



Beyond RevMan:

Meta-Regression Analysis in Context

Robin Christensen, MSc, Biostatistician

The Parker Institute: Musculoskeletal Statistics Unit

Frederiksberg Hospital

Copenhagen, Denmark



Statistical Editor
Cochrane Musculoskeletal Group (CMSG),
Australian Satellite
&
Member of the
Cochrane Statistical Methods Group (CSMG)

Meta-Regression Analysis in Context

LITERATURE #1

- S. G. Thompson and S. J. Pocock. Can meta-analyses be trusted? *Lancet* 338 (8775):1127-1130, 1991
- S. G. Thompson. Why sources of heterogeneity in meta-analysis should be investigated. *BMJ* 309 (6965):1351-1355, 1994
- S. G. Thompson and S. J. Sharp. Explaining heterogeneity in meta-analysis: a comparison of methods. *Stat.Med.* 18 (20):2693-2708, 1999

Meta-Regression Analysis in Context

LITERATURE #2 (recommendations/guidelines)

- S. G. Thompson and J. P. Higgins. How should meta-regression analyses be undertaken and interpreted? *Stat.Med.* 21 (11):1559-1573, 2002
- S. G. Thompson and J. P. Higgins. Treating individuals 4: can meta-analysis help target interventions at individuals most likely to benefit? *Lancet* 365 (9456):341-346, 2005

Meta-Regression Analysis in Context

LITERATURE #3 (Applied statistics)

- R. Christensen, E. M. Bartels, A. Astrup, and H. Bliddal. Effect of weight reduction in obese patients diagnosed with knee osteoarthritis: a systematic review and meta-analysis. *Ann.Rheum Dis.* 66 (4):433-439, 2007
- R. Christensen, E. M. Bartels, A. Astrup, and H. Bliddal. Symptomatic efficacy of avocado/soybean unsaponifiables (ASU) in osteoarthritis (OA) patients: a meta-analysis of randomized controlled trials. *Osteoarthritis Cartilage.* 16(4):399-408, 2008

What is a Meta-Analysis?

The use of statistical techniques in a systematic review to integrate (i.e. combine/pool) the results of included studies. Sometimes misused as a synonym for systematic reviews.

Deeks JJ, Higgins JPT, Altman DG (CSMG)

What is a Meta-Analysis?

- Traditional methods of meta-analysis attempt to combine results in order to obtain a single summarized ‘*effect size*’
- The observed effect in each study is an estimate, with some imprecision, of the true effect in that study

Thompson & Pocock. *Lancet* 338 (8775):1127-1130, 1991.

Meta-Analysis: INFERENCE

A meta-analysis is a two-stage process

- 1st stage (#a): a summary statistic for each study (i.e. $\theta_i \approx \hat{\theta}_i = y_i$)
- 1st stage (#b): error around the estimate, $y_i \sim \mathcal{N}(\theta_i, \sigma_i^2)$; i. i. d.

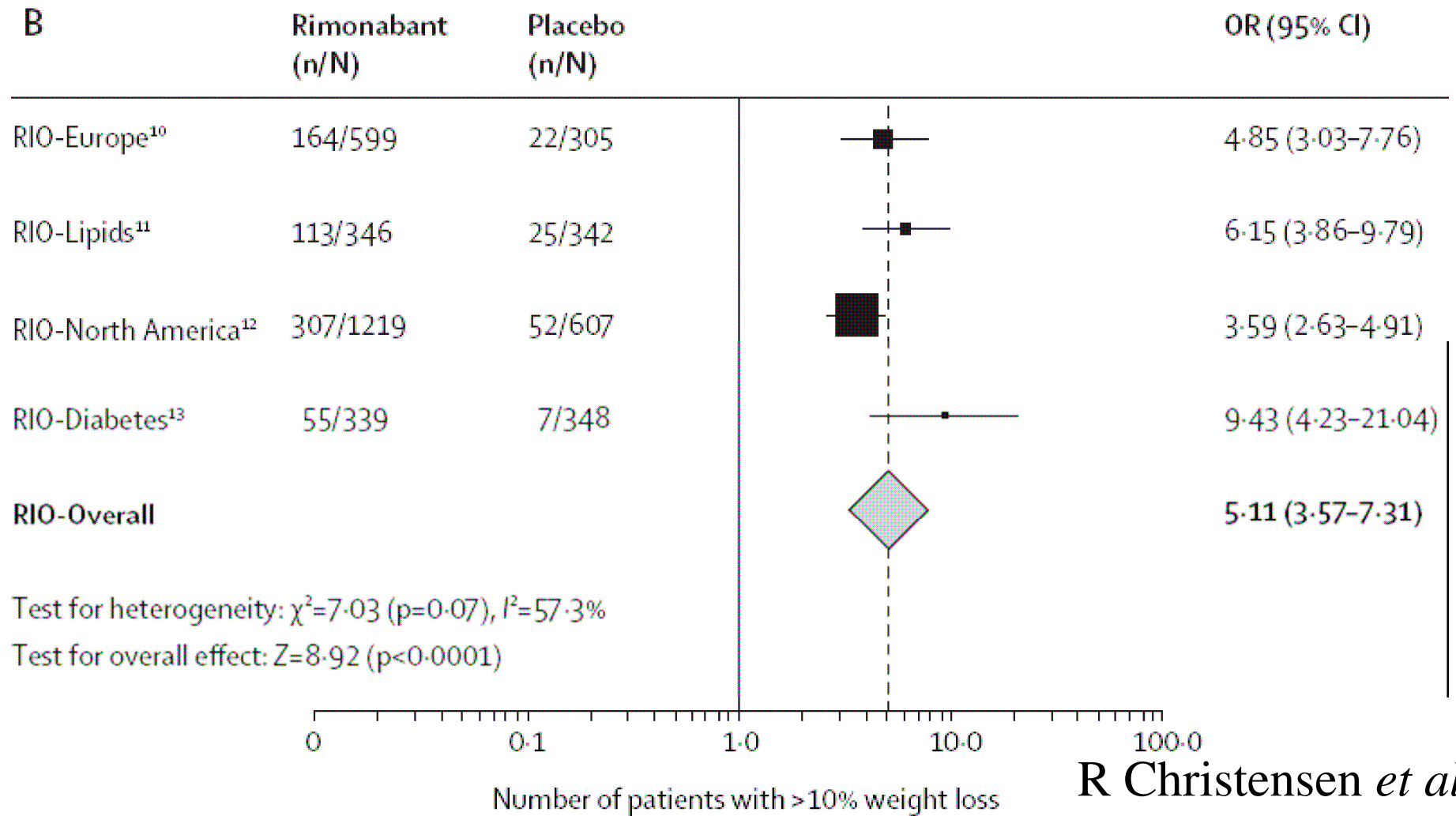
$$\sqrt{\sigma_i^2} \approx \text{SE}(y_i)$$

- 2nd stage (#a): a summary statistic combining all studies (i.e. $\theta \approx \hat{\theta} = y$). Included studies referred to as #: 1, 2, 3,, i ,, $k-1, k$

- 2nd stage (#b): error around the estimate, $y \sim \mathcal{N}(\theta, \tau^2)$

- y : estimate (i.e. calculate) as a weighted average
$$y = \frac{\sum y_i / [\text{SE}(y_i)]^2}{\sum 1 / [\text{SE}(y_i)]^2}$$

Meta-Analysis: Efficacy!

