

Using Review Manager (RevMan) in your Meta-Analysis

Introduction

The aim of a meta-analysis is to combine, or pool, the results from several published papers to find an overall estimate of the measure you are interested in. You can think of this as seeing what the result would have been if all the participants in the different papers had been involved in the same study.

You can use the RevMan program to produce Forest and Funnel plots but to do this you will need to extract the same kind of data from each study.

You will also need to decide if the studies are similar (heterogeneous) enough that it makes sense to pool the results. For instance, the studies might have involved different kinds of participants, different (but perhaps related) drugs or different designs. It might be that you will not be able to include all of your studies in the meta-analysis (though you would keep them in your systematic review), or you might decide to pool results for different groups of studies.

RevMan can calculate the pooled odds (or risk) ratio or the pooled mean difference.

In all cases you need to have data for the two groups you wish to compare from each paper.

You will need either:

- The number of events and total number of participants in each group;
- The odds ratio (OR) and confidence interval (CI);
- The mean and standard deviation of some measure for each group.

If your data does not come from randomised controlled trials (RCTs) then check with your supervisor whether a meta-analysis using RevMan is appropriate.

If you do not have the right kind of data, then you cannot produce a Forest plot – and you should explain this in your report.

Downloading RevMan

You can download RevMan from this page: <https://community.cochrane.org/help/tools-and-software/revman-5/revman-5-download>

You will need to choose the version that matches the specification of your computer. Follow the instructions in the Installation Wizard. Note that you will not automatically be able to download the program onto a university PC as you will not have admin rights. If you need advice about downloading the program, then please contact IT help.

Open RevMan

Choose to run the program in Non-Cochrane mode.

General

Note that exactly what you will see on your screen might depend on the version of RevMan you have. These instructions are designed to give you an overview of the parts of the program you will need.

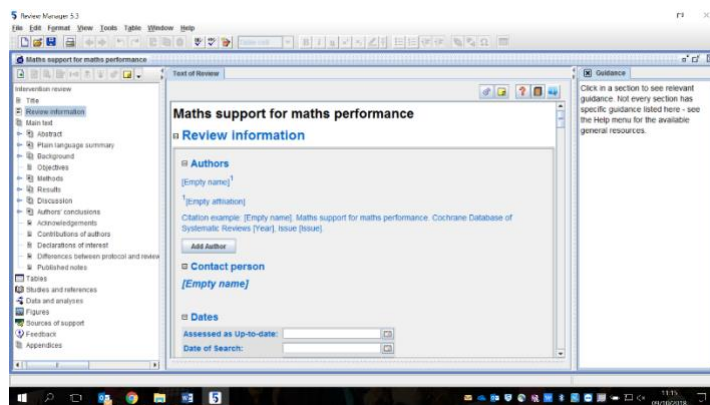
When you have completed each screen click on **Next** or **Continue**. Once you have completed a section you will need to click **Finish**. Each line in the instructions below usually refers to a new screen.

Note that RevMan refers to papers as studies.

Starting your Review

- Click on: **Create a new review**
- Choose: **Intervention Review**
- Fill in the title of your review.
- Choose: **Full Review** and **Finish**

You should then see a page that looks something like this:



You will see a menu on the left and one in the middle of the screen. I will refer to these as the left-hand and main menu respectively.

Entering the details of your papers

- From the left-hand menu click on **Studies & References**.
- On the main menu under References to Studies and Included studies click **Add study**.
- Put in a study id - it makes sense to use the author & date.
- Leave as published data only (unpublished data not sought).
- Fill in the date of the study, if it has not copied it for you.
- Ignore the next screen unless you wish to add another identifier for this paper.
- If you have more papers to add, choose: **Add another study in same section** and then click **continue**.
- Repeat until you have added all your papers then choose **nothing** and **finish**.

Setting up a table for your data

- From the menu on the left choose: **Data & Analyses**.
- On the main menu click: **Add a comparison** under Data and Analyses.
- Decide on a name for your comparison.
- Choose: **Add an outcome under the new comparison** and **continue**.
- Choose the data type. This will probably be **dichotomous** (for events), **continuous** (for means and standard deviations) or **generic inverse variance** (for odds ratios). Note the descriptions that appear in the box to the right as this tells you the kind of data you will need to enter and should guide your choice. (For generic inverse variance you will use the RevMan calculator to find the standard error.)

