How do I interpret meta-analysis in systematic reviews of studies investigating the effectiveness of interventions?

EBP toolkit

A meta-analysis is a statistical approach that **pools data** from **more than 1 study** to estimate the "**overall effect"** of an intervention in comparison to another intervention

A meta-analysis is recommended when the studies are **similar** in their design, population, intervention, comparison, outcomes, and time points

Step 1. Look at a diamond's overall effect value (mean difference between groups) and determine whether a statistically significant difference exists between groups. In this example, the overall effect is -0.21 (-0.37 to -0.04). The p-value is p=0.01 and there is no "zero" within the confidence interval – meaning there is a statistically significant difference between groups.

Step 2. Identify the group that presented a more favorable outcome. In this example, the "multidisciplinary" group presented better pain improvements because the diamond was on the multidisciplinary side. If the diamond were touching the middle line, the interpretation would be that there is no statistically significant difference.

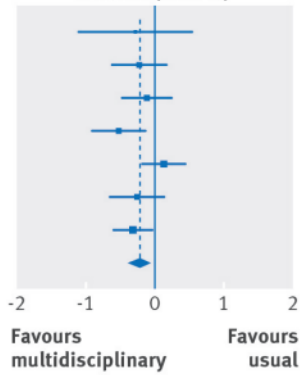
Step 3. Interpret the effect size (magnitude of difference) using Cohen's d, MDC, or MCID. In this example, the study's authors used Cohen's d. This, 0.21 would be a small effect - unlikely to be clinically meaningful). So, although there was a statistically significant difference between groups, this difference was unlikely to be clinically relevant

Step 4. Identify the presence of heterogeneity (I^2). Heterogeneity reflects whether the studies included in the meta-analysis are too diverse. Higher I^2 values indicate high heterogeneity (which is not desired in meta-analysis). In this example, the I^2 is 25% (not important)

A rough guide to interpreting I^2

- 0% to 40%: might not be important
- 30% to 60%: may represent moderate heterogeneity
- 50% to 90%: may represent substantial heterogeneity
- 75% to 100%: considerable heterogeneity

	Multidisciplinary biopsychosocial rehabilitation			Usual care					
Study or subgroup	Mean	SD	Total	Mean	SD	Total	Standardised mean difference, inverse variance, random (95% CI)	Weight (%)	Standardised mean difference, inverse variance, random (95% CI)
Pain									
Abbassi 2012	3.7	2.5	12	4.3	1.4	11		3.7	-0.28 (-1.10 to 0.54)
Bendix 1996/1998	6.0	2.2	50	6.5	2.2	49		13.3	-0.23 (-0.62 to 0.17)
Lambeek 2010	4.2	2.7	59	4.5	2.7	60		15.4	-0.11 (-0.47 to 0.24)
Linton 2005	2.9	2.0	61	4.1	2.6	47		13.8	-0.52 (-0.91 to -0.14)
Lukinmaa 1989	47.3	20.5	86	44.6	20.5	72		18.7	0.13 (-0.18 to 0.44)
Strand 2001	37.2	20.5	81	42.5	20.5	36		13.4	-0.26 (-0.65 to 0.14)
Von Korff 2005	4.0	2.3	99	4.7	2.1	98		21.6	-0.32 (-0.60 to -0.04)
Total			448			373		100.0	-0.21 (-0.37 to -0.04)
Test for heterogeneity: τ^2=0.01, χ^2=7.96, df=6, P=0.24, I^2=25%									
Test for overall effect: z=2.49, P=0.01									



Kamper SJ et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: Cochrane systematic review and meta-analysis. *BMJ.* 2015

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Step 1. Look at a diamond's overall effect value (odds ratio) and determine whether a statistically significant difference exists between groups. In this example, the overall effect is 1.04 (0.73, 1.47). The p-value is p=0.83 and the numbers within the confidence interval include 1 - meaning there is no statistically significant difference between groups.

Step 2. Identify the group that presented a more favorable outcome. In this example, because the diamond is touching the middle line, the interpretation would be that there is no statistically significant difference between groups.

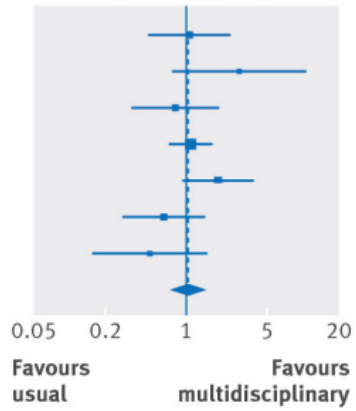
Step 3. If there is a statistically significant difference, it's time to interpret the effect size (magnitude of difference). ORs > 1 indicates increased occurrence of an event; OR = 1 (odds are the same), and OR < 1 indicates decreased occurrence of an event

Step 4. Identify the presence of heterogeneity (I^2). Heterogeneity reflects whether the studies included in the meta-analysis are too diverse. Higher I^2 values indicate high heterogeneity (which is not desired in meta-analysis). In this example, the I^2 is 31% (it might not be important)

A rough guide to interpreting I^2

- 0% to 40%: might not be important
- 30% to 60%: may represent moderate heterogeneity
- 50% to 90%: may represent substantial heterogeneity
- 75% to 100%: considerable heterogeneity

Study or subgroup	Events	Total	Events	Total	Odds ratio, Mantel-Haenszel, random (95% CI)	Weight (%)	Odds ratio, Mantel-Haenszel, random (95% CI)
Work							
Bendix 1996/1998	26	50	25	49		13.8	1.04 (0.47 to 2.29)
Linton 2005	57	61	36	43		6.2	2.77 (0.76 to 10.14)
Lukinmaa 1989	70	86	61	72		12.6	0.79 (0.34 to 1.83)
Mitchell 1994	214	271	211	271		28.9	1.07 (0.71 to 1.61)
Skouen 2002	35	57	40	86		16.8	1.83 (0.93 to 3.62)
Strand 2001	38	81	21	36		13.7	0.63 (0.29 to 1.40)
Von Korff 2005	89	99	93	98		8.1	0.48 (0.16 to 1.46)
Total	529	705	487	655		100.0	1.04 (0.73 to 1.47)
Test for heterogeneity: τ^2=0.06, χ^2=8.65, df=6, P=0.19, I^2=31%							
Test for overall effect: z=0.21, P=0.83							



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