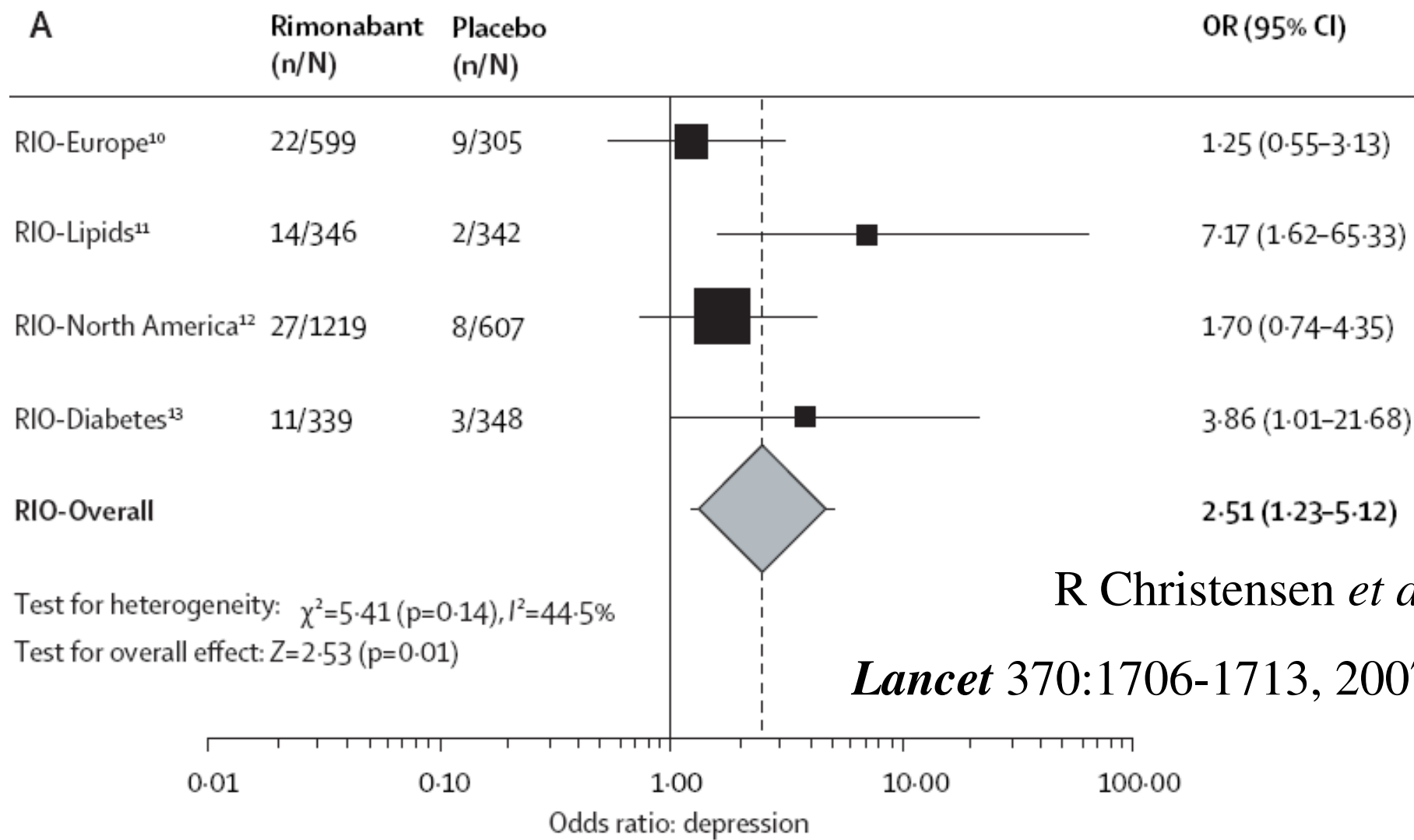


R Christensen *et al.*

Lancet 370:1706-1713, 2007.

The Parker Institute: Musculoskeletal Statistics Unit (RC)

Meta-Analysis: Safety!



R Christensen *et al.*

Lancet 370:1706-1713, 2007.

Focusing on the Weight%:

Fixed-effects meta-regression analysis

$$W_i = 1/[SE(y_i)]^2$$

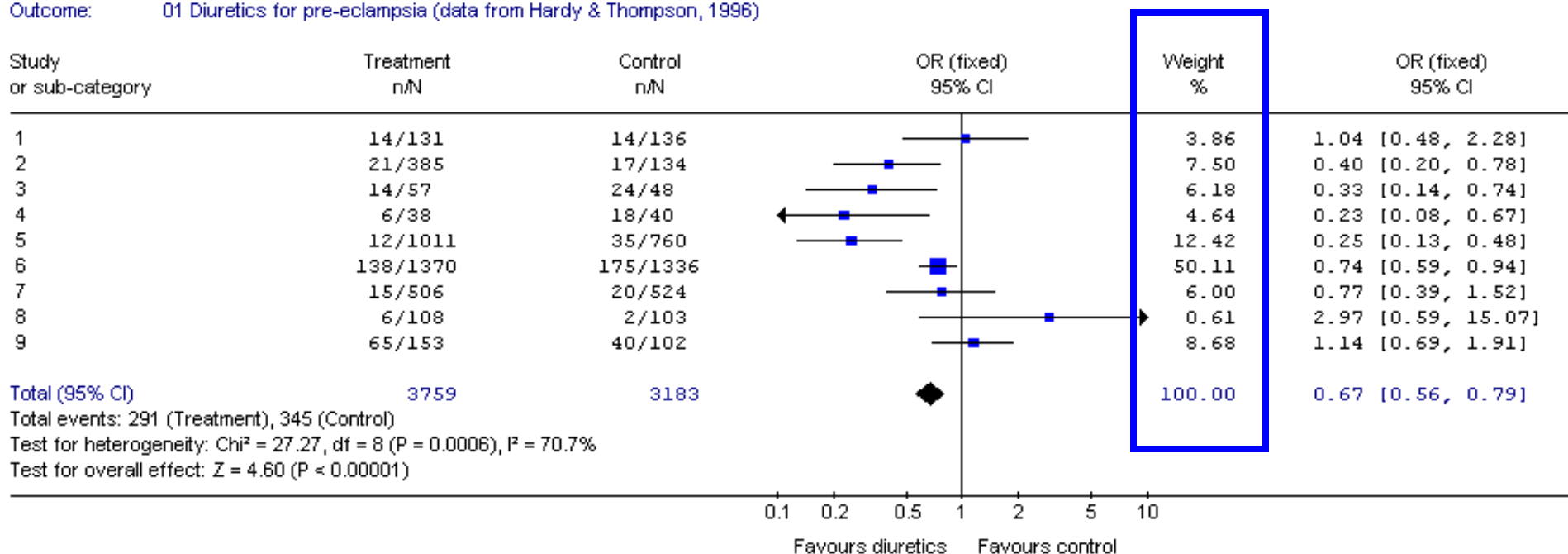
$$\text{Weight}\%(i) = (W_i / \sum W_i) \times 100\%$$

Focusing on the Weight%:

Fixed-effects meta-regression analysis

$$\text{Weight}\%(i) = (W_i / \sum W_i) \times 100\%$$

Review: Hardy & Thompson (1996)
 Comparison: 01 Effects of diuretics on pre-eclampsia
 Outcome: 01 Diuretics for pre-eclampsia (data from Hardy & Thompson, 1996)

