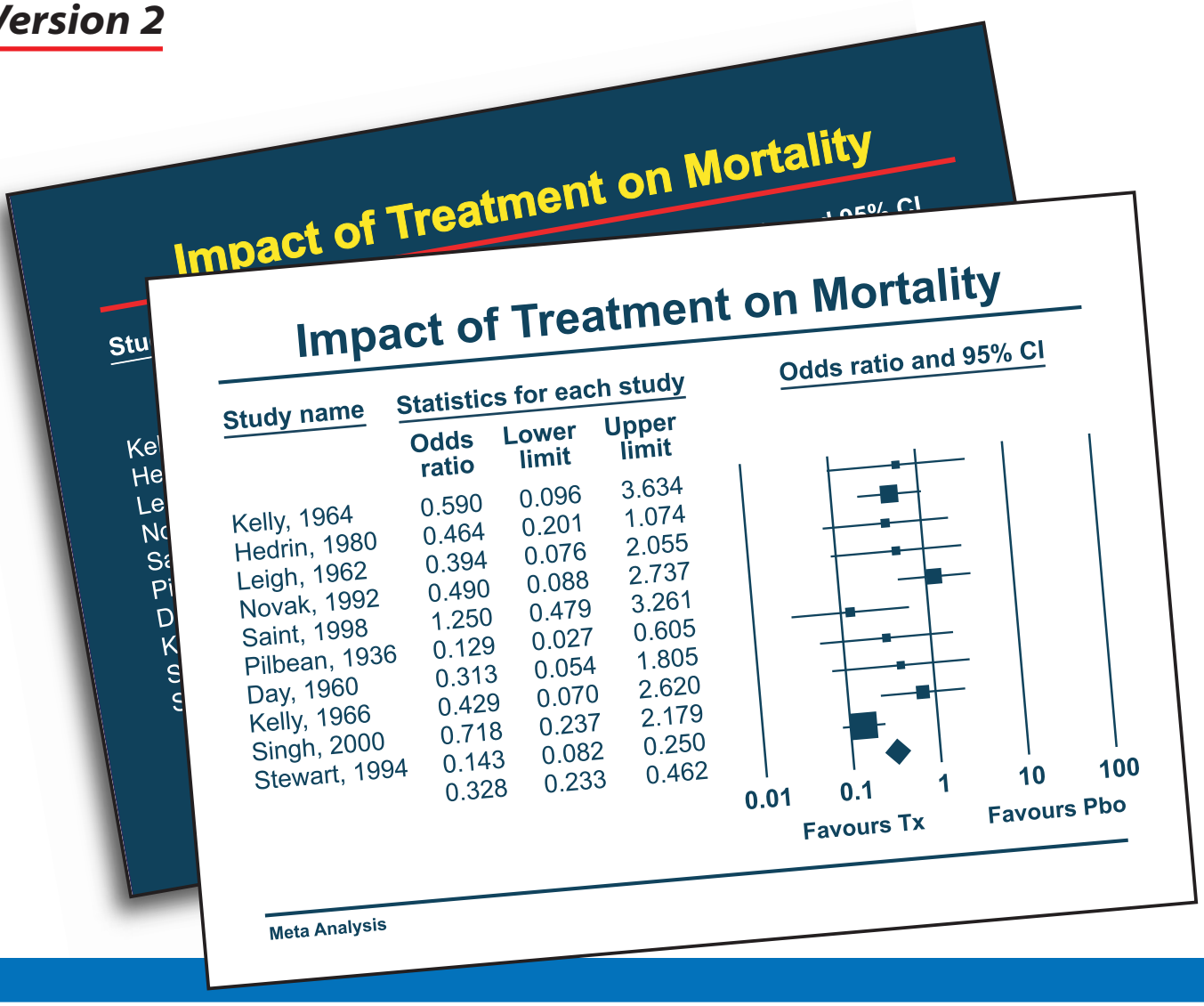
COMPREHENSIVE META-ANALYSIS

A computer program for meta-analysis

Version 2

Developed by a team of experts in the U.S. and the U.K.