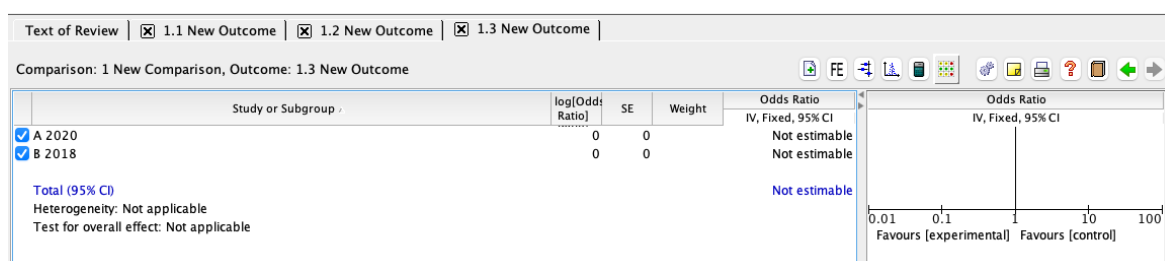
Entering data

- Choose names for your outcome and for the two groups you are looking at.
- Leave the choices as they are unless you have been advised otherwise.
- Leave the *analysis details* as it is unless you have been advised otherwise.
- The next screen allows you to change the graph labels, the sort option and the scale for your graph but you can also edit these later. (See the notes below on how RevMan interprets 'favours'.)
- Choose: **Add study data**.
- Highlight the studies you want to include and then click: **Finish**
- (The **edit** button allows you to go back and change any of these settings but you can also do this later.)

You should now see a table showing the names of your papers and spaces to enter the data.

If you chose dichotomous or continuous data then you can enter the data from each study directly. As you do this you will see a Forest plot being constructed on the right.

If you are adding Odds Ratios then you will see a table like this:



You **cannot** add the data directly as you need the log of the odds ratio and the standard error (not the confidence interval), but you can use the RevMan calculator to find these figures for you.

Click on one of the zeros in the table and then click on the calculator icon.

Enter the Odds Ratio and lower bound of the Confidence Interval into the boxes. (RevMan will then complete the upper end of the CI and other values.)

Calculator - A 2020 [New Outcome]

Events: a, b, N1
Non-event: c, d, N2
Total: N+, N-, N

Log(Odds Ratio): 0.8879
Log(CI Start): 0.4947
Log(CI End): 1.2811
SE: 0.2006
Odds Ratio: 2.4300
CI Start: 1.6401
CI End: 3.6005
Z: 4.4262
P value: 0.0000

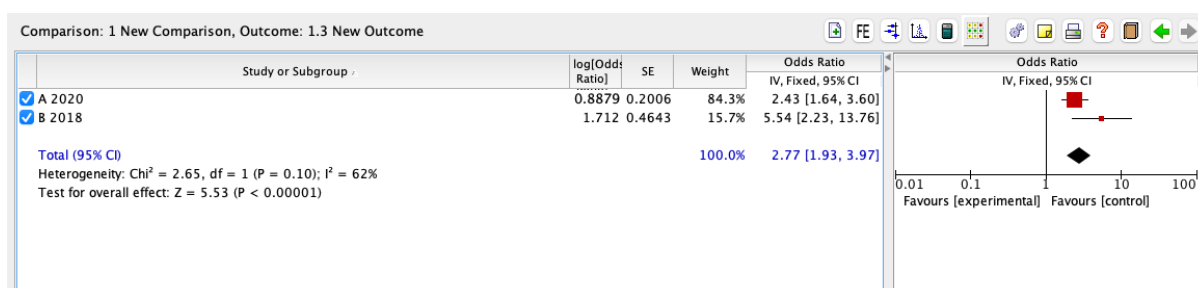
Confidence Interval: 90% 95% 99%

Update data table

Click on the Update data table button at the bottom and RevMan will automatically transfer the data you need.

Add data from your other papers in the same way.

You should see the original OR and CI appearing in the table, (there may be some minor discrepancies, probably due to rounding), with the Forest plot on the right.



Click on the Forest Plot icon to see the graph in more detail and to download it for inclusion in your report.

An important note about 'favourable'.

Meta-analysis is often used to review medical interventions where an *event* is usually a bad outcome such as death or the onset of a disease. This means that the default in RevMan is to say that the intervention favours the experimental group (the one receiving the intervention) if there are fewer events (proportionally) in that group. Similarly, the default for mean differences is to assume that a lower mean is a good thing. RevMan also assumes that the data for the experimental group is on the left of the table. It is important to check that the labels make sense for your context. You can edit the labels – see below.