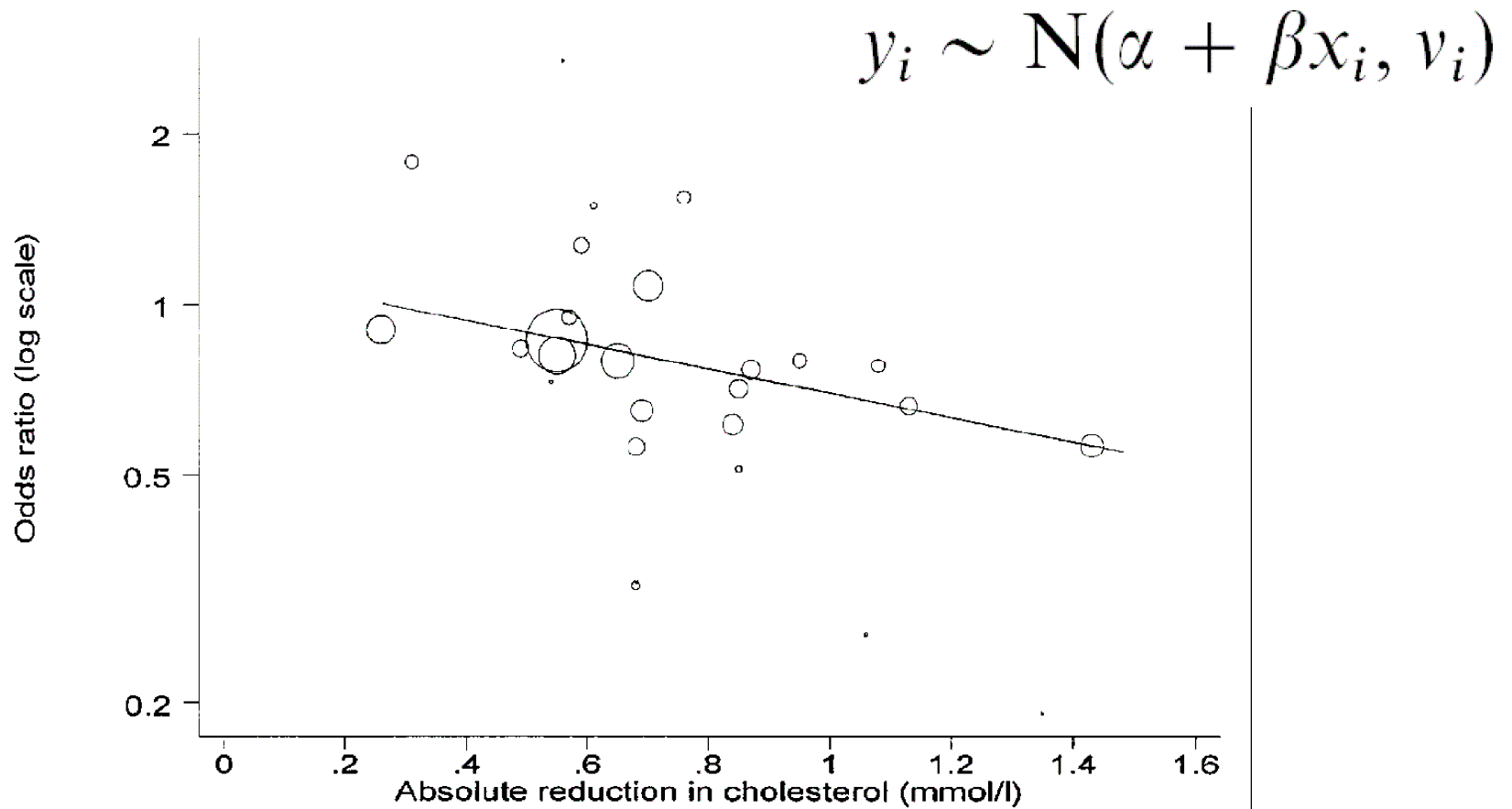


What is Meta-Regression?

- Meta-regression aims to relate the size of effect to one or more characteristics of the studies involved
- Typically - methods that use normal errors regression are considered. The observed ‘*effect size*’ in each trial (y_i say in trial i) is assumed to follow a normal distribution

Thompson & Sharp. *Stat.Med.* 18 (20):2693-2708, 1999.

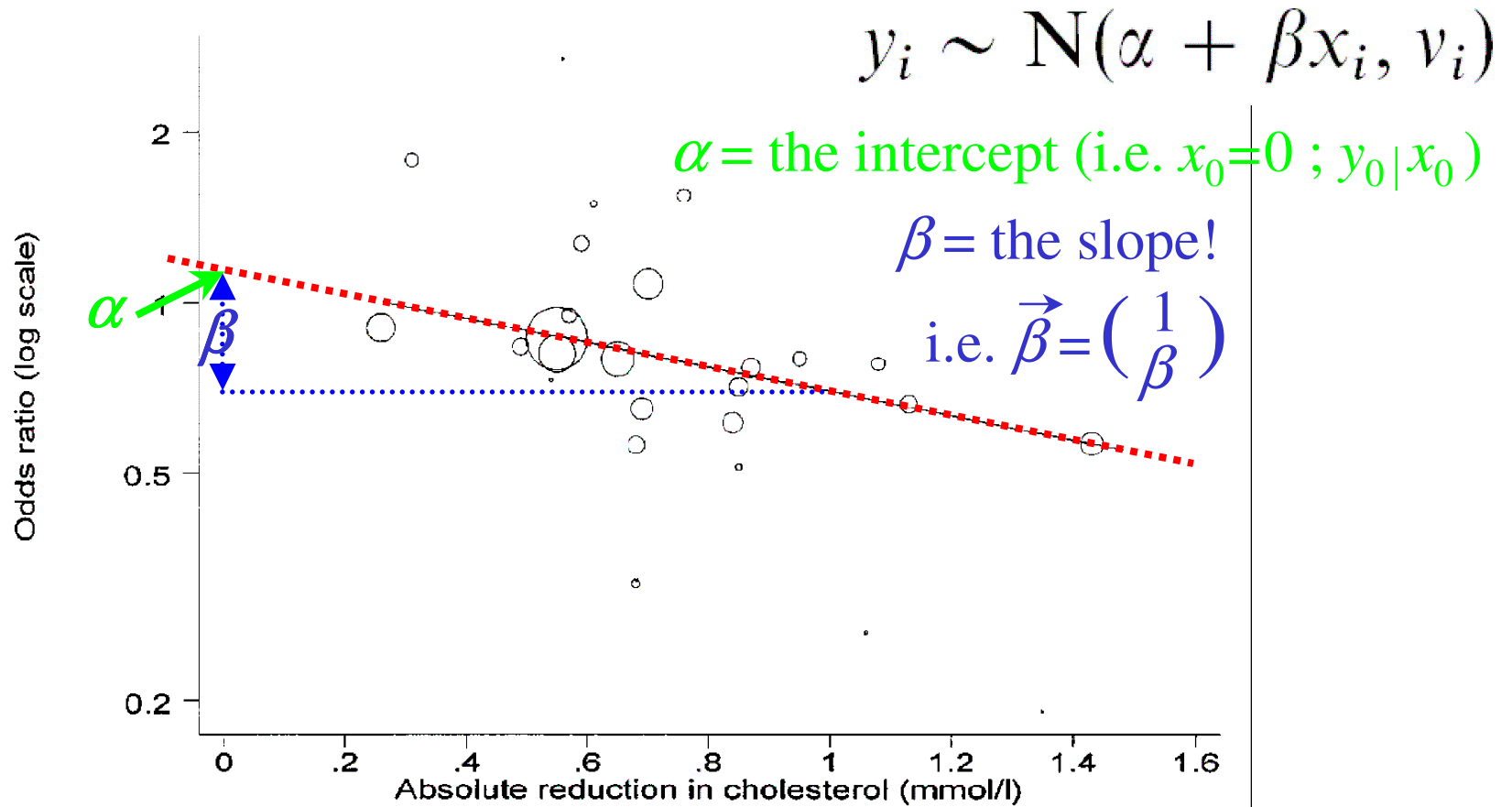
What is Meta-Regression?



regression of y_i on x_i with weights $w_i = 1/v_i$

Thompson & Sharp. *Stat.Med.* 18 (20):2693-2708, 1999.

What is Meta-Regression?



Thompson & Sharp. *Stat.Med.* 18 (20):2693-2708, 1999.

What is Meta-Regression?