- **Compute the treatment effect automatically**
- **Perform your meta-analysis quickly and accurately**
- **Create high-resolution forest plots with one click**

Work FAST. Work with confidence. Present results professionally.

New in Version 2

Data entry

- Enter data using a spreadsheet interface.
- Enter data for effect size (or treatment effect) in more than 100 different formats.
- Enter data for each study in its own format. For example, enter data for one study as number of events and sample size, for another study as odds ratio and confidence interval, and so on.
- Include multiple study designs in the same analysis. Enter data from studies that used independent groups, paired/matched designs, or crossover trials. The program will compute the standard errors for each, and allow you to merge the different designs in the same analysis.
- Include data from prospective and retrospective trials in the same analysis.
- Include continuous, binary, and correlational data in the same analysis. The program will convert among odds ratios, standardized mean differences, and correlations.
- See the web site for a list of all supported formats.

Data structure

- Independent subgroups within studies
- Multiple outcomes within studies
- Multiple time-points within outcomes
- Multiple comparisons (Placebo vs A and Placebo vs B) within studies

Computational options

- Fixed effect and/or random effects models
- Inverse variance, Mantel Haenszel, or Peto weights
- Option to use the same computational algorithms as other programs such as RevMan or Stata

Data import

- Import data from other programs, including STATA, Revman, Excel, and SPSS

Cumulative analyses

- Runs the analysis repeatedly, adding an additional study with each iteration, to show how the evidence has shifted over time

Sensitivity analysis

- Runs the analysis repeatedly, removing one study for each iteration, to show that study's impact on the combined effect.

Analysis of variance

- Use ANOVA to assess the impact of categorical moderators.
- Select fixed effect, mixed models, fully random effects.

Meta regression

- Use meta regression to assess the impact of continuous predictors.
- Automatically create scatter-plots.
- Select fixed effect, mixed models.

High-resolution plots

- Specify the symbols for studies, subgroups, and combined effects. Set the symbol to be a constant size or proportional to study weight.
- Modify colors globally or for each element of the plot. Set templates for formats and color schemes.
- Export directly to Word or PowerPoint or save as file.

Publication bias

- Funnel plots using precision or standard error
- Classic Fail-Safe N
- Orwin's Fail Safe N
- Trim and Fill
- Rank correlation test
- Regression test
- Program produces statistics, plots, and detailed text report.

Effect size measures

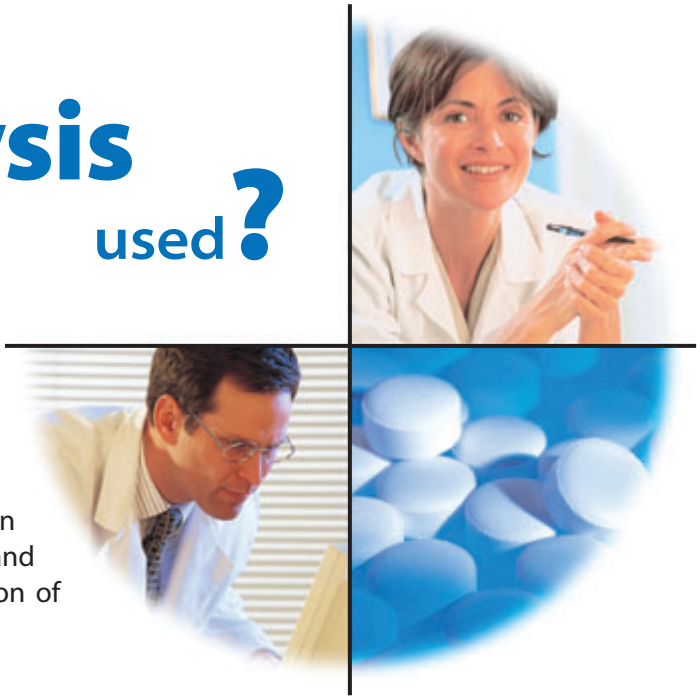
- For studies that look at treatment effects or other effect sizes the program will compute the odds ratio, risk ratio, risk difference, standardized mean difference (d), bias-corrected standard difference (Hedges's g), raw mean difference, correlation, hazard ratio, rate ratio, and more.
- For studies that look at events or means for one group the program will compute the risk, the rate, or the mean.
- For other measures (e.g. regression coefficients) the program will work with generic indices. This is available both for raw values and for log values.

