NUFFIELD DEPARTMENT OF
PRIMARY CARE
HEALTH SCIENCES

UNIVERSITY OF
OXFORD

Obesity

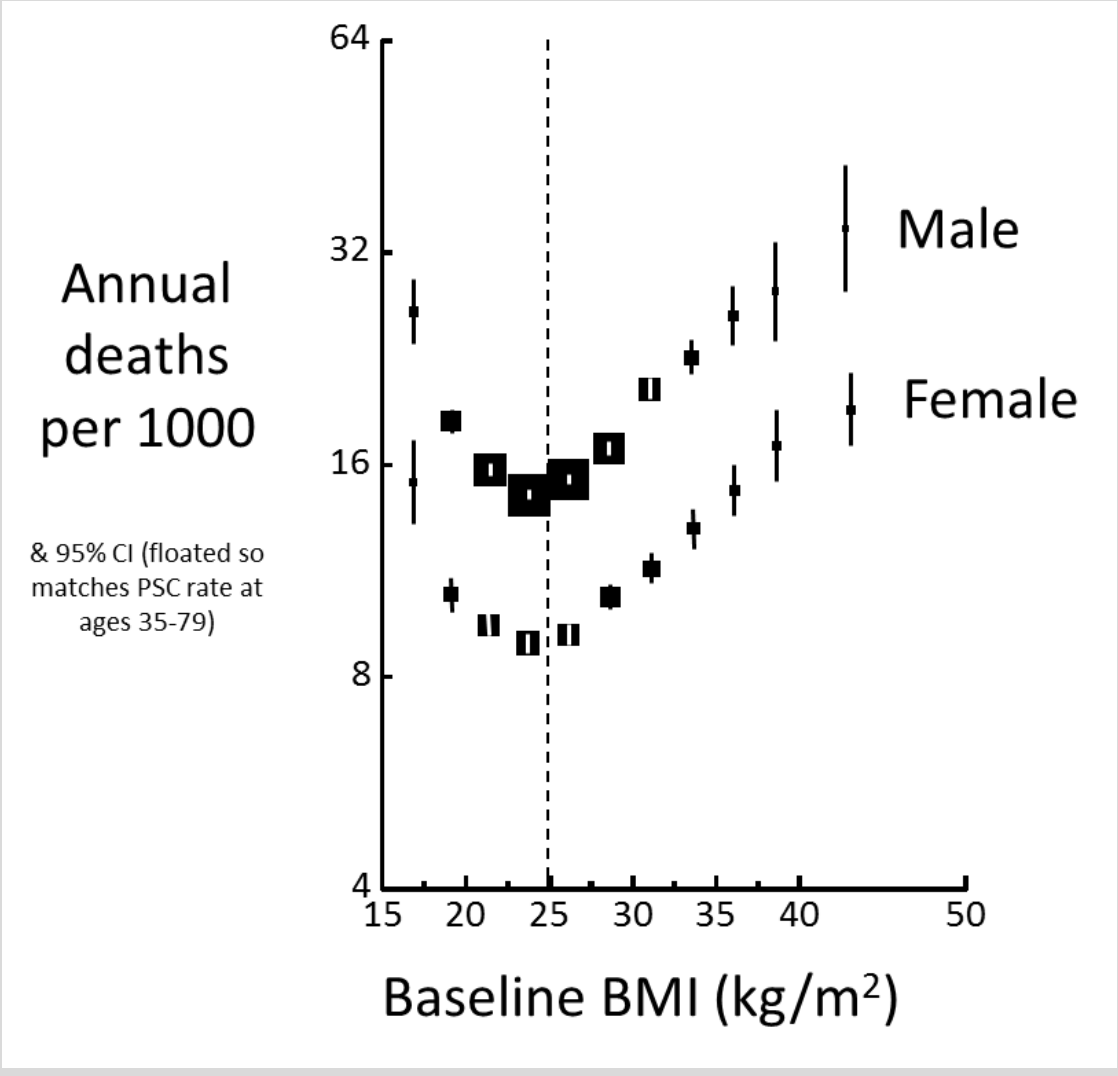
Paul Aveyard

Professor of behavioural medicine

June 23, 2015

THE RISKS FROM OBESITY AND THE HEALTH BENEFITS OF WEIGHT LOSS

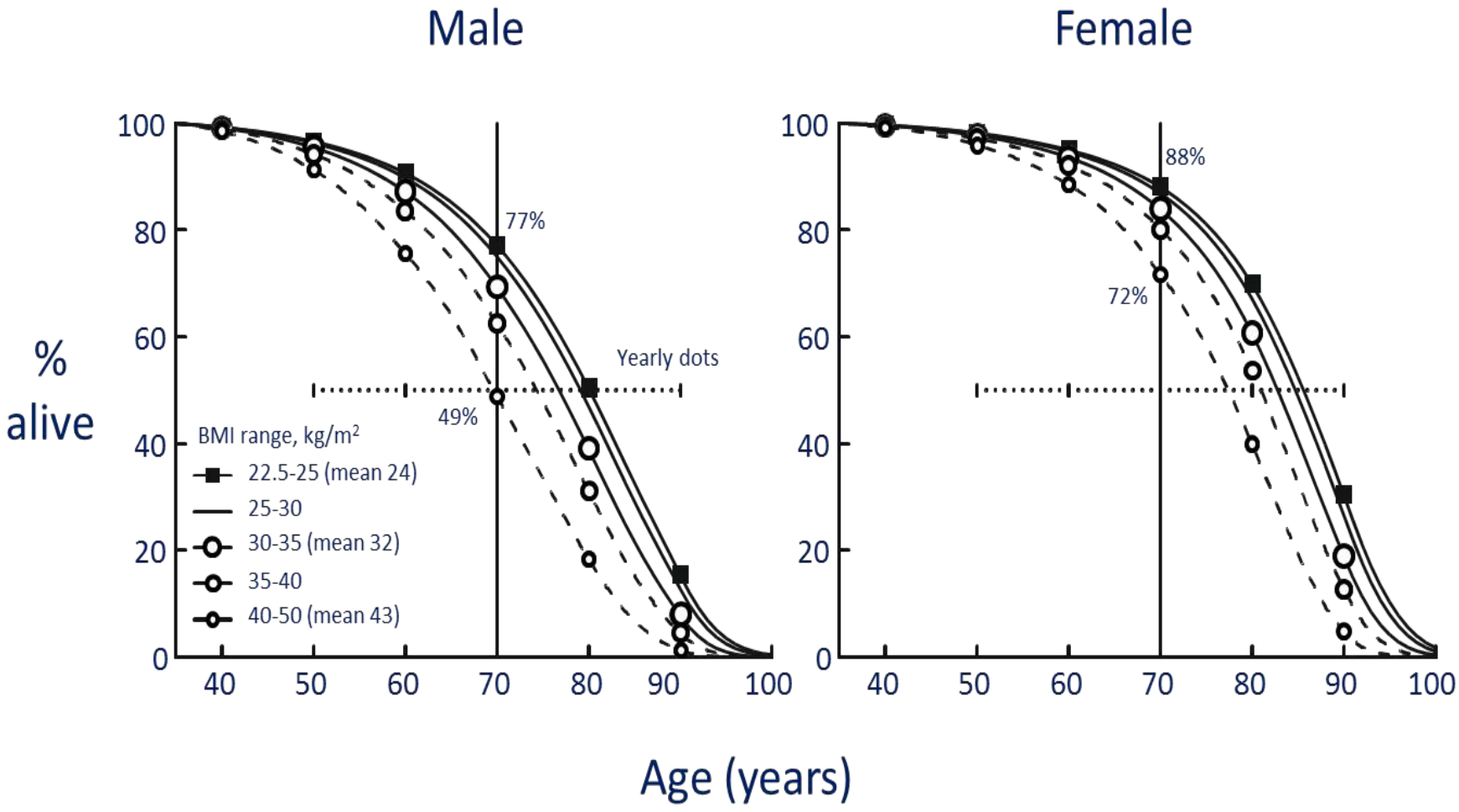
All-cause mortality and BMI



Adjusted for age, smoking and study; 1st 5 years of follow-up excluded

Fig 2, Lancet 2009; 373: 1083-96

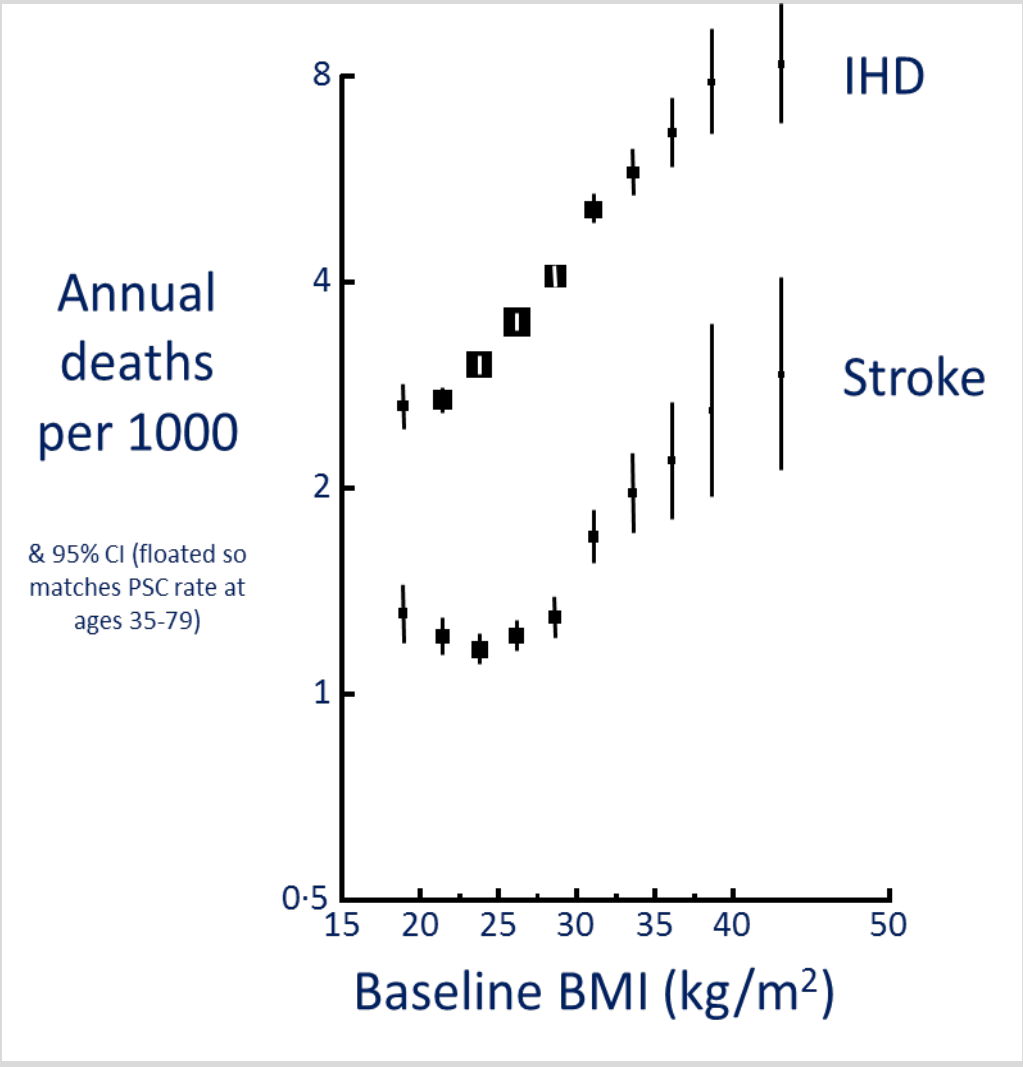
Lifespan and BMI in western Europe, year 2000