(Two agenda's: *a priori* vs. *post hoc*)

1st: Quantify the magnitude as a function of the *a priori* defined covariate changing (e.g. the amount of weight loss predicts symptomatic improvement in knee OA patients)

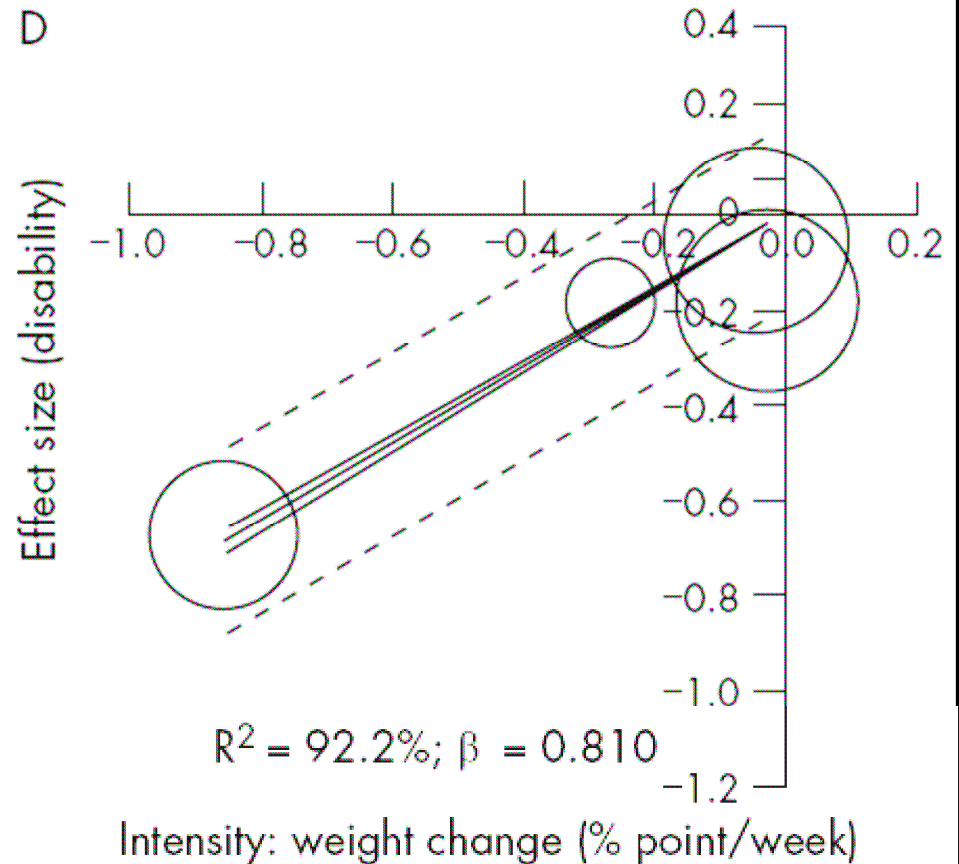
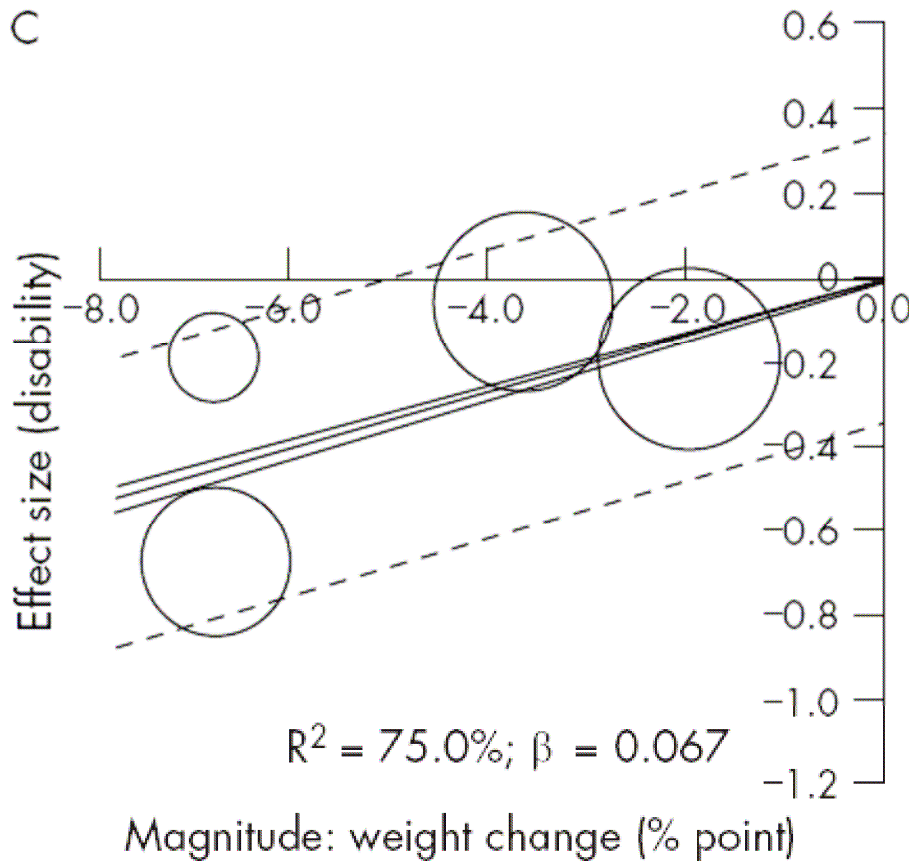
Christensen R *et al. Ann.Rheum Dis.* 66 (4):433-439, 2007

2nd: Exploring reasons for heterogeneity – partly/hardly preplanable; i.e. possible/probable study-level predictors

Christensen R *et al. Osteoarthritis Cartilage.* 16(4):399-408, 2008

What is Meta-Regression?

(Quantifying a dose-response relationship)



Christensen R *et al. Ann.Rheum Dis.* 66 (4):433-439, 2007

What is Meta-Regression?

(Exploring reasons for heterogeneity)

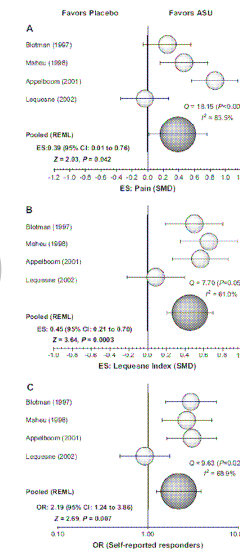


Table II
 Statistical data explaining possible clinical reasons for heterogeneity among available study level covariates

Outcome Variable	ES: pain		ES: Lequesne		log _e (OR): responders	
	$\tau^2 = 0.120$	$I^2 = 83.5\%$	$\tau^2 = 0.038$	$I^2 = 61.0\%$	$\tau^2 = 0.232$	$I^2 = 68.9\% (\%)$
%Hip OA	≤0	≤0	≤0	≤0	≤0	≤0
Jadad QS	0.039	27.1	0.061	98.4	0.324	96.2
Duration	0.074	51.1	0.004	6.4	≤0	≤0
Age	≤0	≤0	0.010	16.6	0.019	5.5
%Females	0.011	7.8	≤0	≤0	≤0	≤0
BMI	0.015	10.7	0.051	82.2	0.315	93.5
KL score	0.160	>100	0.056	89.4	0.398	>100
Pain	0.010	68.2	≤0	≤0	0.065	19.3
Lequesne	0.187	>100	0.068	>100	0.331	98.0

Christensen R *et al. Osteoarthritis Cartilage.* 16(4):399-408, 2008

What is Meta-Regression?