Visit

www.Meta-Analysis.com

and download an evaluation copy.

Where is meta-analysis used?



Meta-analysis, the statistical process for combining data from multiple studies, is the basis for evidence-based practice in the health sciences, social sciences, and a host of other fields.

Pharmaceutical companies use meta-analysis to gain approval for new drugs. Clinicians use it to determine the most effective course of treatment. Researchers use it to plan new studies, to justify these studies (in grant applications) and to put these studies in context (in the introductory section of published papers).

This program includes features...

for the Researcher

The program is incredibly easy to learn and use. The interface is clear and intuitive. The interactive guide will walk you through all steps in the analysis. Be productive within minutes of starting the program.

for the Statistician

This program was developed in collaboration with many of the recognized experts in the field of meta-analysis, both in the US and the UK (see back panel). It includes a wide array of sophisticated options for data entry, analysis, and display.

for the Academic Instructor

With this program, the logic of meta-analysis comes alive. Use the program to demonstrate conceptual issues such as the impact of study weights on the combined effect, the implications of heterogeneity, and fixed effect vs. random effects models.

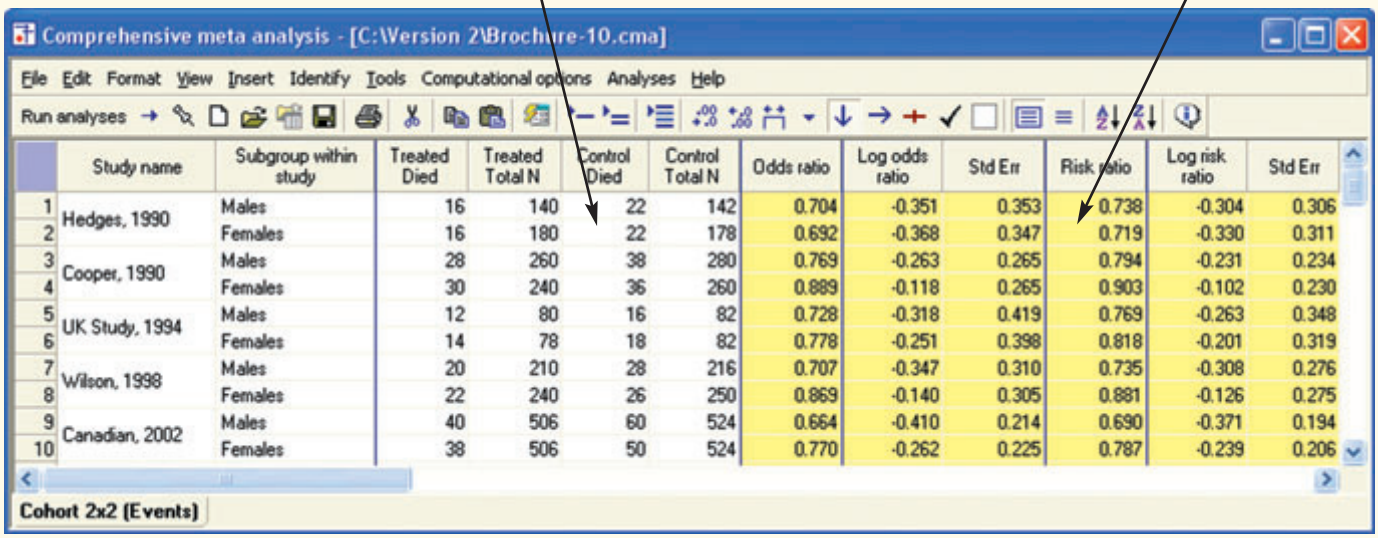
COMPUTE THE EFFECT SIZE AUTOMATICALLY