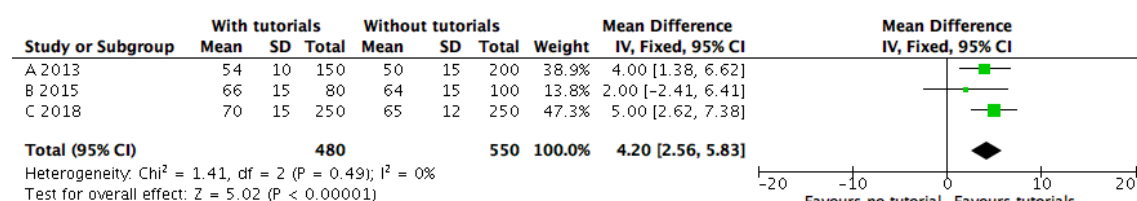
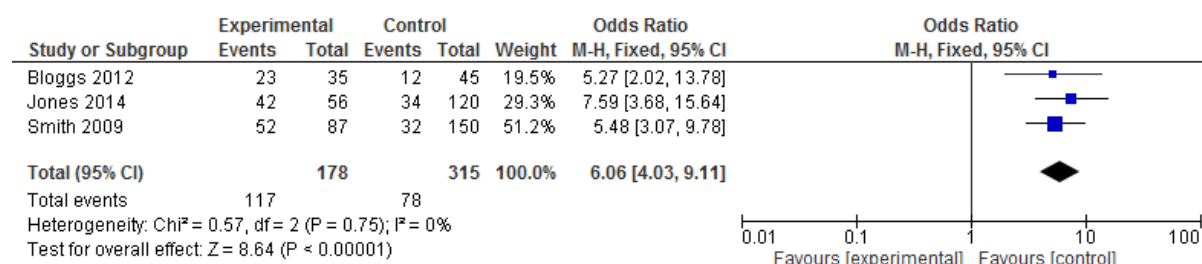
Interpreting the Forest Plot

Your Forest plot should look something like the ones below.

The squares show the estimate (of odds ratio or mean difference) for each study. The size of each square is related to the weight given to each study by RevMan. This is partly to do with the size of the sample for each paper, so bigger studies usually have bigger squares. The lines show the confidence intervals. The vertical line in the middle of the graph shows the value where there is no difference between the groups (i.e. the odds ratio is 1 or the mean difference zero). If the confidence interval crosses this line it means that there was no significant effect found in that paper.

The diamond at the bottom represents the pooled estimate, with the centre of the diamond giving the value and the width showing the confidence interval.

You will see the relevant numbers in the table.



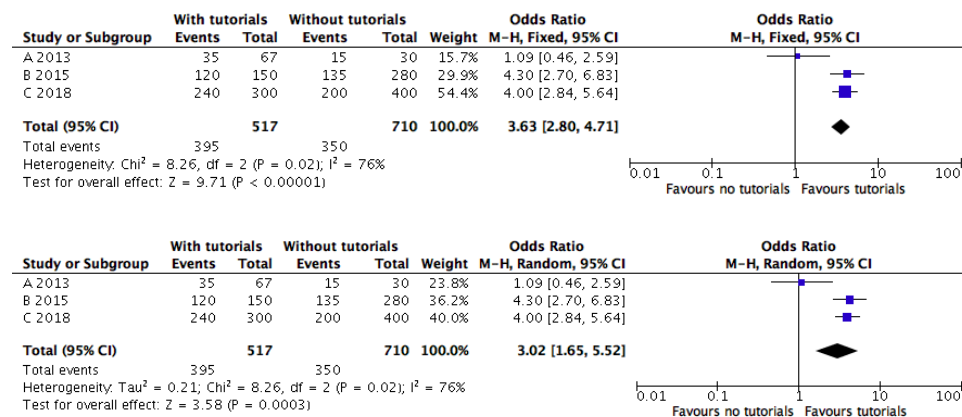
Heterogeneity

The Forest plot also gives a measure of the heterogeneity of the data from your papers, expressed as a percentage. This is a statistical measure of how much variability there is among the studies. Using a fixed effects model (the default) assumes that any variation is due to sampling error. A random effects model is used when the studies might not have a common effect size. (One way to think of this is that in a fixed effects model you are assuming that all studies had participants from the same population.)

LET: Mathematics, Statistics & Numeracy Support

You might also want to comment on differences among your studies in terms of patients, interventions and design, these produce *clinical heterogeneity*.

You should check what advice you have been given about when you should switch to a random effects model - you can do this by clicking on the FE icon. You should see changes in the pooled estimate and confidence interval and in the weighting given to each paper.



Finishing Off

You can make other changes to your Forest plot. If you hover over the icons above the graph, you will see a description of what they do.

You can add more study data.

You can change the scale of your graph by using the slider below it or via the Properties (cogs) icon.

You can change the labels on the graph via the Properties icon.

You can change Mean Difference to Standard Mean Difference.

You can change from Odds Ratios to Risk Ratios or Risk Difference.

You can also produce a Funnel Plot. Note that interpreting a Funnel plot can be difficult with a small number of studies. RevMan will not draw the sloping lines on a Funnel Plot if you are using a random effects model.

When you are happy with your plots, download them to include in your report.

If you would like further advice, then you can book a tutorial with us via this link:

<https://unihub.mdx.ac.uk/study/writing-numeracy/Support-fot-MSN>