(Exploring reasons for heterogeneity)

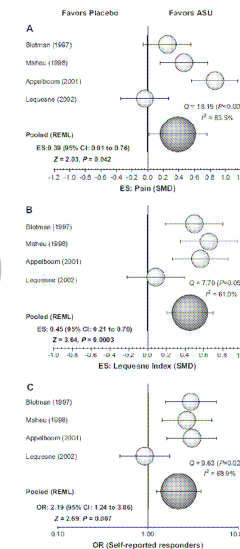


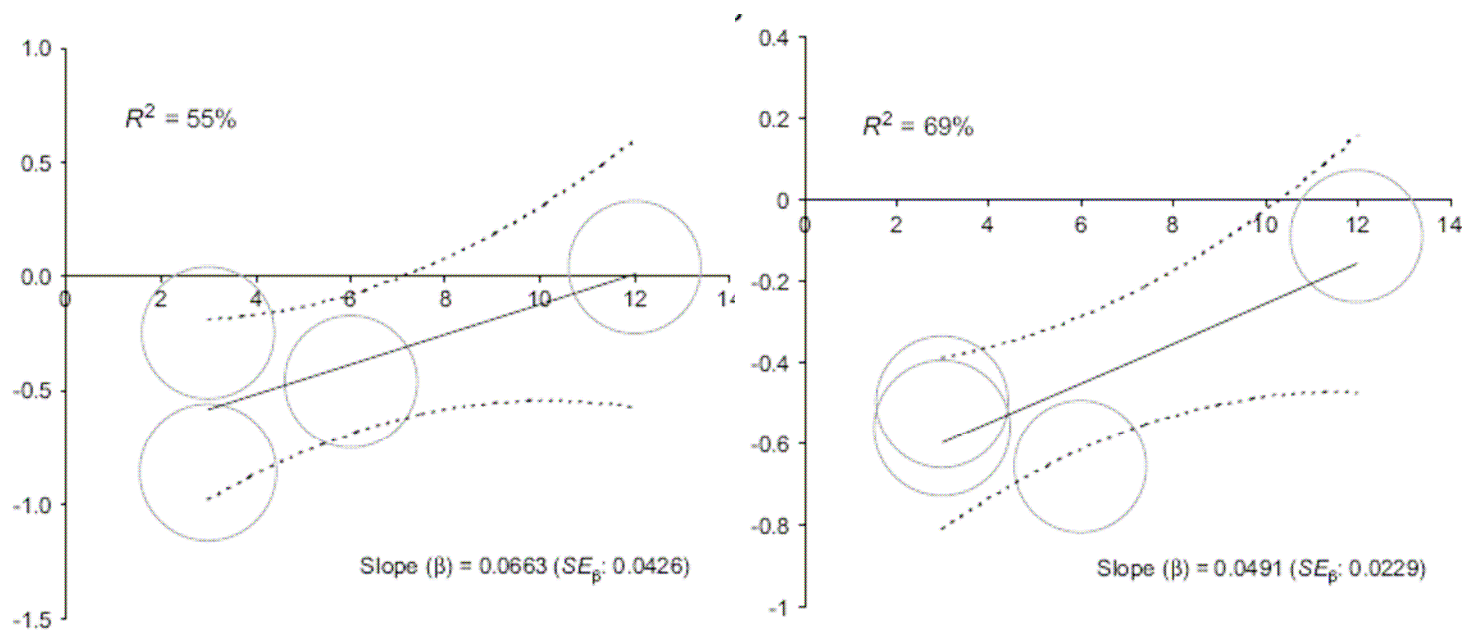
Table II
Statistical data explaining possible clinical reasons for heterogeneity among available study level covariates

Outcome Variable	ES: pain		ES: Lequesne		log _e (OR): responders	
	$\tau^2 = 0.120$	$I^2 = 83.5\%$	$\tau^2 = 0.038$	$I^2 = 61.0\%$	$\tau^2 = 0.232$	$I^2 = 68.9\% (\%)$
%Hip OA	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0
radiol OS	0.039	27.1	0.061	98.4	0.324	96.2
Duration	0.074	51.1	0.004	6.4	≤ 0	≤ 0
Age	≤ 0	≤ 0	0.010	16.6	0.019	5.5
%Females	0.011	7.8	≤ 0	≤ 0	≤ 0	≤ 0
BMI	0.015	10.7	0.051	82.2	0.315	93.5
KL score	0.160	>100	0.056	89.4	0.398	>100
Pain	0.010	68.2	≤ 0	≤ 0	0.065	19.3
Lequesne	0.187	>100	0.068	>100	0.331	98.0

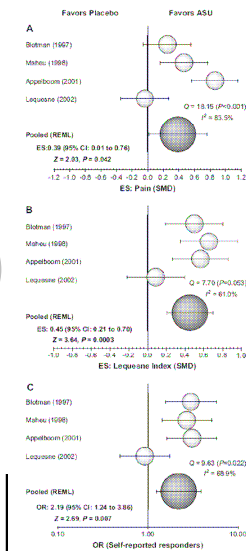
Christensen R *et al.* *Osteoarthritis Cartilage*. 16(4):399-408, 2008

What is Meta-Regression?

(Exploring reasons for heterogeneity)



Christensen R *et al.* *Osteoarthritis Cartilage*. 16(4):399-408, 2008



What is Meta-Regression?

(Exploring reasons for heterogeneity)

An *a priori* assumption – the usual suspects:

(i) Does the *year of publication* ‘predict’ the ‘effect size’ (heterogeneity)?

(see S. Reichenbach *et al.* Meta-analysis: chondroitin for osteoarthritis of the knee or hip. *Ann.Intern.Med.* 146 (8):580-590, 2007).

(ii) Does the *trial duration* ‘predict’ the ‘effect size’ (heterogeneity)?

(see R Christensen *et al.* Symptomatic efficacy of avocado/soybean unsaponifiables (ASU) in osteoarthritis (OA) patients: a meta-analysis of randomized controlled trials. *OAC* 16(4):399-408.

(iii) Does the *Standard Error* (SE) ‘predict’ the ‘effect size’ (heterogeneity)?

(see Sterne & Egger. Funnel plots for detecting bias in meta-analysis: guidelines on choice of axis. *J Clin.Epidemiol.* 54 (10):1046-1055, 2001).

How should meta-regression analyses be undertaken and interpreted?

Simon G. Thompson^{*,†} and Julian P. T. Higgins

MRC Biostatistics Unit, Institute of Public Health, Robinson Way, Cambridge CB2 2SR, U.K.

STATISTICS IN MEDICINE

Statist. Med. 2002; **21**:1559–1573 (DOI: 10.1002/sim.1187)

SUMMARY

Appropriate methods for meta-regression applied to a set of clinical trials, and the limitations and pitfalls in interpretation, are insufficiently recognized. Here we summarize recent research focusing on these issues, and consider three published examples of meta-regression in the light of this work. One principal methodological issue is that meta-regression should be weighted to take account of both within-trial variances of treatment effects and the residual between-trial heterogeneity (that is, heterogeneity not explained by the covariates in the regression). This corresponds to random effects meta-regression. The associations derived from meta-regressions are observational, and have a weaker interpretation than the causal relationships derived from randomized comparisons. This applies particularly when averages of patient characteristics in each trial are used as covariates in the regression. Data dredging is the main pitfall in reaching reliable conclusions from meta-regression. It can only be avoided by prespecification of covariates that will be investigated as potential sources of heterogeneity. However, in practice this is not always easy to achieve. The examples considered in this paper show the tension between the scientific rationale for using meta-regression and the difficult interpretative problems to which such analyses are prone. Copyright © 2002 John Wiley & Sons, Ltd.

How should meta-regression analyses be undertaken and interpreted?

Simon G. Thompson^{*,†} and Julian P. T. Higgins

MRC Biostatistics Unit, Institute of Public Health, Robinson Way, Cambridge CB2 2SR, U.K.

STATISTICS IN MEDICINE

Statist. Med. 2002; **21**:1559–1573 (DOI: 10.1002/sim.1187)

SUMMARY

Appropriate methods for meta-regression applied to a set of clinical trials, and the limitations and pitfalls in interpretation, are insufficiently recognized. Here we summarize recent research focusing on these issues, and consider three published examples of meta-regression in the light of this work. One principal methodological issue is that meta-regression should be weighted to take account of both within-trial variances of treatment effects and the residual between-trial heterogeneity (that is, heterogeneity not explained by the covariates in the regression). This corresponds to random effects meta-regression. The associations derived from meta-regressions are observational, and have a weaker interpretation than the causal relationships derived from randomized comparisons. This applies particularly when averages of patient characteristics in each trial are used as covariates in the regression. Data dredging is the main pitfall in reaching reliable conclusions from meta-regression. It can only be avoided by prespecification of covariates that will be investigated as potential sources of heterogeneity. However, in practice this is not always easy to achieve. The examples considered in this paper show the tension between the scientific rationale for using meta-regression and the difficult interpretative problems to which such analyses are prone. Copyright © 2002 John Wiley & Sons, Ltd.

How should meta-regression analyses be undertaken and interpreted?