In every meta-analysis you start with the published summary data for each study and compute the treatment effect (or effect size). For example, if a study reports the number of events in each group you might compute the odds ratio. Or, if a study reports means and standard deviations you might compute the standardized mean difference. With some software, this process can be tedious and difficult.

With this program, work quickly and accurately

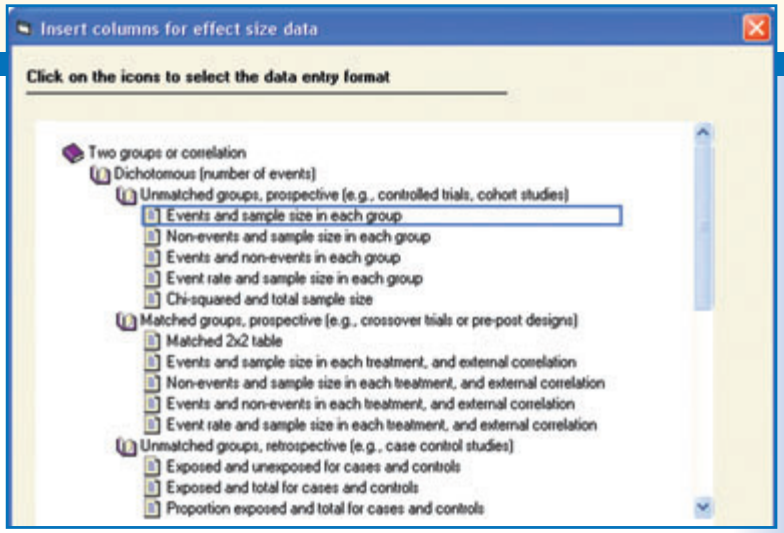
Simply enter data into the white columns

The program computes the effect size and displays it in the yellow columns.



	Study name	Subgroup within study	Treated Died	Treated Total N	Control Died	Control Total N	Odds ratio	Log odds ratio	Std Err	Risk ratio	Log risk ratio	Std Err
1	Hedges, 1990	Males	16	140	22	142	0.704	-0.351	0.353	0.738	-0.304	0.306
2		Females	16	180	22	178	0.692	-0.368	0.347	0.719	-0.330	0.311
3	Cooper, 1990	Males	28	260	38	280	0.769	-0.263	0.265	0.794	-0.231	0.234
4		Females	30	240	36	260	0.889	-0.118	0.265	0.903	-0.102	0.230
5	UK Study, 1994	Males	12	80	16	82	0.728	-0.318	0.419	0.769	-0.263	0.348
6		Females	14	78	18	82	0.778	-0.251	0.398	0.818	-0.201	0.319
7	Wilson, 1998	Males	20	210	28	216	0.707	-0.347	0.310	0.735	-0.308	0.276
8		Females	22	240	26	250	0.869	-0.140	0.305	0.881	-0.126	0.275
9	Canadian, 2002	Males	40	506	60	524	0.664	-0.410	0.214	0.690	-0.371	0.194
10		Females	38	506	50	524	0.770	-0.262	0.225	0.787	-0.239	0.206

ENTER DATA IN MORE THAN 100 FORMATS



"What if I have only means, or p-values, or ..."

Start with almost any kind of data and CMA will compute the effect size for you. Enter events and sample size (as in the example shown) or means and standard deviations, or p-values, or odds ratios and confidence limits – select from more than 100 data formats.