Causal PSC relative risks applied to EU mortality rates

Fig 7, Lancet 2009; 373: 1083-96

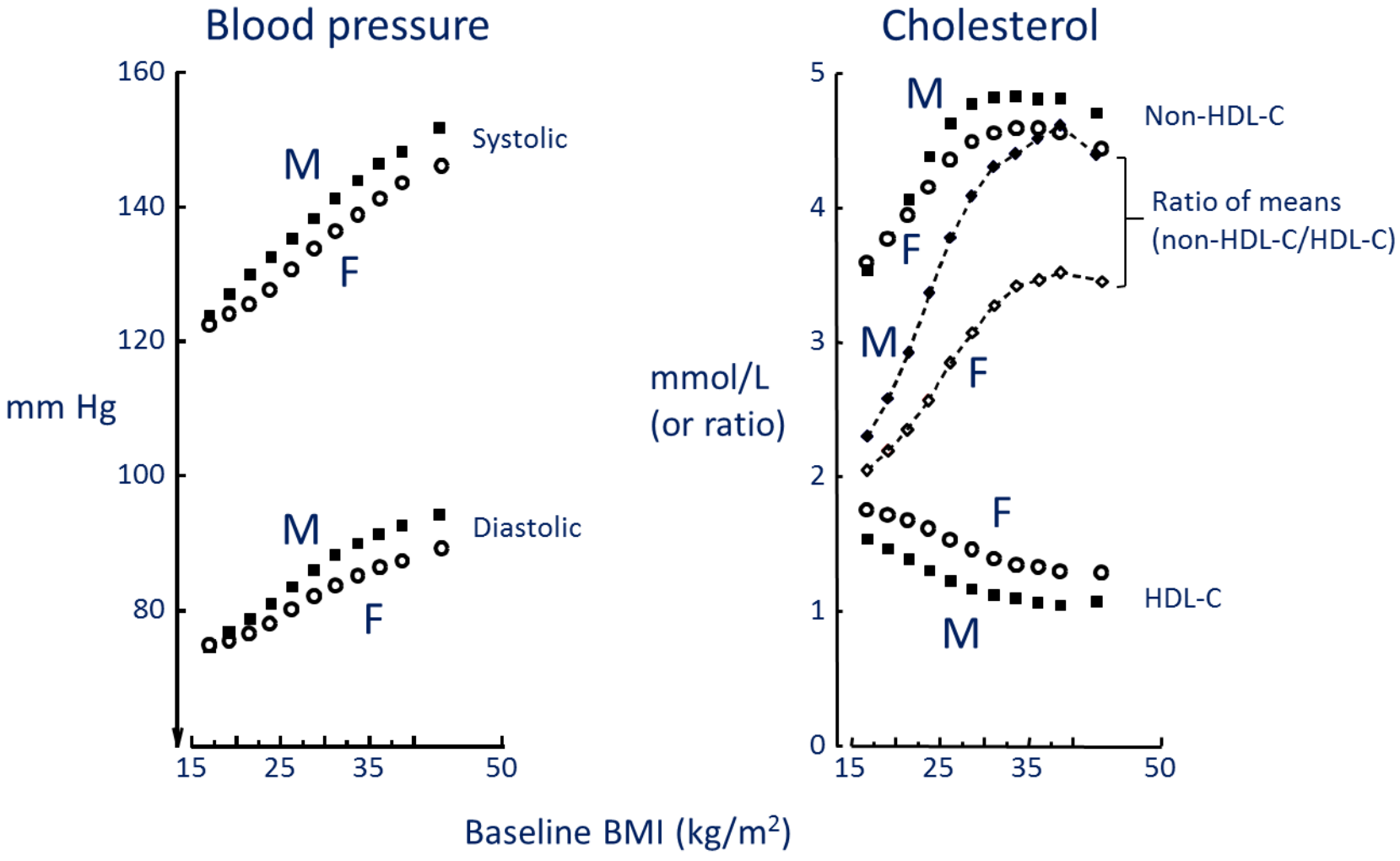
IHD and stroke mortality and BMI



Adjusted for age, sex, smoking and study; 1st 5 years of follow-up excluded

Fig 3, Lancet 2009; 373: 1083-96

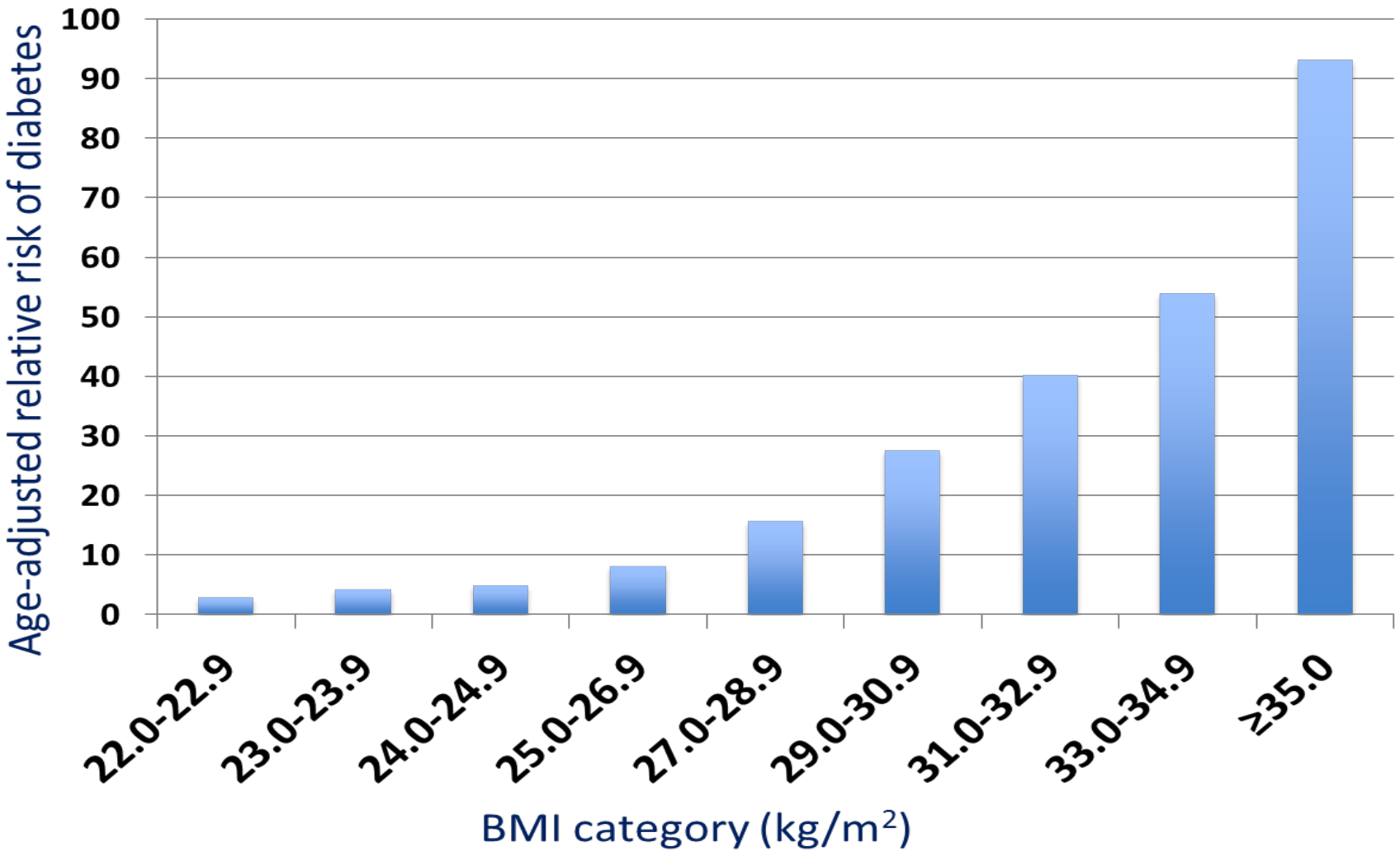
Blood pressure, cholesterol and BMI



Adjusted for age, smoking and study

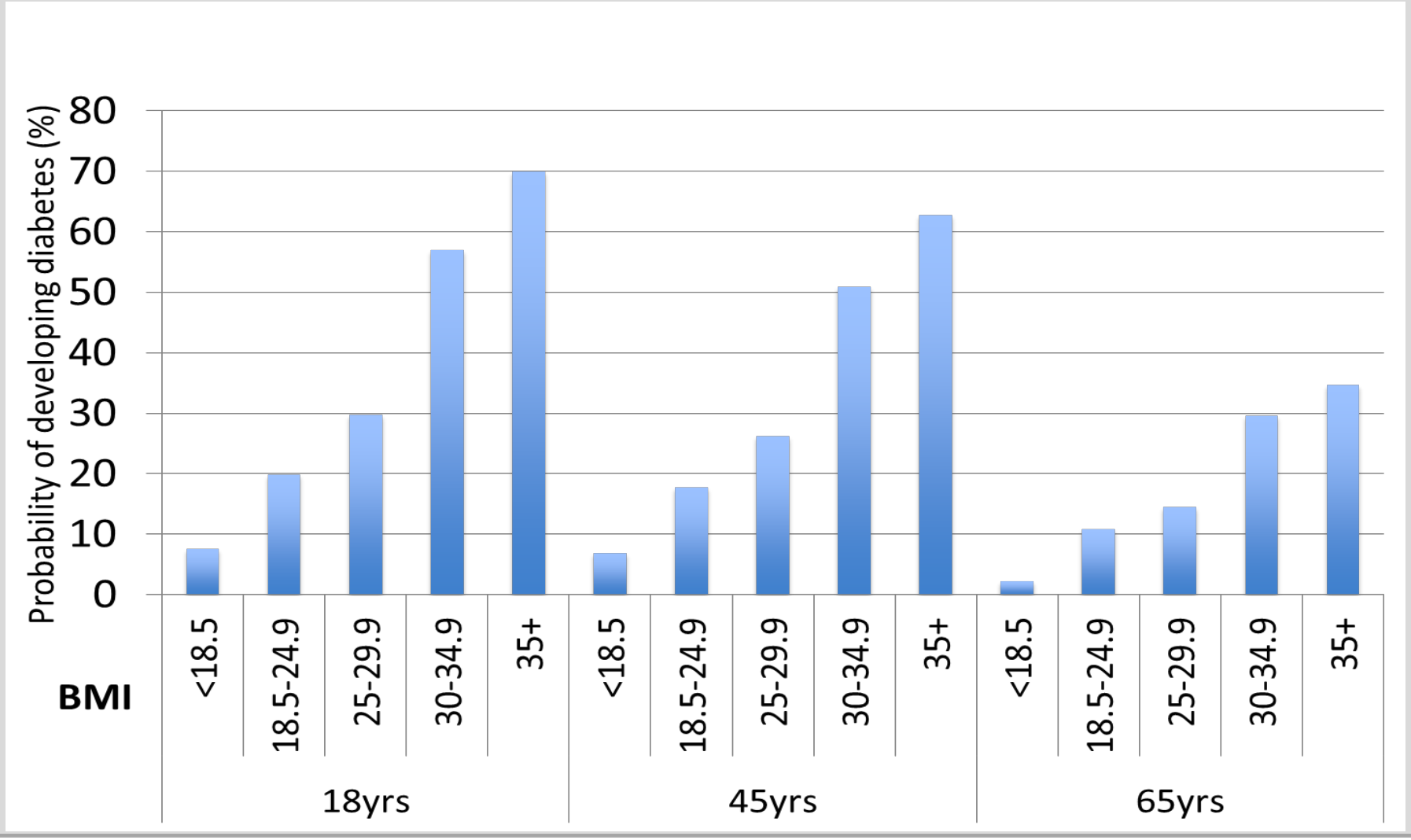
Fig 1a & b, Lancet 2009; 373: 1083-96

BMI and risk of diabetes



Colditz *et al.* (1995) *Ann Intern Med* **122**(7): 481-6

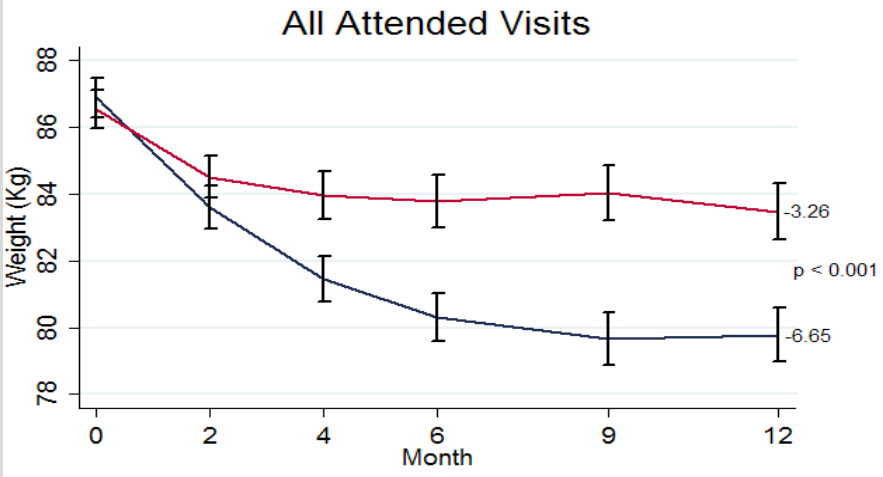
Remaining average lifetime risk of diabetes by age and BMI