STATISTICS IN MEDICINE

Statist. Med. 2002; **21**:1559–1573 (DOI: 10.1002/sim.1187)

A **visual presentation** of a meta-regression relationship is essential. A diagram seems to be the most helpful, *using symbol sizes that relate to the precision* of each treatment effect estimate.

If **equally sized points** are used, it is *impossible to see which trials provide the greatest information*, and how this might affect the interpretation. Confidence intervals around the points tend to pull the eye towards the small imprecise trials, which is exactly the opposite of what is wanted.

A diagram **emphasizes that the unit of analysis is the trial**, not the individual patient.

Microsoft Excel - Reichenbach - DATABASE

File Rediger Vis Indsæt Formater Funktioner Data Vindue Hjælp

100% Arial 10 F K U

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	OBS	YEAR	TIME	ITT	nE	nC	AttrE	AttrC	RD_attr	J	d	SEd	Size	%Weight	Varia
2	1	1987	6	17	8	9	.	.	.	0.949	-1.01	0.4745	4.442	0.499422	0.2
3	2	1991	51	40	18	18	0.100	0.100	0.000	0.978	-2.14	0.3342	8.954	1.006818	0.1
4	3	1992	24	56	29	27	0.170	0.700	-0.530	0.986	-1.93	0.2679	13.938	1.567166	0.0
5	4	1992	25	129	63	62	0.050	0.020	0.030	0.994	-0.53	0.1786	31.360	3.526124	0.0
6	5	1992	21	120	56	55	0.000	0.020	-0.020	0.993	-0.64	0.1913	27.318	3.071646	0.0
7	6	1996	25	146	65	61	0.120	0.150	-0.030	0.994	-1.81	0.1786	31.360	3.526124	0.0
8	7	1998	13	127	83	44	.	.	.	0.994	-0.87	0.1862	28.835	3.24226	0.0
9	8	1998	26	85	39	46	0.080	0.040	0.040	0.991	-0.94	0.2194	20.777	2.336128	0.0
10	9	1998	52	104	52	52	.	.	.	0.993	-0.57	0.1964	25.917	2.914152	0.0
11	10	1998	52	46	23	23	0.090	0.090	0.000	0.983	-1.17	0.2900	11.891	1.336982	0.0
12	11	1999	39	100	50	50	.	.	.	0.992	-0.57	0.2015	24.622	2.768468	0.0
13	12	1999	52	120	54	56	0.200	0.270	-0.070	0.993	-0.42	0.1913	27.318	3.071646	0.0
14	13	1999	13	105	70	35	0.010	0.030	-0.020	0.993	-1.23	0.2041	24.010	2.699688	0.0
15	14	2001	27	132	63	67	0.110	0.100	0.010	0.994	-0.23	0.1760	32.276	3.629071	0.0
16	15	2001	26	555	159	214	.	.	.	0.998	-0.86	0.1097	83.107	9.344514	0.0
17	16	2002	52	100	50	50	.	.	.	0.992	-0.34	0.2015	24.622	2.768468	0.0
18	17	2005	103	300	150	150	0.270	0.270	0.000	0.997	-0.14	0.1200	69.444	7.808345	0.0
19	18	2006	24	631	318	313	0.220	0.210	0.010	0.999	0.01	0.0791	159.900	17.97919	0.0
20	19	2006	132	622	309	313	0.300	0.250	0.050	0.999	-0.02	0.0791	159.900	17.97919	0.0
21	20	2006	34	311	155	156	.	.	.	0.998	-0.3	0.1122	79.372	8.92459	0.0
22													889.362		
23															
24															
25															
26															
27															
28															
29															
30															
31															
32															
33															
34															
35															

Microsoft Excel - Reichenbach - DATABASE

File Rediger Vis Indsæt Formater Funktioner Data Vindue Hjælp

75% Arial 10 F K U

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Count	OBS	YEAR	TIME	d	SEd	Size	%Weight	Number										
2	1	1	1987	6	-1.01	0.47	4.44167	0.499422	1										
3	1	2	1991	51	-2.14	0.33	8.954257	1.006818	2										
4	2	2	1991	51	-2.14	0.33	8.954257	1.006818	2										
5	1	3	1992	24	-1.93	0.27	13.93778	1.567166	3										
6	2	3	1992	24	-1.93	0.27	13.93778	1.567166	3										
7	3	3	1992	24	-1.93	0.27	13.93778	1.567166	3										
8	1	4	1992	25	-0.53	0.18	31.36	3.526124	7										
9	2	4	1992	25	-0.53	0.18	31.36	3.526124	7										
10	3	4	1992	25	-0.53	0.18	31.36	3.526124	7										
11	4	4	1992	25	-0.53	0.18	31.36	3.526124	7										
12	5	4	1992	25	-0.53	0.18	31.36	3.526124	7										
13	6	4	1992	25	-0.53	0.18	31.36	3.526124	7										
14	7	4	1992	25	-0.53	0.18	31.36	3.526124	7										
15	1	5	1992	21	-0.64	0.19	27.31804	3.071646	6										
16	2	5	1992	21	-0.64	0.19	27.31804	3.071646	6										
17	3	5	1992	21	-0.64	0.19	27.31804	3.071646	6										
18	4	5	1992	21	-0.64	0.19	27.31804	3.071646	6										
19	5	5	1992	21	-0.64	0.19	27.31804	3.071646	6										
20	6	5	1992	21	-0.64	0.19	27.31804	3.071646	6										
21	1	6	1996	25	-1.81	0.18	31.36	3.526124	7										
22	2	6	1996	25	-1.81	0.18	31.36	3.526124	7										
23	3	6	1996	25	-1.81	0.18	31.36	3.526124	7										
24	4	6	1996	25	-1.81	0.18	31.36	3.526124	7										
25	5	6	1996	25	-1.81	0.18	31.36	3.526124	7										
26	6	6	1996	25	-1.81	0.18	31.36	3.526124	7										
27	7	6	1996	25	-1.81	0.18	31.36	3.526124	7										
28	1	7	1998	13	-0.87	0.19	28.83543	3.24226	6										
29	2	7	1998	13	-0.87	0.19	28.83543	3.24226	6										
30	3	7	1998	13	-0.87	0.19	28.83543	3.24226	6										
31	4	7	1998	13	-0.87	0.19	28.83543	3.24226	6										
32	5	7	1998	13	-0.87	0.19	28.83543	3.24226	6										
33	6	7	1998	13	-0.87	0.19	28.83543	3.24226	6										
34	1	8	1998	26	-0.94	0.22	20.77664	2.336128	5										
35	2	8	1998	26	-0.94	0.22	20.77664	2.336128	5										
36	3	8	1998	26	-0.94	0.22	20.77664	2.336128	5										
37	4	8	1998	26	-0.94	0.22	20.77664	2.336128	5										
38	5	8	1998	26	-0.94	0.22	20.77664	2.336128	5										
39	1	9	1998	52	-0.57	0.20	25.91736	2.914152	6										
40	2	9	1998	52	-0.57	0.20	25.91736	2.914152	6										
41	3	9	1998	52	-0.57	0.20	25.91736	2.914152	6										
42	4	9	1998	52	-0.57	0.20	25.91736	2.914152	6										
43	5	9	1998	52	-0.57	0.20	25.91736	2.914152	6										
44	6	9	1998	52	-0.57	0.20	25.91736	2.914152	6										
45	1	10	1998	52	-1.17	0.29	11.89061	1.336982	3										
46	2	10	1998	52	-1.17	0.29	11.89061	1.336982	3										