What other formats are included?

www.Meta-Analysis.com

ENTER DATA FOR EACH STUDY IN ITS OWN FORMAT

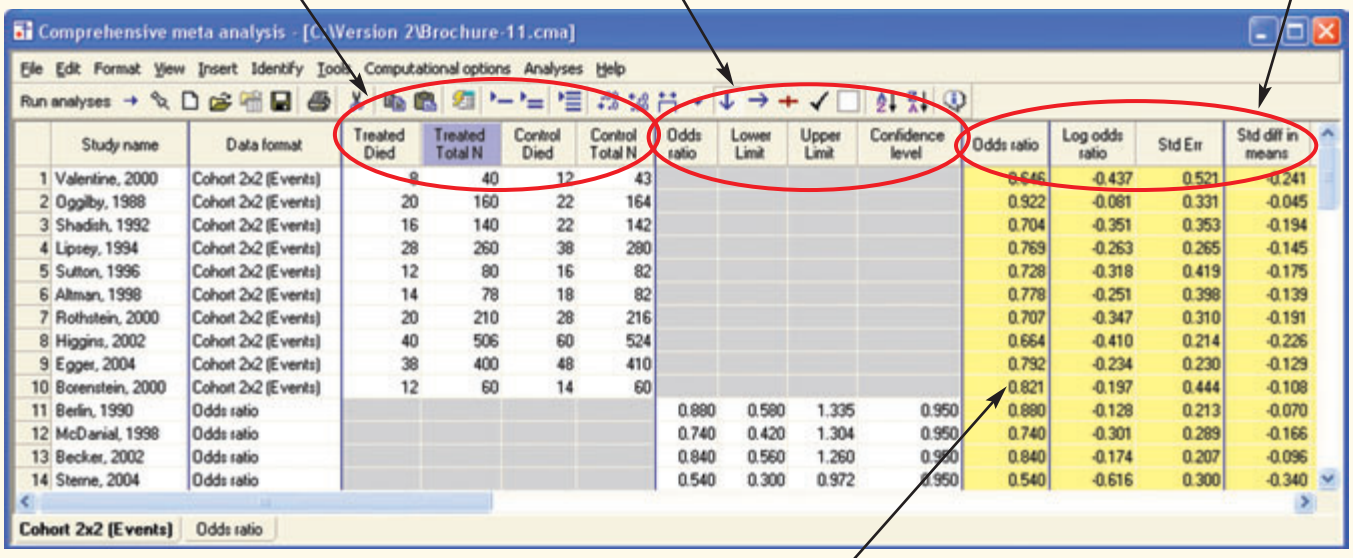
What if one study provided events and sample size, but another provided the odds ratio and confidence interval and another provided only a p-value?

You can enter a different kind of data for each study. Customize the data-entry screen with as many data formats as needed. Comprehensive Meta-Analysis will compute the effect size for each study AND show you exactly how it was computed!

Here, studies 1-10 reported the number of events and total N in each group...

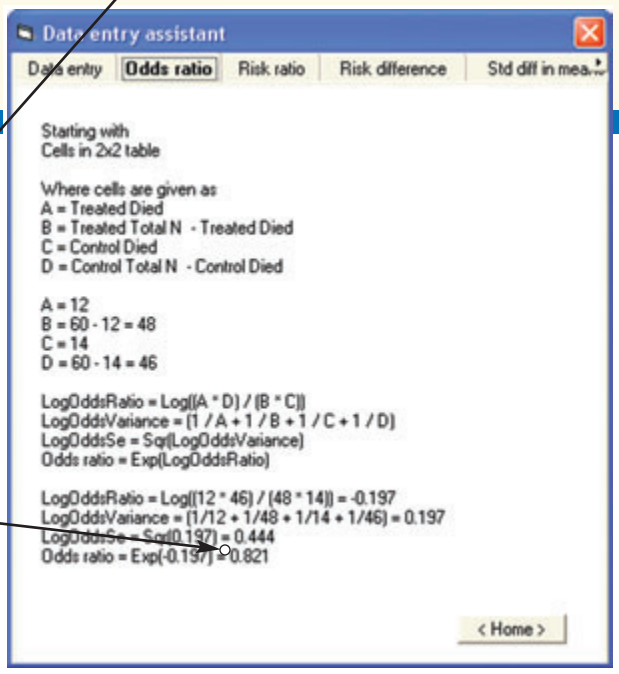
while studies 11-14 reported the odds ratio and confidence limits.