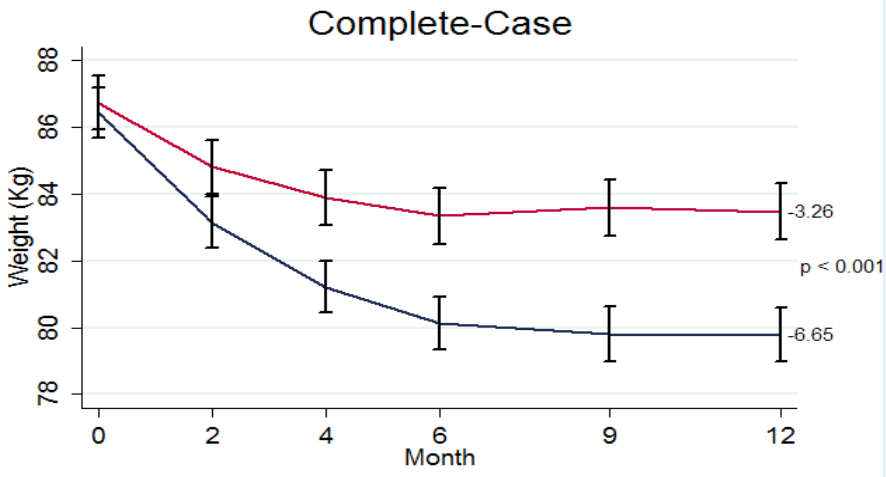


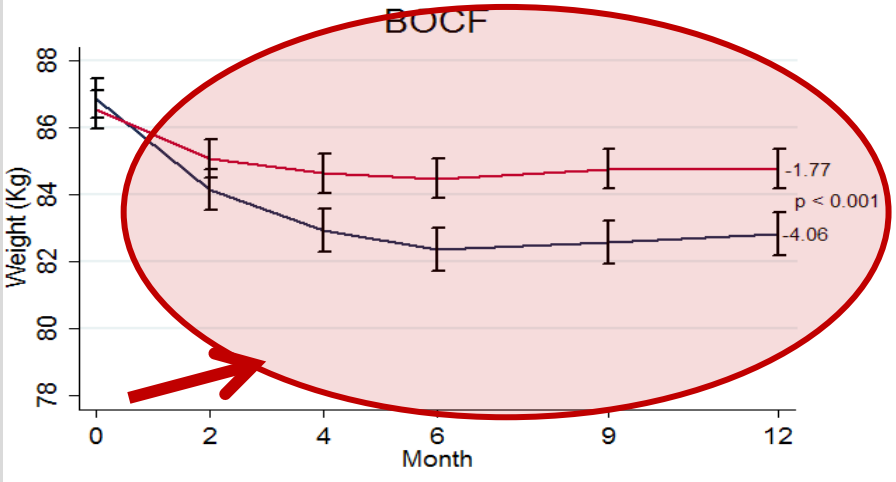
Diabetes Care **30**(6): 1562-6

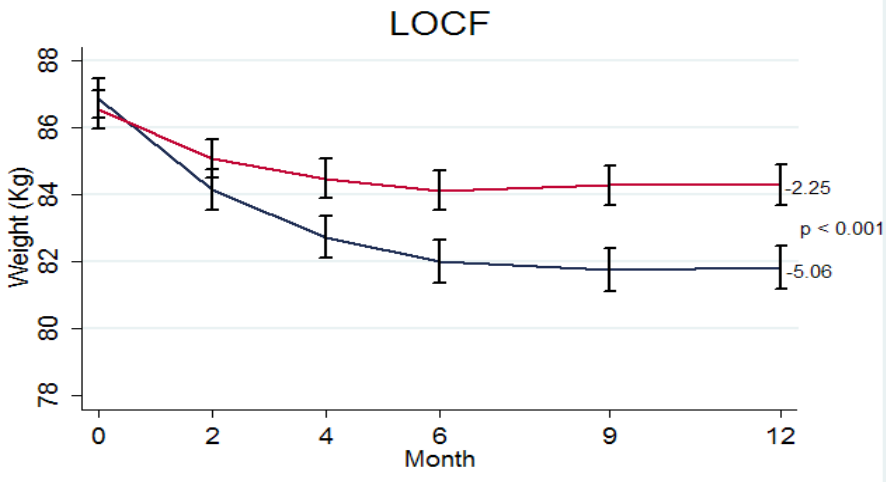
A WORD ABOUT STATISTICS

Data synthesis and presentation

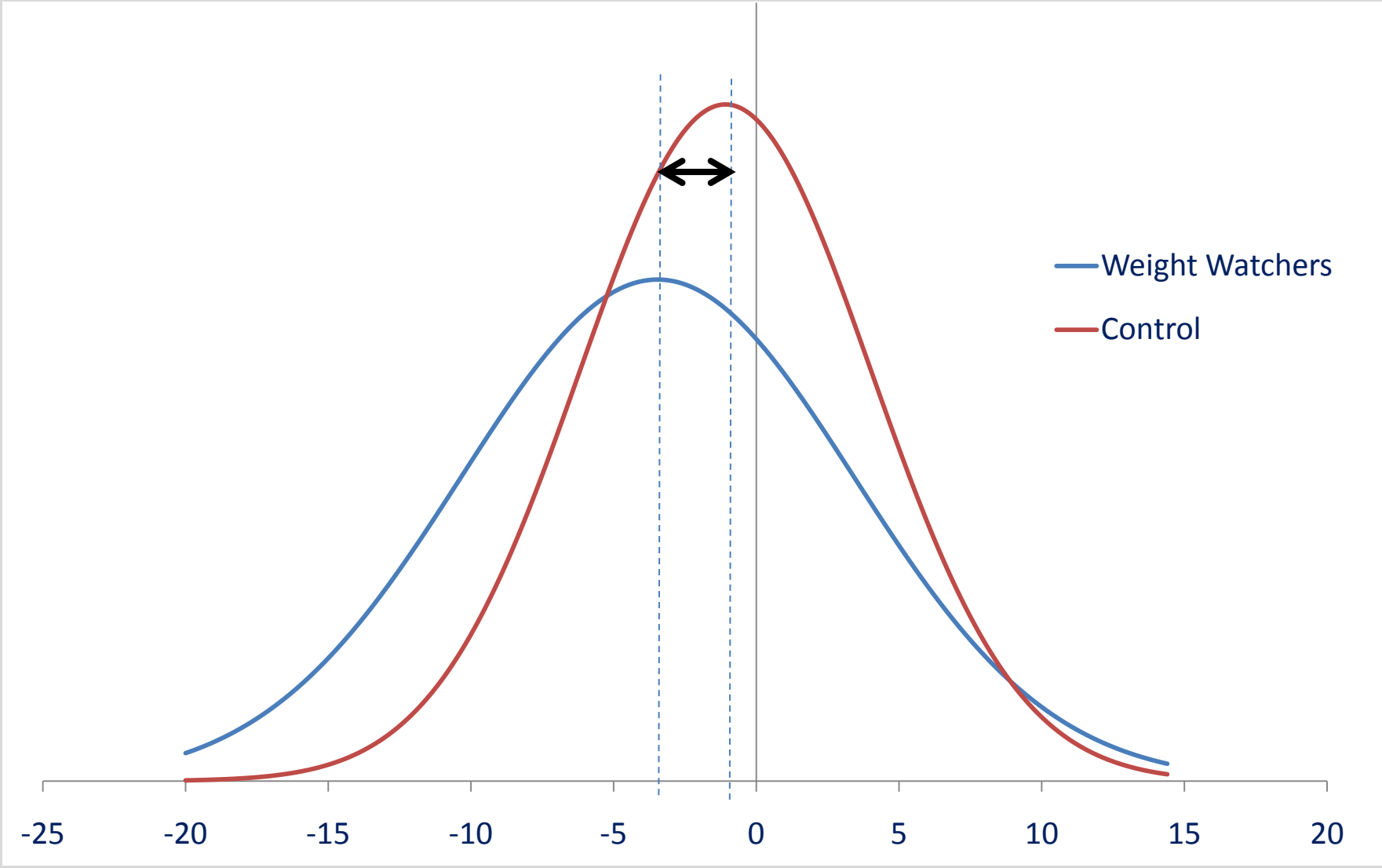




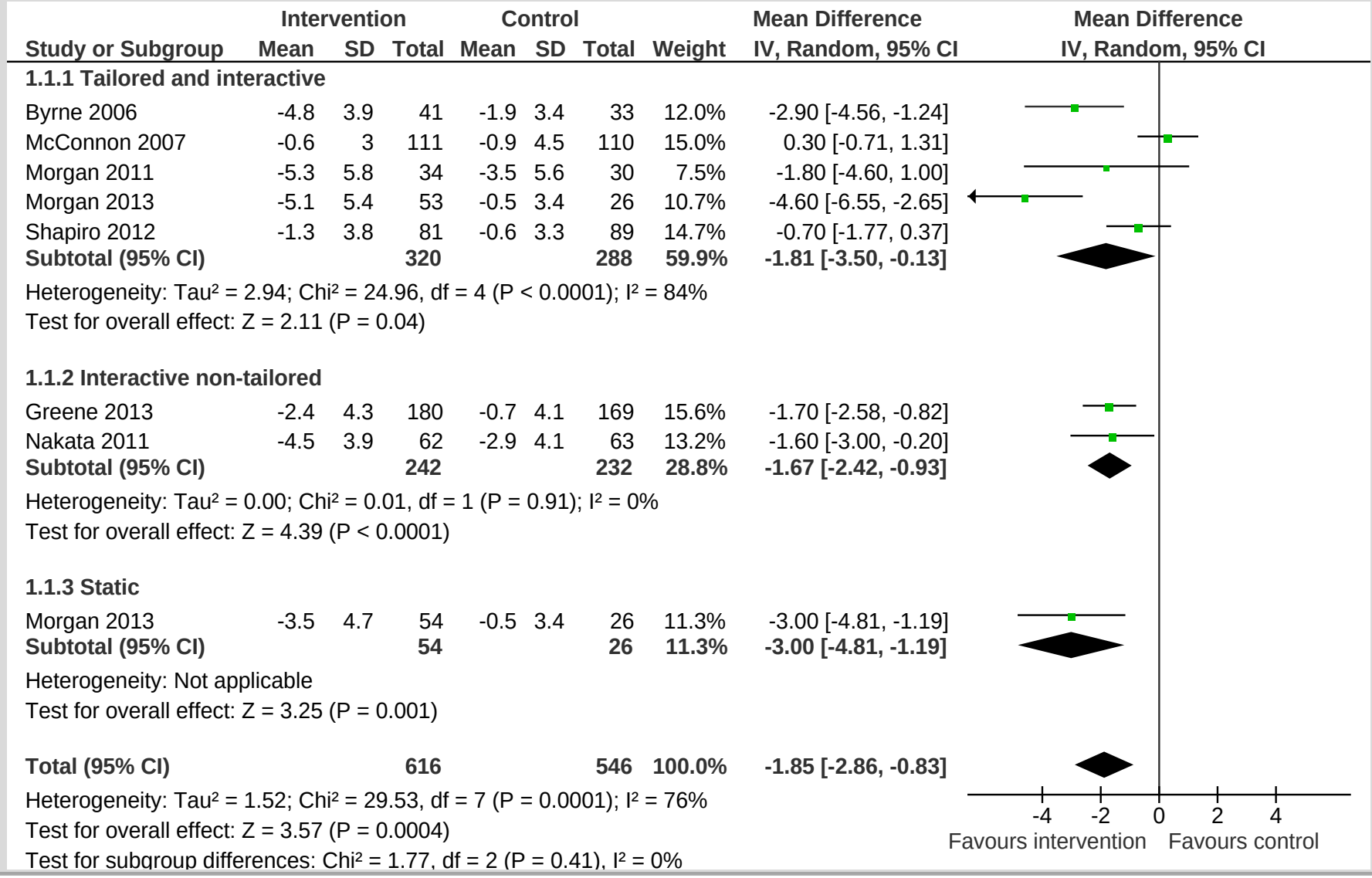




Weight loss in the Lighten Up trial (Jolly et al)



What do confidence intervals mean?



Study or Subgroup	Intervention Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
1.1.1 Tailored and interactive								
Byrne 2006	-4.8	3.9	41	-1.9	3.4	33	12.0%	-2.90 [-4.56, -1.24]
McConnon 2007	-0.6	3	111	-0.9	4.5	110	15.0%	0.30 [-0.71, 1.31]
Morgan 2011	-5.3	5.8	34	-3.5	5.6	30	7.5%	-1.80 [-4.60, 1.00]
Morgan 2013	-5.1	5.4	53	-0.5	3.4	26	10.7%	-4.60 [-6.55, -2.65]
Shapiro 2012	-1.3	3.8	81	-0.6	3.3	89	14.7%	-0.70 [-1.77, 0.37]
Subtotal (95% CI)			**320**			**288**	**59.9%**	**-1.81 [-3.50, -0.13]**
Heterogeneity: Tau² = 2.94; Chi² = 24.96, df = 4 (P < 0.0001); I² = 84%								
Test for overall effect: Z = 2.11 (P = 0.04)								
1.1.2 Interactive non-tailored								
Greene 2013	-2.4	4.3	180	-0.7	4.1	169	15.6%	-1.70 [-2.58, -0.82]
Nakata 2011	-4.5	3.9	62	-2.9	4.1	63	13.2%	-1.60 [-3.00, -0.20]