Unweighted Regr Weighted Regression

Microsoft Excel - Reichenbach - DATABASE

File Rediger Vis Indsæt Formater Funktioner Data Vindue Hjælp

O16 =

	A	B	C	D	E	F	G											
1	Count	OBS	YEAR	TIME	d	SEd	Size											
2	1	1	1987	6	-1.01	0.47	4.44167											
3	1	2	1991	51	-2.14	0.33	8.95425											
4	2	2	1991	51	-2.14	0.33	8.95425											
5	1	3	1992	24	-1.93	0.27	13.9377											
6	2	3	1992	24	-1.93	0.27	13.9377											
7	3	3	1992	24	-1.93	0.27	13.9377											
8	1	4	1992	25	-0.53	0.18	31.36											
9	2	4	1992	25	-0.53	0.18	31.36											
10	3	4	1992	25	-0.53	0.18	31.36											
11	4	4	1992	25	-0.53	0.18	31.36											
12	5	4	1992	25	-0.53	0.18	31.36											
13	6	4	1992	25	-0.53	0.18	31.36											
14	7	4	1992	25	-0.53	0.18	31.36											
15	1	5	1992	21	-0.64	0.19	27.3180											
16	2	5	1992	21	-0.64	0.19	27.3180											
17	3	5	1992	21	-0.64	0.19	27.3180											
18	4	5	1992	21	-0.64	0.19	27.3180											
19	5	5	1992	21	-0.64	0.19	27.3180											
20	6	5	1992	21	-0.64	0.19	27.3180											
21	1	6	1996	25	-1.81	0.18	31.36											
22	2	6	1996	25	-1.81	0.18	31.36											
23	3	6	1996	25	-1.81	0.18	31.36											
24	4	6	1996	25	-1.81	0.18	31.36											
25	5	6	1996	25	-1.81	0.18	31.36											
26	6	6	1996	25	-1.81	0.18	31.36											
27	7	6	1996	25	-1.81	0.18	31.36											
28	1	7	1998	13	-0.87	0.19	28.8354											
29	2	7	1998	13	-0.87	0.19	28.8354											
30	3	7	1998	13	-0.87	0.19	28.8354											
31	4	7	1998	13	-0.87	0.19	28.83543	3.24226	6									
32	5	7	1998	13	-0.87	0.19	28.83543	3.24226	6									
33	6	7	1998	13	-0.87	0.19	28.83543	3.24226	6									
34	1	8	1998	26	-0.94	0.22	20.77664	2.336128	5									
35	2	8	1998	26	-0.94	0.22	20.77664	2.336128	5									
36	3	8	1998	26	-0.94	0.22	20.77664	2.336128	5									
37	4	8	1998	26	-0.94	0.22	20.77664	2.336128	5									
38	5	8	1998	26	-0.94	0.22	20.77664	2.336128	5									
39	1	9	1998	52	-0.57	0.20	25.91736	2.914152	6									
40	2	9	1998	52	-0.57	0.20	25.91736	2.914152	6									
41	3	9	1998	52	-0.57	0.20	25.91736	2.914152	6									
42	4	9	1998	52	-0.57	0.20	25.91736	2.914152	6									
43	5	9	1998	52	-0.57	0.20	25.91736	2.914152	6									
44	6	9	1998	52	-0.57	0.20	25.91736	2.914152	6									
45	1	10	1998	52	-1.17	0.29	11.89061	1.336982	3									
46	2	10	1998	52	-1.17	0.29	11.89061	1.336982	3									

Unweighted Regr Weighted Regression

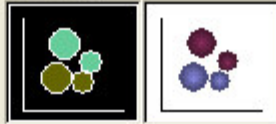
Guiden Diagram - trin 1 af 4 - diagramtype

Standardtyper Brugedefinerede typer

Diagramtype:

- Søjle
- Liggende søjle
- Kurve
- Cirkel
- XY-punkt
- Område
- Krans
- Radar
- Grundflade
- Boblediagram**
- Høj-lav-slut-aktiediagram

Undertype:



Boblediagram. Sammenligner 3 værdisæt. Svarer til et punktdiagram, hvor boblens størrelse angiver den tredje værdi.

Hold nede for at se et eksempel

Annuler < Tilbage Næste > Udfør

Microsoft Excel - Reichenbach - DATABASE

Filer Rediger Vis Indsæt Formater Funktioner Data Vindue Hjælp

75%

	A	B	C	D	E	F	G	H	I
1	Count	OBS	YEAR	TIME	d	SEd	Size	%Weight	Number
2	1	1	1987	6	-1.01	0.47	4.44167	0.499422	1
3	1	2	1991	51	-2.14	0.33	8.954257	1.006818	2
4	2	2	1991	51	-2.14	0.33	8.954257	1.006818	2
5	1	3	1992	24	-1.93	0.27	13.93778	1.567166	3
6	2	3	1992	24	-1.93	0.27	13.93778	1.567166	3
7	3	3	1992	24	-1.93	0.27	13.93778	1.567166	3
8	1	4	1992	25	-0.53	0.18	31.36	3.526124	7
9	2	4	1992	25	-0.53	0.18	31.36	3.526124	7
10	3	4	1992	25	-0.53	0.18	31.36	3.526124	7
11	4	4	1992	25	-0.53	0.18	31.36	3.526124	7
12	5	4	1992	25	-0.53	0.18	31.36	3.526124	7
13	6	4	1992	25	-0.53	0.18	31.36	3.526124	7
14	7	4	1992	25	-0.53	0.18	31.36	3.526124	7
15	1	5	1992	21	-0.64	0.19	27.31804	3.071646	6
16	2	5	1992	21	-0.64	0.19	27.31804	3.071646	6
17	3	5	1992	21	-0.64	0.19	27.31804	3.071646	6
18	4	5	1992	21	-0.64	0.19	27.31804	3.071646	6
19	5	5	1992	21	-0.64	0.19	27.31804	3.071646	6
20	6	5	1992	21	-0.64	0.19	27.31804	3.071646	6
21	1	6	1996	25	-1.81	0.18	31.36	3.526124	7
22	2	6	1996	25	-1.81	0.18	31.36	3.526124	7
23	3	6	1996	25	-1.81	0.18	31.36	3.526124	7
24	4	6	1996	25	-1.81	0.18	31.36	3.526124	7
25	5	6	1996	25	-1.81	0.18	31.36	3.526124	7
26	6	6	1996	25	-1.81	0.18	31.36	3.526124	7
27	7	6	1996	25	-1.81	0.18	31.36	3.526124	7
28	1	7	1998	13	-0.87	0.19	28.83543	3.24226	6
29	2	7	1998	13	-0.87	0.19	28.83543	3.24226	6
30	3	7	1998	13	-0.87	0.19	28.83543	3.24226	6
31	4	7	1998	13	-0.87	0.19	28.83543	3.24226	6
32	5	7	1998	13	-0.87	0.19	28.83543	3.24226	6
33	6	7	1998	13	-0.87	0.19	28.83543	3.24226	6
34	1	8	1998	26	-0.94	0.22	20.77664	2.336128	5
35	2	8	1998	26	-0.94	0.22	20.77664	2.336128	5
36	3	8	1998	26	-0.94	0.22	20.77664	2.336128	5
37	4	8	1998	26	-0.94	0.22	20.77664	2.336128	5
38	5	8	1998	26	-0.94	0.22	20.77664	2.336128	5
39	1	9	1998	52	-0.57	0.20	25.91736	2.914152	6
40	2	9	1998	52	-0.57	0.20	25.91736	2.914152	6
41	3	9	1998	52	-0.57	0.20	25.91736	2.914152	6
42	4	9	1998	52	-0.57	0.20	25.91736	2.914152	6
43	5	9	1998	52	-0.57	0.20	25.91736	2.914152	6
44	6	9	1998	52	-0.57	0.20	25.91736	2.914152	6
45	1	10	1998	52	-1.17	0.29	11.89061	1.336982	3
46	2	10	1998	52	-1.17	0.29	11.89061	1.336982	3