The program computes the effect size and standard error from either format, so all studies can be used in the analysis.



	Study name	Data format	Treated Died	Treated Total N	Control Died	Control Total N	Odds ratio	Lower Limit	Upper Limit	Confidence level	Odds ratio	Log odds ratio	Std Err	Std diff in means
1	Valentine, 2000	Cohort 2x2 (Events)	9	40	12	43					0.646	-0.437	0.521	-0.241
2	Oggilby, 1988	Cohort 2x2 (Events)	20	160	22	164					0.922	-0.081	0.331	-0.045
3	Shadish, 1992	Cohort 2x2 (Events)	16	140	22	142					0.704	-0.351	0.353	-0.194
4	Lipsey, 1994	Cohort 2x2 (Events)	28	260	38	280					0.769	-0.263	0.265	-0.145
5	Sutton, 1996	Cohort 2x2 (Events)	12	80	16	82					0.728	-0.318	0.419	-0.175
6	Altman, 1998	Cohort 2x2 (Events)	14	78	18	82					0.778	-0.251	0.398	-0.139
7	Rothstein, 2000	Cohort 2x2 (Events)	20	210	28	216					0.707	-0.347	0.310	-0.191
8	Higgins, 2002	Cohort 2x2 (Events)	40	506	60	524					0.664	-0.410	0.214	-0.226
9	Egger, 2004	Cohort 2x2 (Events)	38	400	48	410					0.792	-0.234	0.230	-0.129
10	Borenstein, 2000	Cohort 2x2 (Events)	12	60	14	60					0.821	-0.197	0.444	-0.108
11	Berlin, 1990	Odds ratio					0.880	0.580	1.335	0.950	0.880	-0.128	0.213	-0.070
12	McDaniel, 1998	Odds ratio					0.740	0.420	1.304	0.950	0.740	-0.301	0.289	-0.166
13	Becker, 2002	Odds ratio					0.840	0.560	1.260	0.950	0.840	-0.174	0.207	-0.096
14	Sterne, 2004	Odds ratio					0.540	0.300	0.972	0.950	0.540	-0.616	0.300	-0.340

Cohort 2x2 (Events) | Odds ratio



SEE HOW THE EFFECT SIZE IS COMPUTED

To see the formula used to compute an effect size, simply double-click on that effect size.
The program opens a dialog box that shows the computation for that specific row.
Here, it shows how the odds ratio (0.821) was computed for the Borenstein study.