Subtotal (95% CI)			**242**			**232**	**28.8%**	**-1.67 [-2.42, -0.93]**
Heterogeneity: Tau² = 0.00; Chi² = 0.01, df = 1 (P = 0.91); I² = 0%								
Test for overall effect: Z = 4.39 (P < 0.0001)								
1.1.3 Static								
Morgan 2013	-3.5	4.7	54	-0.5	3.4	26	11.3%	-3.00 [-4.81, -1.19]
Subtotal (95% CI)			**54**			**26**	**11.3%**	**-3.00 [-4.81, -1.19]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 3.25 (P = 0.001)								
Total (95% CI)			**616**			**546**	**100.0%**	**-1.85 [-2.86, -0.83]**
Heterogeneity: Tau² = 1.52; Chi² = 29.53, df = 7 (P = 0.0001); I² = 76%								
Test for overall effect: Z = 3.57 (P = 0.0004)								
Test for subgroup differences: Chi² = 1.77, df = 2 (P = 0.41), I² = 0%								

HOW TO HELP PEOPLE LOSE WEIGHT- DIRECT TO SELF-HELP

Inclusion criteria (PICOS)

P articipants: adults with BMI ≥ 25 kg/m^2

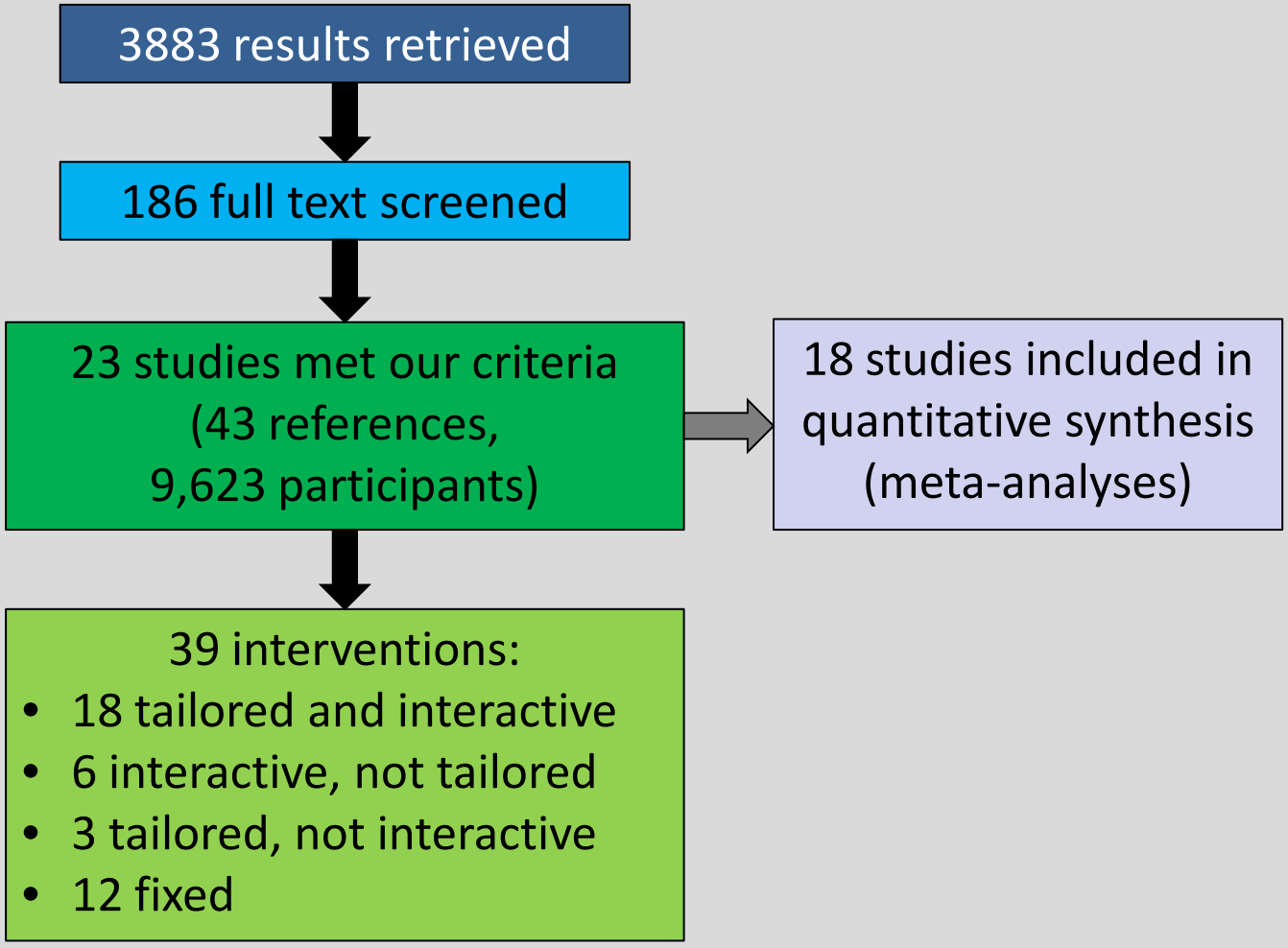
I nterventions: self-help programmes aiming to achieve weight loss through changes in diet or activity. Self-help defined as interventions that could feasibly be delivered in self-management context (e.g. used by individuals for a weight loss attempt not assisted by health care professionals, counsellors, or any other kind of person-to-person support).