Unweighted Regr Weighted Regression

Kilde data

Dataområde Serie

ES vs Duration

ES vs Duration

Serie

ES vs Duration

Navn: ES vs Duration

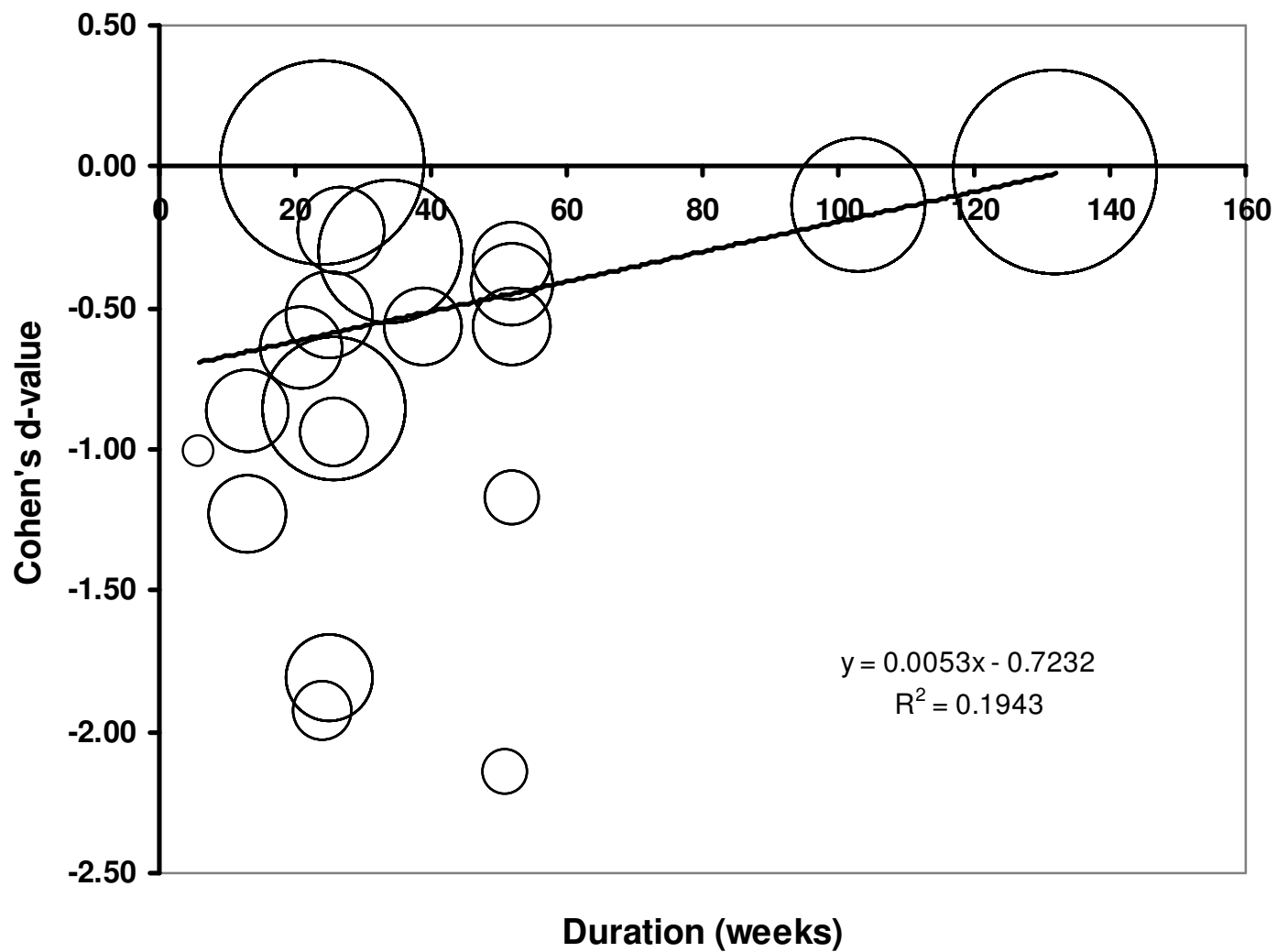
X-værdier: ='Weighted Regression'!\$D\$2:

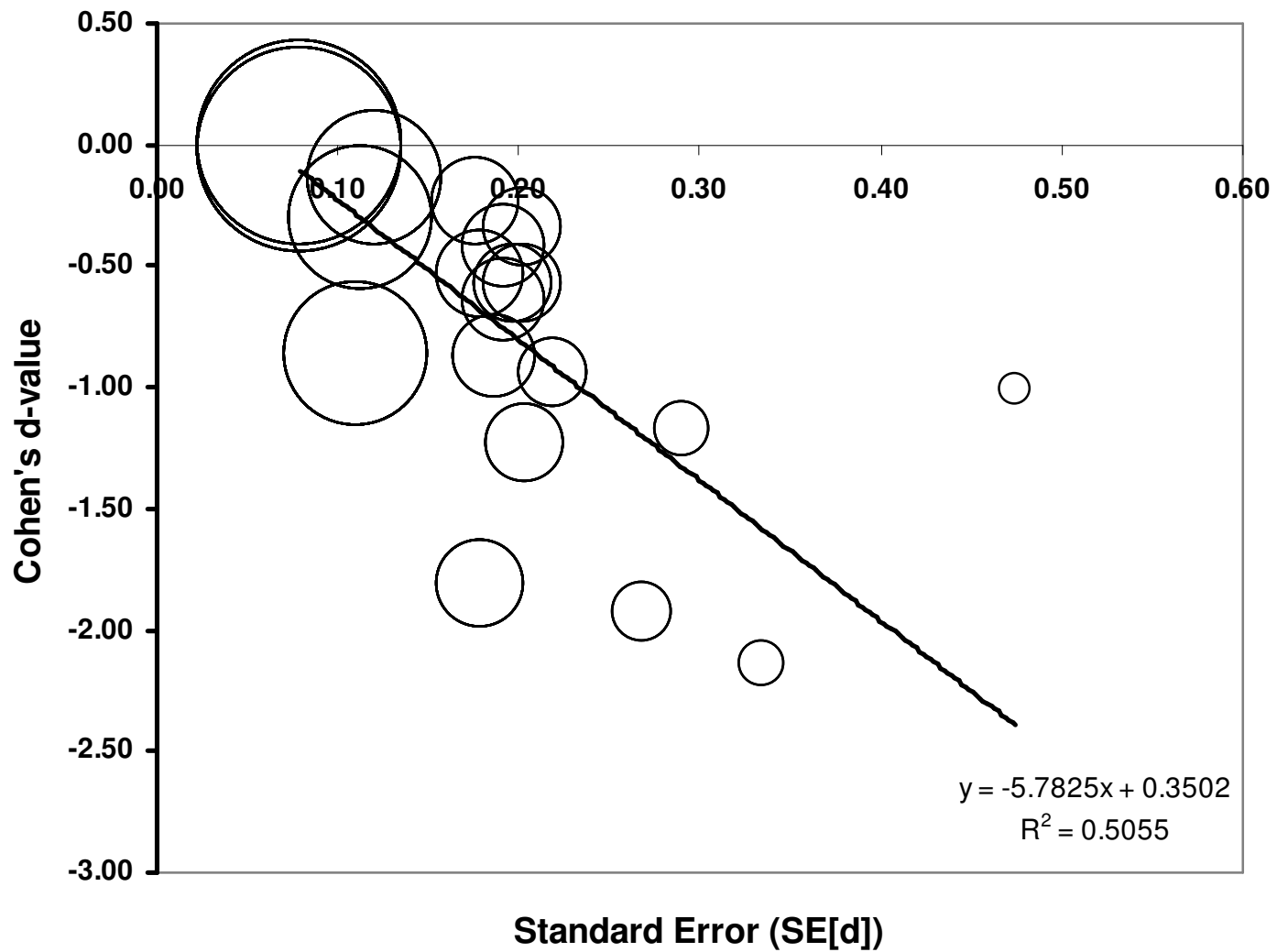
Y-værdier: ='Weighted Regression'!\$E\$2:

Størrelser: ='Weighted Regression'!\$I\$2::

Tilføj Ejern

Annuler < Tilbage Næste > Udfør







Meta-Regression Analysis in Context



Thank You - Hobart!

Robin Christensen, MSc, Biostatistician

The Parker Institute: Musculoskeletal Statistics Unit

robin.christensen@frh.regionh.dk