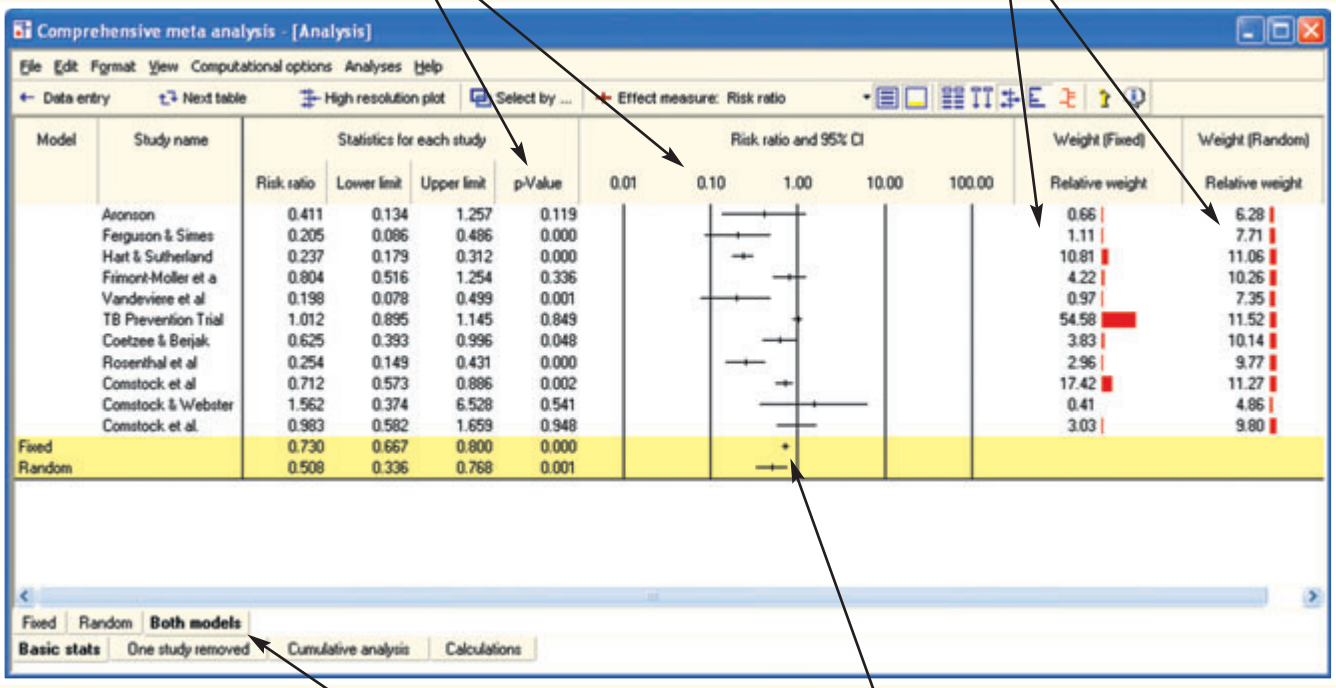
Think it's impossible? Download a free trial and see for yourself.
www.Meta-Analysis.com

PERFORM THE META-ANALYSIS

Run the meta-analysis with one click to display the screen shown here. Then use the menus to customize the display and computational options.

The program shows the effect size and confidence interval for each study.

The program shows the relative weight assigned to each study using fixed and random effects.



Select the computational model.

The program shows the combined effect size and confidence interval using fixed and random effects.

ASSESS THE IMPACT OF MODERATOR VARIABLES

"Is the intervention more effective for one group of studies than another?"

Use weighted ANOVA to group by study type (e.g., chronic vs. acute patients). The program will run the meta-analysis within groups and compare the treatment effect across groups.

"Does the treatment effect increase with dosage?"

Use meta-regression to assess the impact of any continuous moderators.

Diagnostics, cumulative analysis, alternate weighting schemes, and more...