C omparators: another self-help intervention or a minimal control

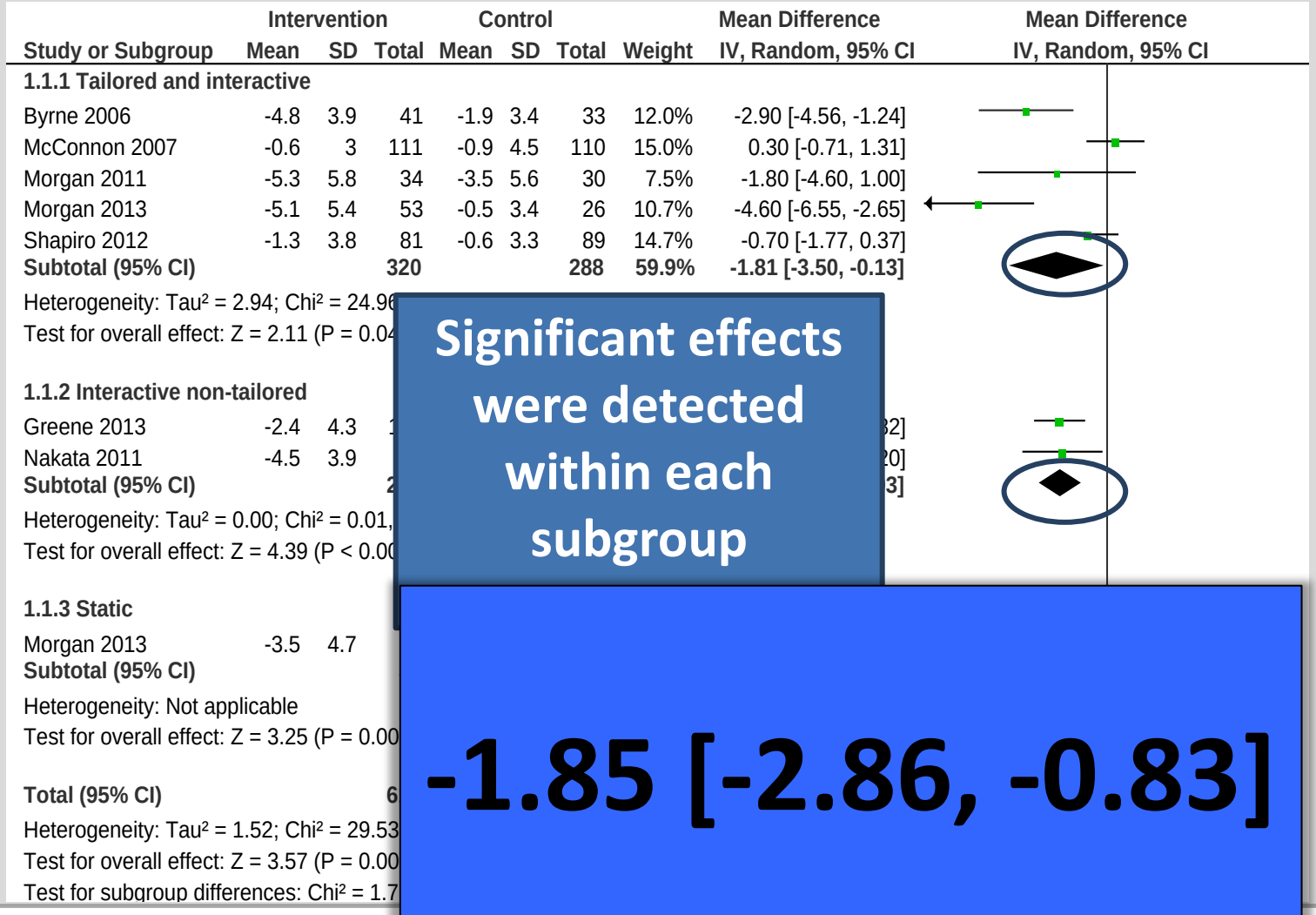
O utcomes: weight change at six and/or 12 months

S tudy design: randomized controlled trials

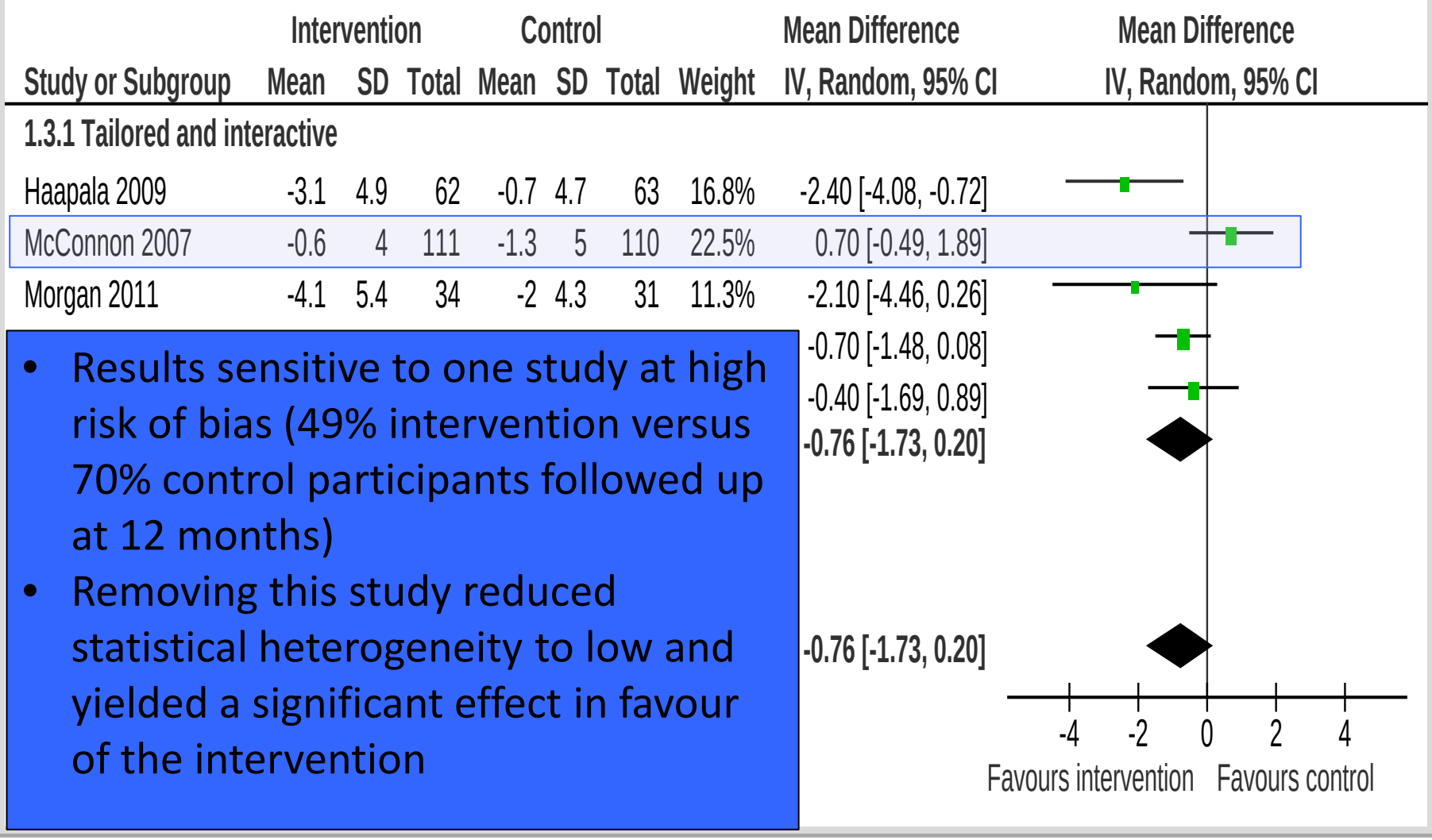
Search results and included studies



Self-help interventions versus minimal controls, BOCF weight change at six months

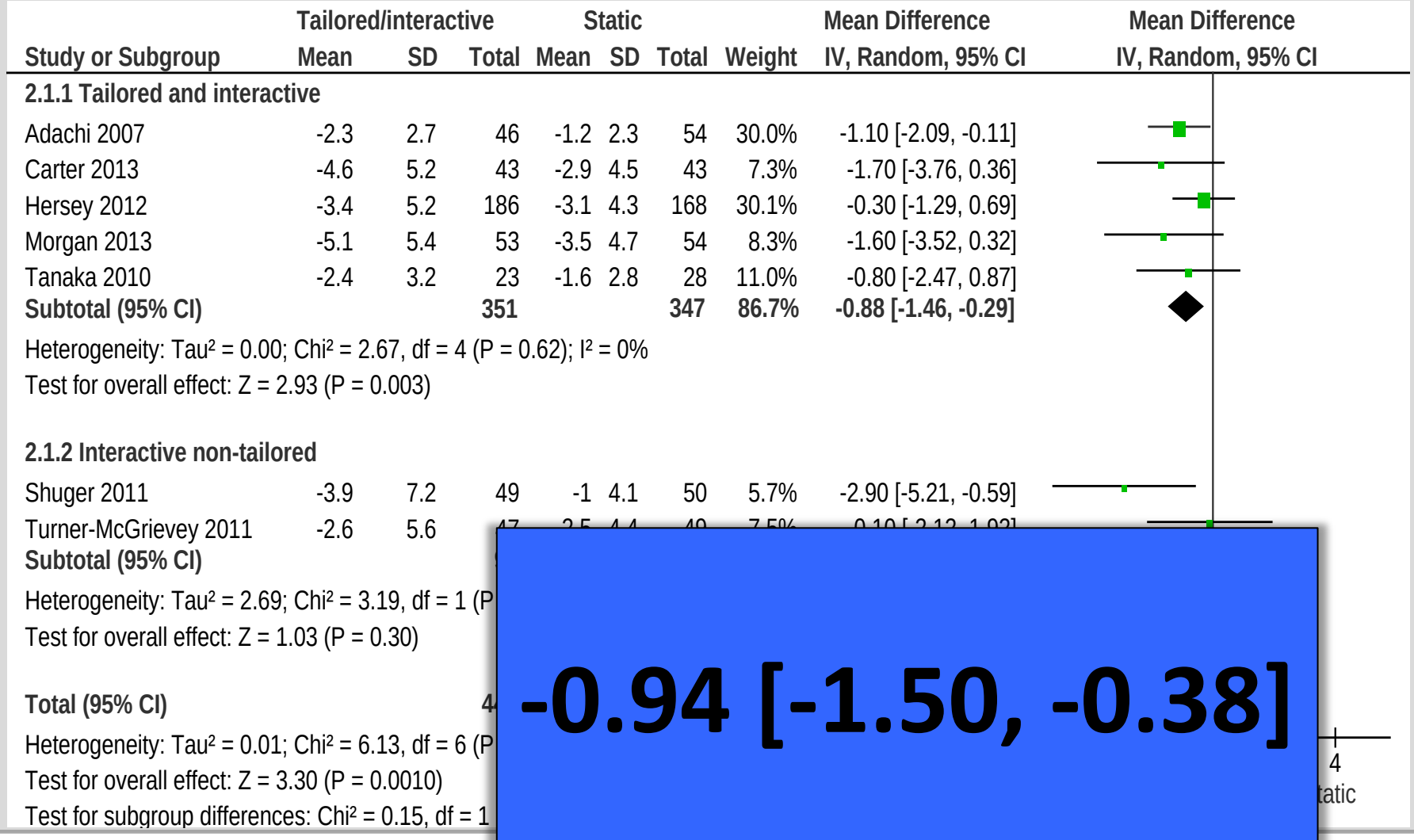


Self-help interventions versus minimal controls, BOCF weight change at 12 months



- Results sensitive to one study at high risk of bias (49% intervention versus 70% control participants followed up at 12 months)
- Removing this study reduced statistical heterogeneity to low and yielded a significant effect in favour of the intervention

Interactive compared with fixed programmes, BOCF weight change at 6 months



Summary of findings

- Self-help interventions can lead to modest but significant weight change at six months.
- Tailoring and interactivity of programmes appear to increase weight loss.

Lighten Up Trial

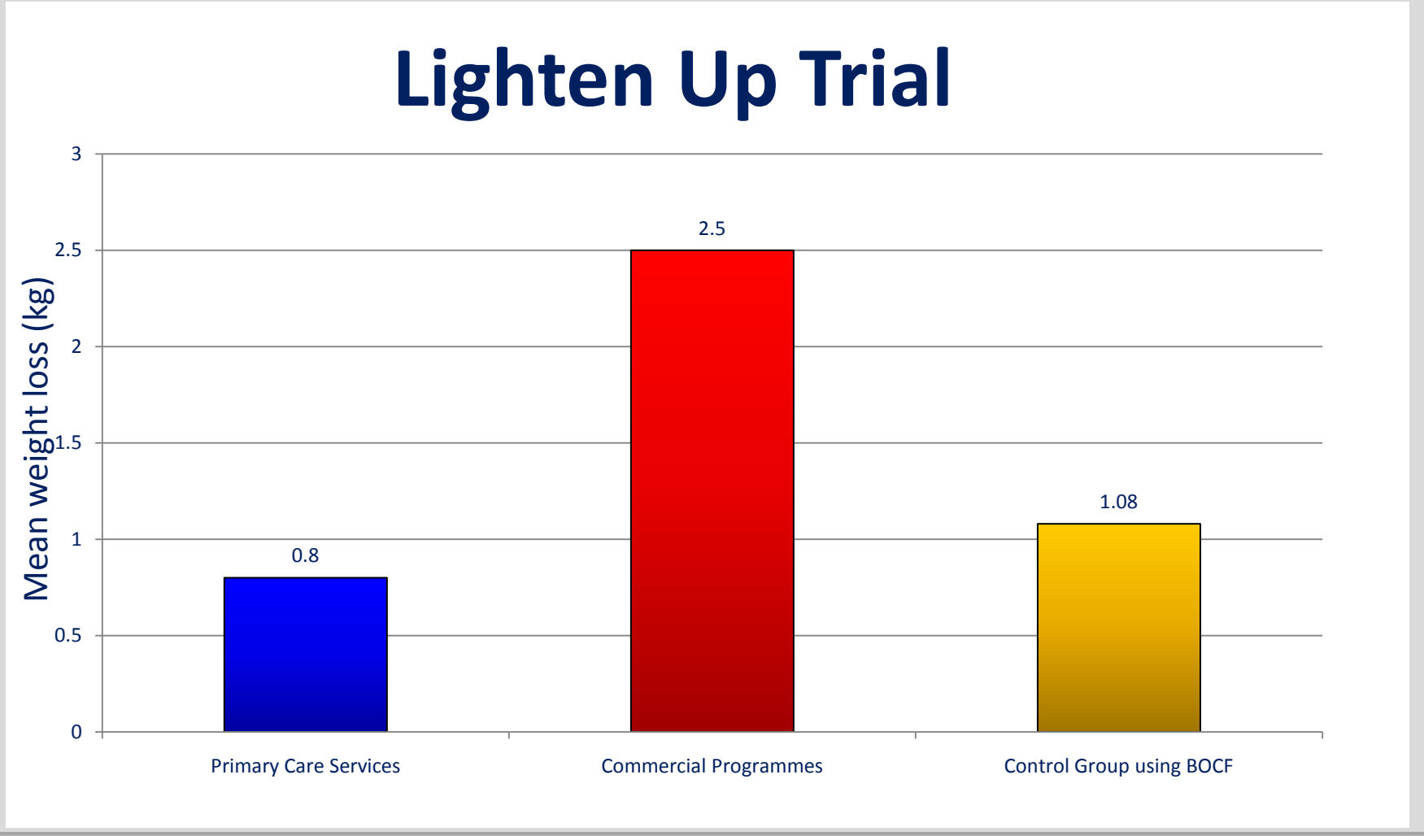
RCT involving 6 interventions vs. comparator for 3 months

- Weight Watchers (n=100)
- Slimming World (n=100)
- Rosemary Conley (n=100)
- Size Down NHS (n=100)
- Pharmacy (n=70)
- GP provision (n=70)
- Choice (n = 100)
- Control group that had no intervention (n=100)