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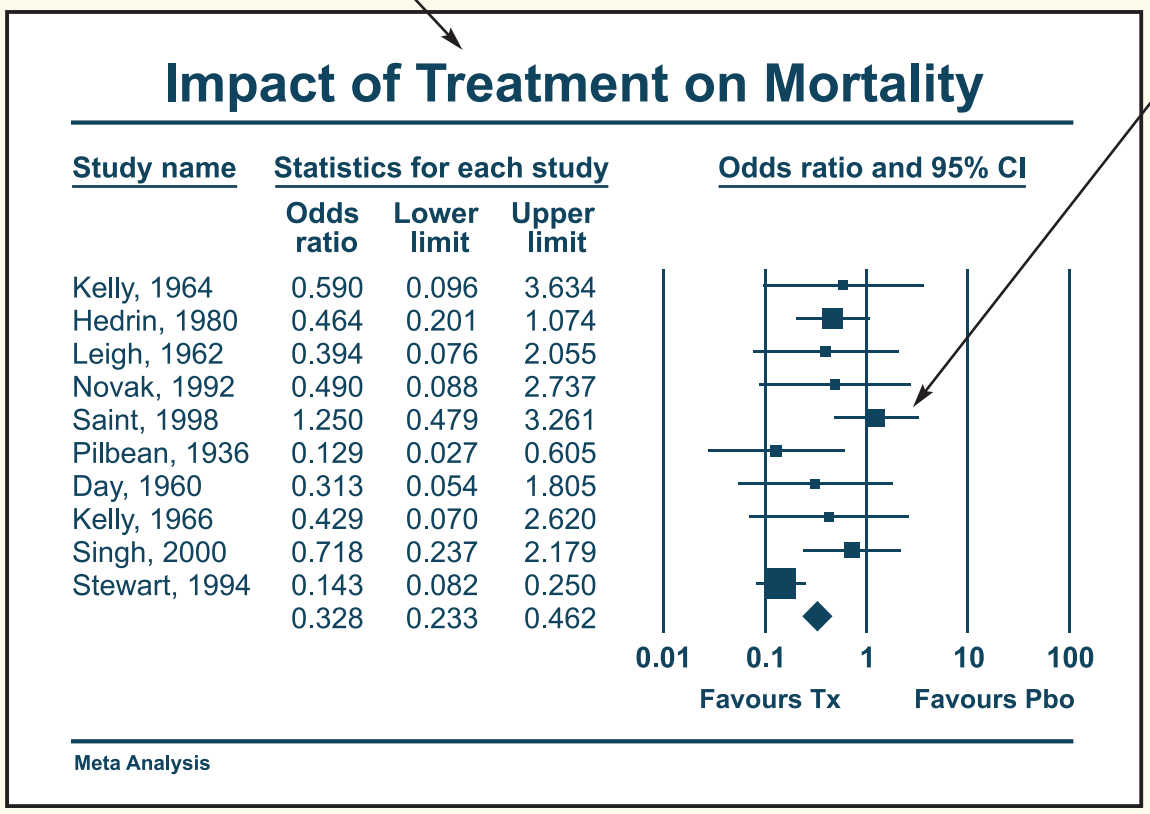
CREATE A HIGH-RESOLUTION FOREST PLOT

Use a forest plot to communicate results clearly and effectively. Export it to Word™ and include it in papers. Export it to PowerPoint™, and include it in presentations.

One click produces the plot shown here, using defaults set by the user.

In this example the symbol for each study is proportional in area to that study's weight in the analysis.



CUSTOMIZE THE PLOT

Modify the symbols, colors, text, columns. All elements of the plot are under your control.

Export to Word™ or PowerPoint™ with one click!

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Remember when working with graphics was fun? It can be, again.

COMPREHENSIVE
META-ANALYSIS
A computer program for meta-analysis

Developed by a team of experts

Left to right, (Seated) David Wilson, Betsy Becker, Julian Higgins, Will Shadish, Hannah Rothstein, Michael Borenstein, Mike McDaniel, Steven Tarlow. (Standing) Spyros Konstantopoulos, Larry Hedges, Harris Cooper, John Ioannidis, Despina Contopoulos-Ioannidis, Jack Vevea, Sue Duval, Mark Lipsey, Alex Sutton, Terri Pigott, Fred Oswald, Wayne Greenwood, Thomas Trikalinos.

Not in pictures: Jesse Berlin, Michael Brannick, Matthias Egger, David Rindskopf, Stephen Senn, Jeff Valentine, Vish Viswesvaran.

Inset photo:
Jonathan Sterne, Doug Altman, Alex Sutton, Michael Borenstein, Julian Higgins, Hannah Rothstein.

Funded by the U.S. National Institutes of Health

National Institute on Aging, Dr. Sidney Stahl
National Institute on Drug Abuse, Dr. Thomas Hilton

AG021360	Combining data types in meta-analysis
AG20052	Publication bias in meta-analysis
AG024771	Software for meta regression
DA019280	Forest plots for meta-analysis

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