HOW TO HELP PEOPLE LOSE WEIGHT
REFER TO A SUPPORT PROGRAMME

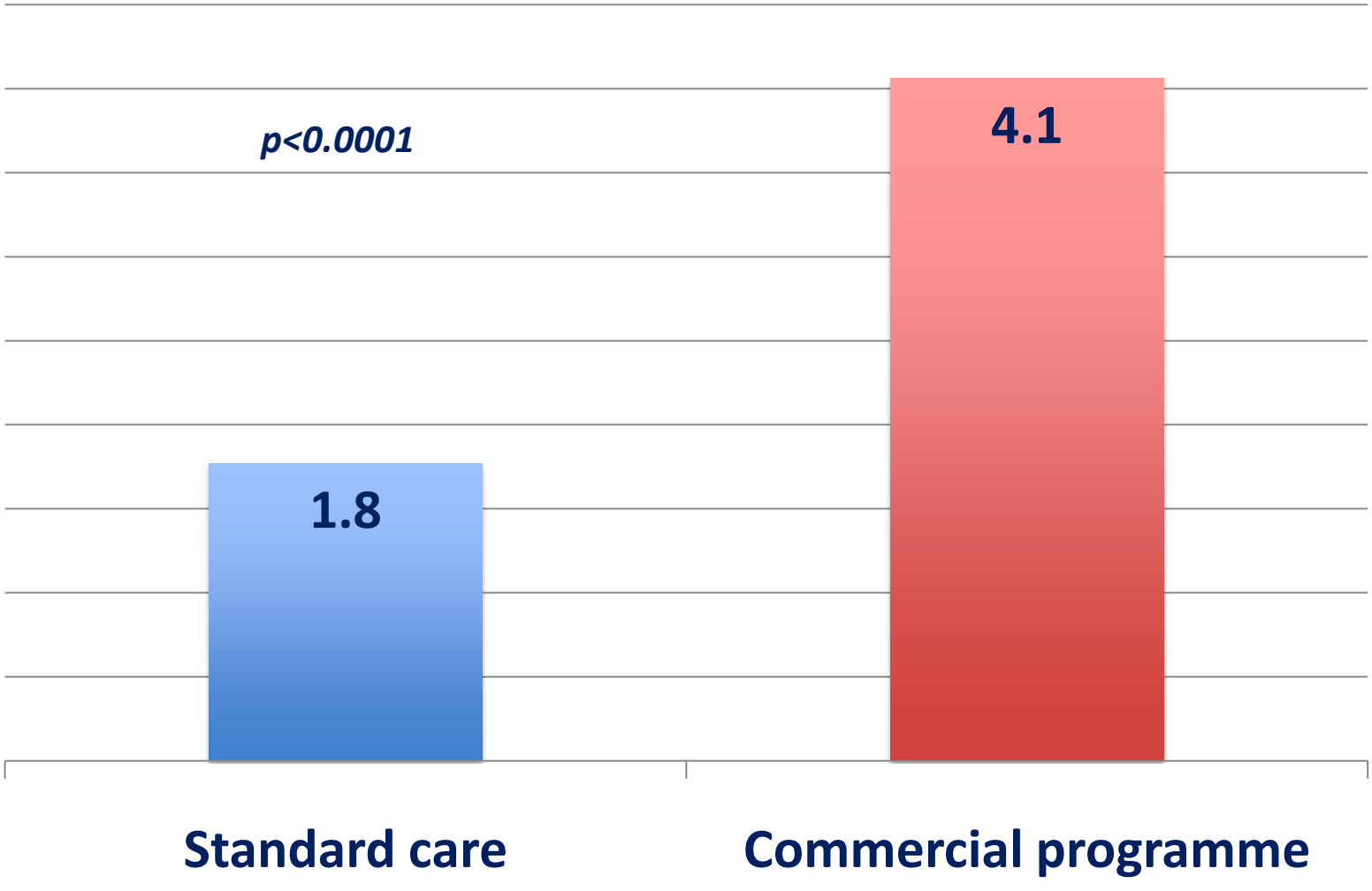
Standard care vs. commercial programmes

Weight loss at 12 months

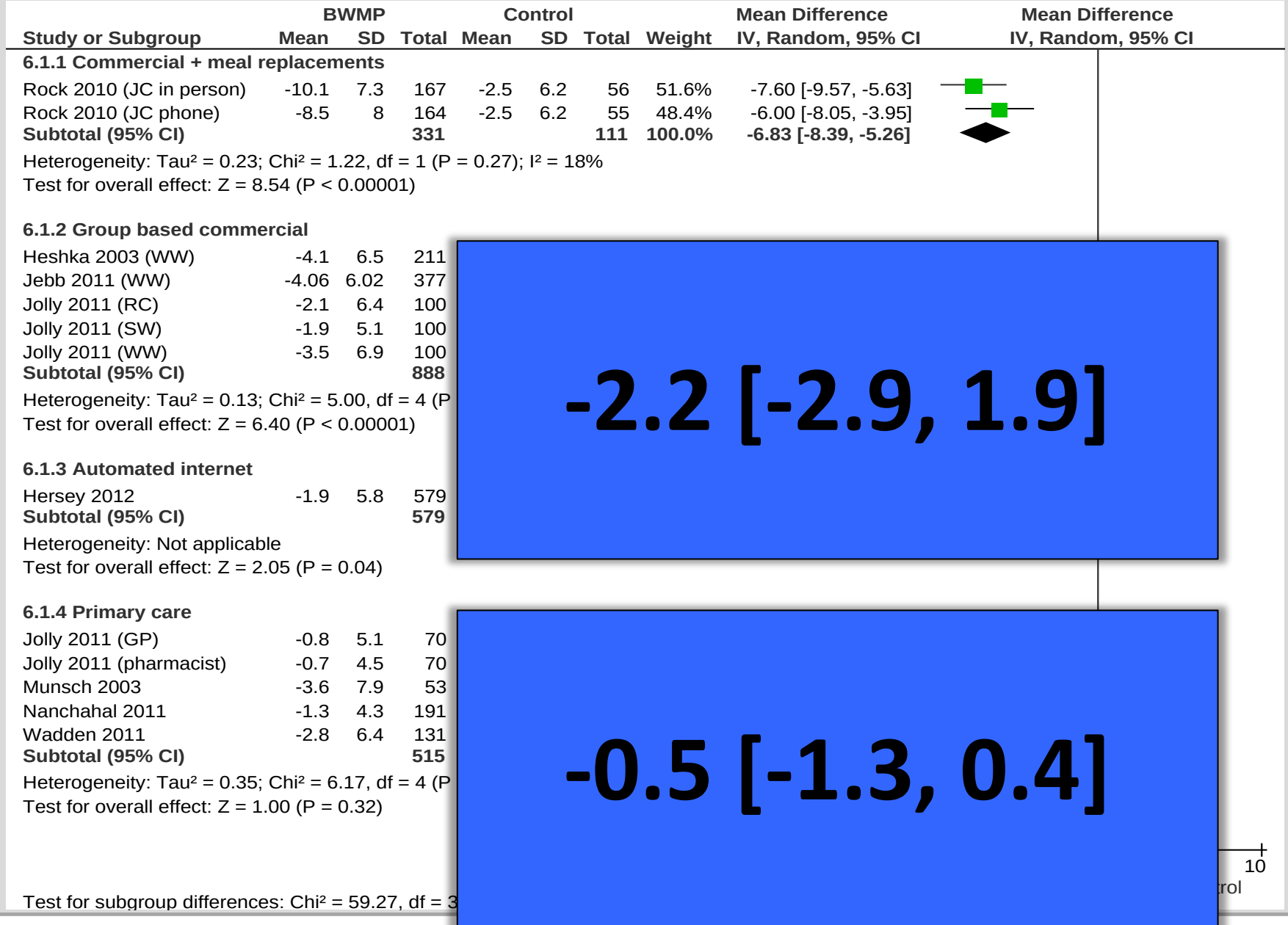


Jolly *et al.* (2011) *BMJ* **343**: d6500

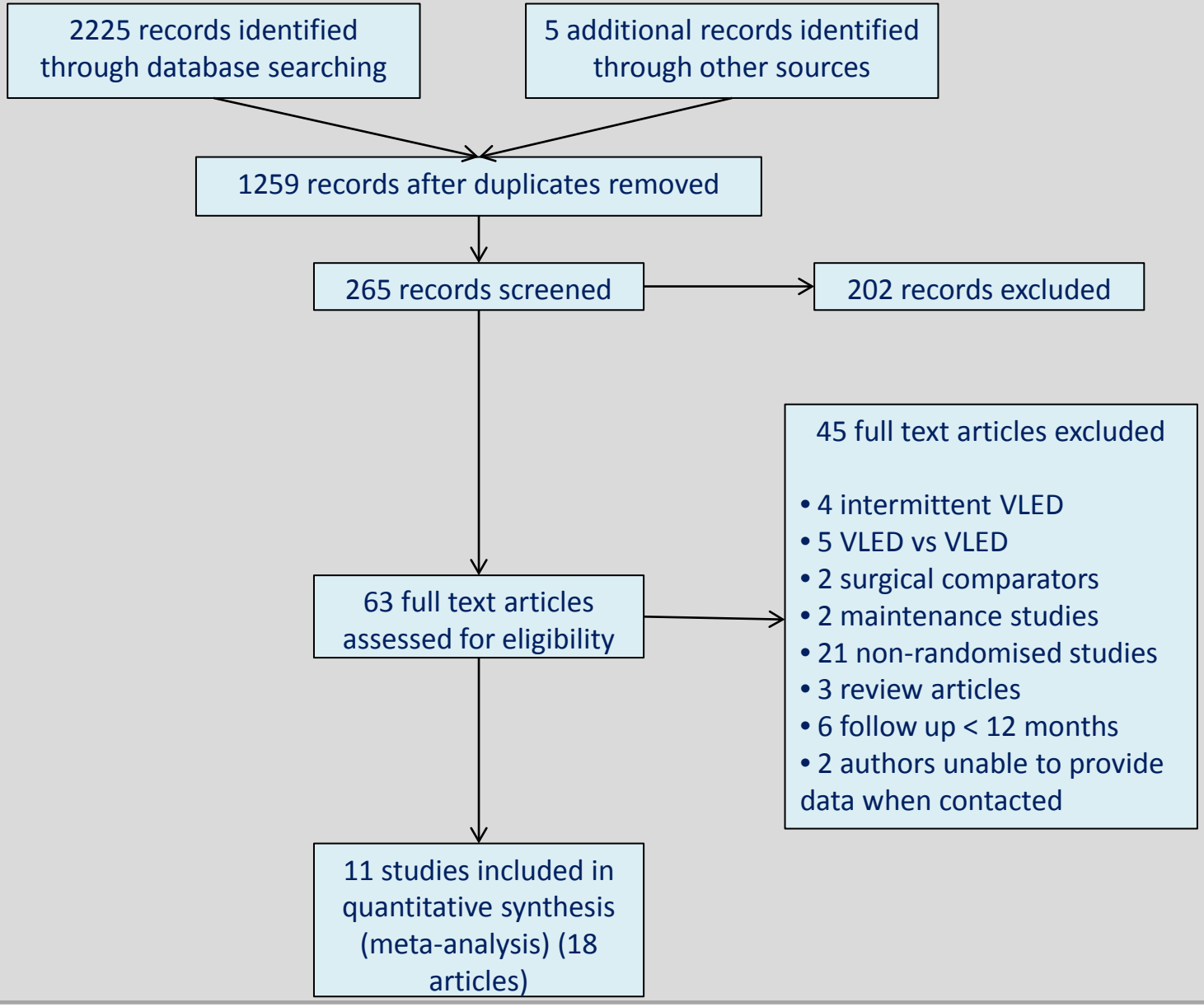
Australia, Germany & UK



Jebb *et al.* (2011) *Lancet* **378**(9801): 1485-92


BWMP
Control
Mean Difference
Mean Difference
Study or Subgroup
Mean SD Total Mean SD Total Weight
IV, Random, 95% CI
IV, Random, 95% CI
6.1.1 Commercial + meal replacements
Rock 2010 (JC in person) -10.1 7.3 167 -2.5 6.2 56 51.6% -7.60 [-9.57, -5.63]
Rock 2010 (JC phone) -8.5 8 164 -2.5 6.2 55 48.4% -6.00 [-8.05, -3.95]
Subtotal (95% CI) 331 111 100.0% -6.83 [-8.39, -5.26]
Heterogeneity: Tau² = 0.23; Chi² = 1.22, df = 1 (P = 0.27); I² = 18%
Test for overall effect: Z = 8.54 (P < 0.00001)
6.1.2 Group based commercial
Heshka 2003 (WW) -4.1 6.5 211
Jebb 2011 (WW) -4.06 6.02 377
Jolly 2011 (RC) -2.1 6.4 100
Jolly 2011 (SW) -1.9 5.1 100
Jolly 2011 (WW) -3.5 6.9 100
Subtotal (95% CI) 888
Heterogeneity: Tau² = 0.13; Chi² = 5.00, df = 4 (P
Test for overall effect: Z = 6.40 (P < 0.00001)
-2.2 [-2.9, 1.9]
6.1.3 Automated internet
Hersey 2012 -1.9 5.8 579
Subtotal (95% CI) 579
Heterogeneity: Not applicable
Test for overall effect: Z = 2.05 (P = 0.04)
6.1.4 Primary care
Jolly 2011 (GP) -0.8 5.1 70
Jolly 2011 (pharmacist) -0.7 4.5 70
Munsch 2003 -3.6 7.9 53
Nanchahal 2011 -1.3 4.3 191
Wadden 2011 -2.8 6.4 131
Subtotal (95% CI) 515
Heterogeneity: Tau² = 0.35; Chi² = 6.17, df = 4 (P
Test for overall effect: Z = 1.00 (P = 0.32)
-0.5 [-1.3, 0.4]
10
rol
Test for subgroup differences: Chi² = 59.27, df = 3

CRASH DIETING
(VERY) LOW ENERGY DIETS


2225 records identified through database searching
5 additional records identified through other sources
1259 records after duplicates removed
265 records screened
202 records excluded
45 full text articles excluded
• 4 intermittent VLED
• 5 VLED vs VLED
• 2 surgical comparators
• 2 maintenance studies
• 21 non-randomised studies
• 3 review articles
• 6 follow up < 12 months
• 2 authors unable to provide data when contacted
63 full text articles assessed for eligibility
11 studies included in quantitative synthesis (meta-analysis) (18 articles)

Study characteristics

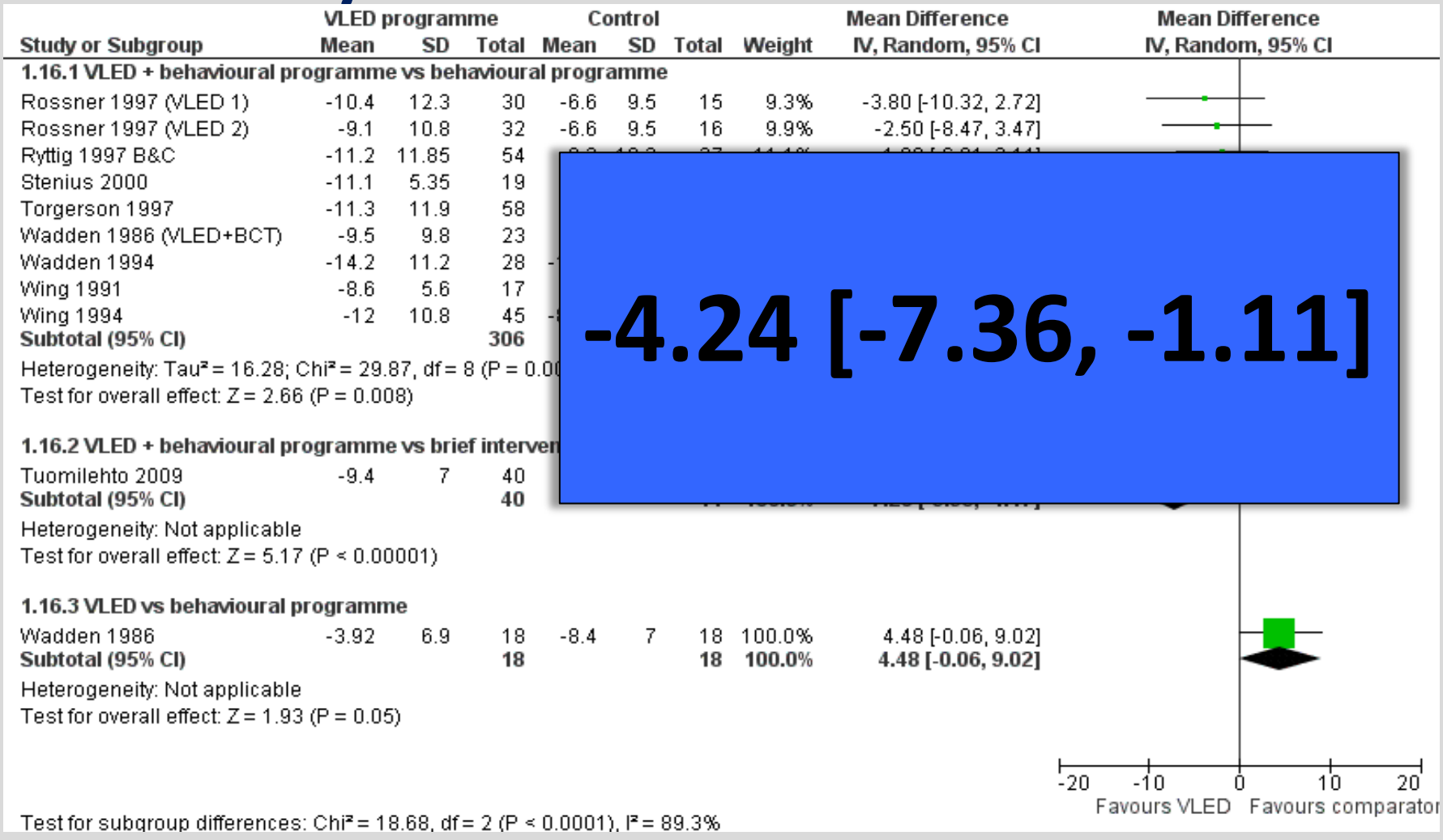
- Participants

Two studies recruited patients with type 2 diabetes

One study recruited patients with asthma

One study recruited patients with obstructive sleep apnoea

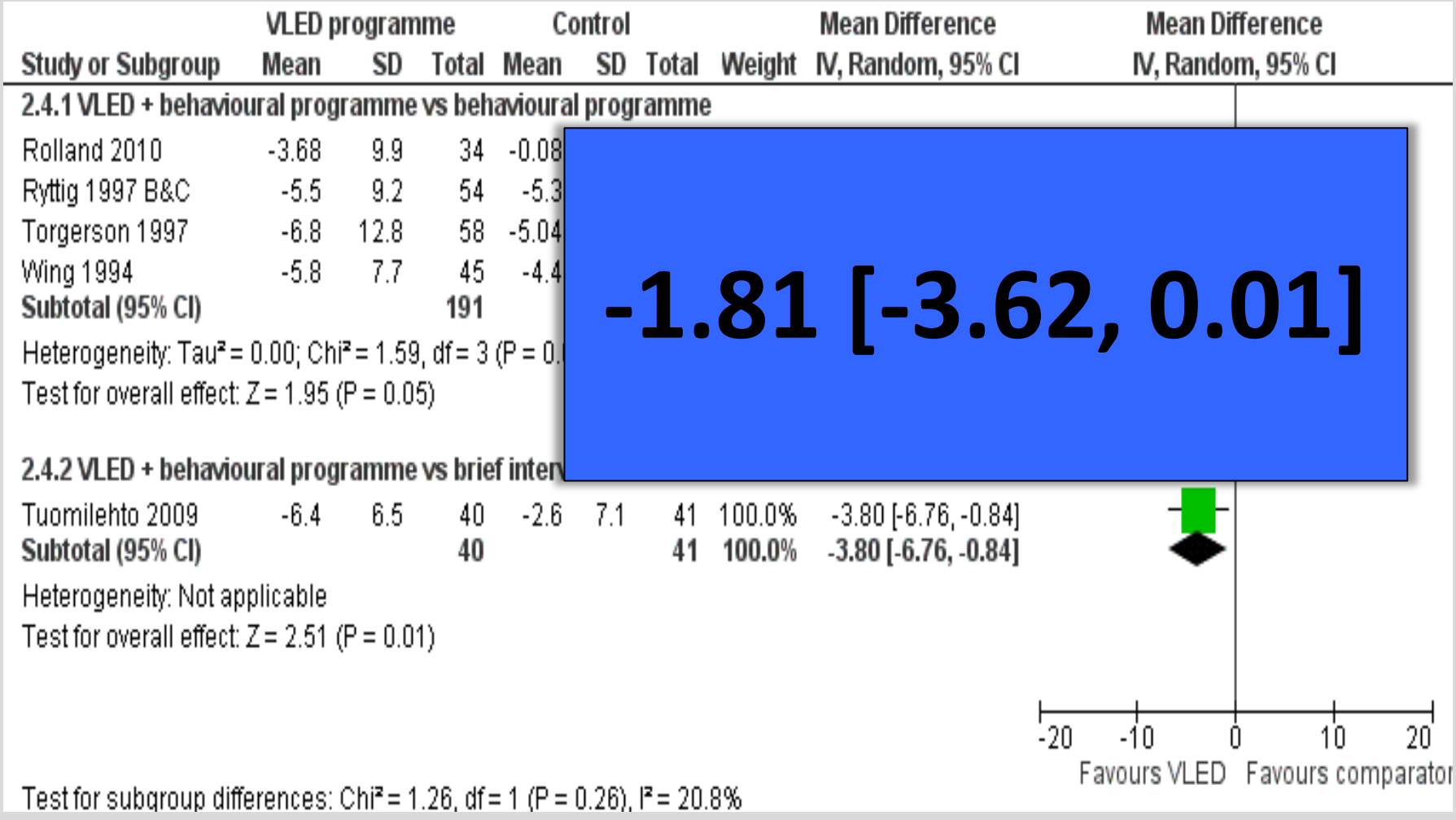
Meta-analysis at 12 months



VLED with a behavioural programme achieved an additional

-4.2 kg (95% CI -7.4 to -1.1) greater weight loss at 12 months than behavioural programme alone

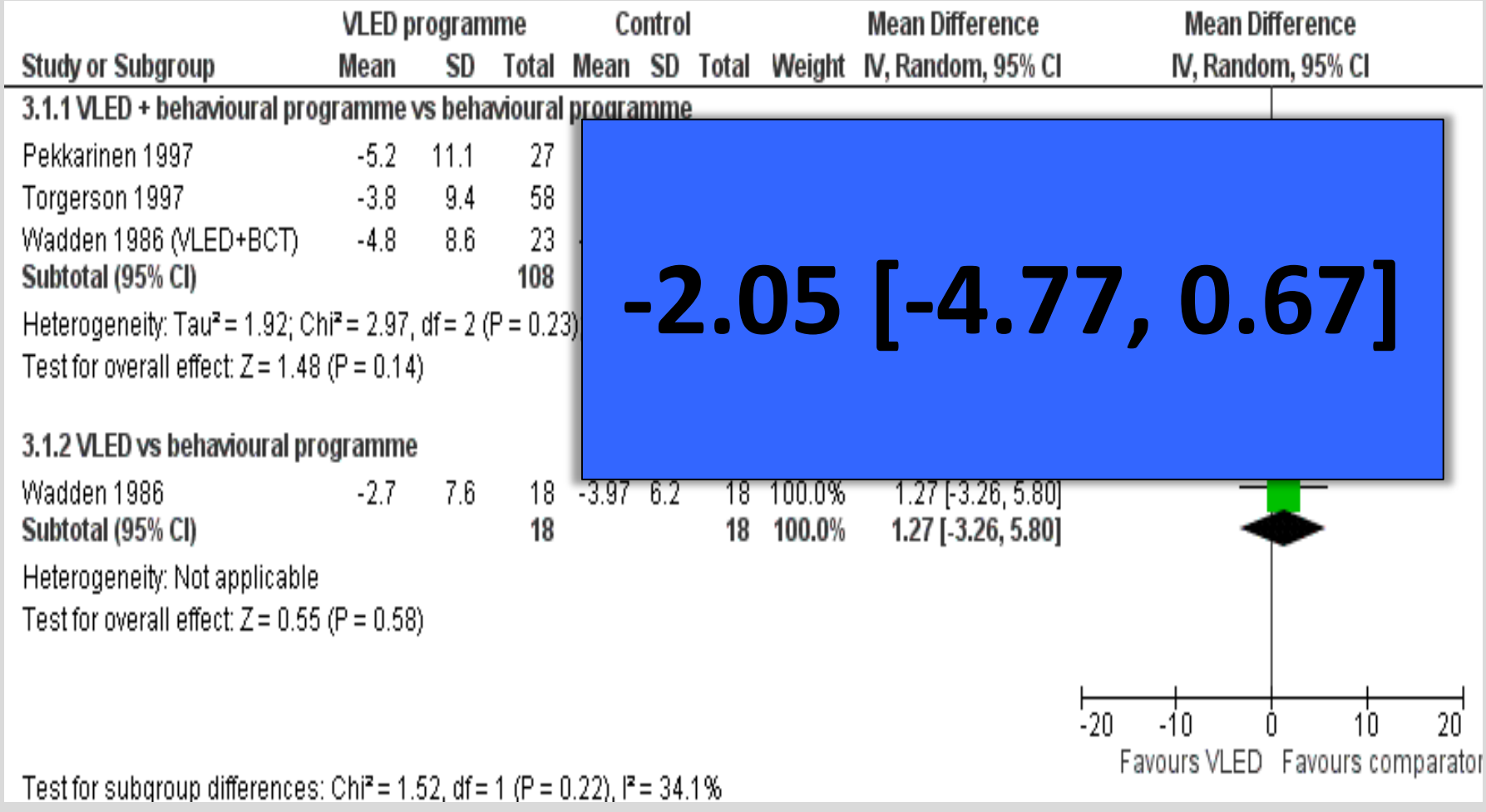
Meta-analysis at 24 months



VLED with a behavioural programme achieved an additional

-1.8 kg (95% CI -3.6 to 0.01) greater weight loss at 24 months than behavioural programme alone

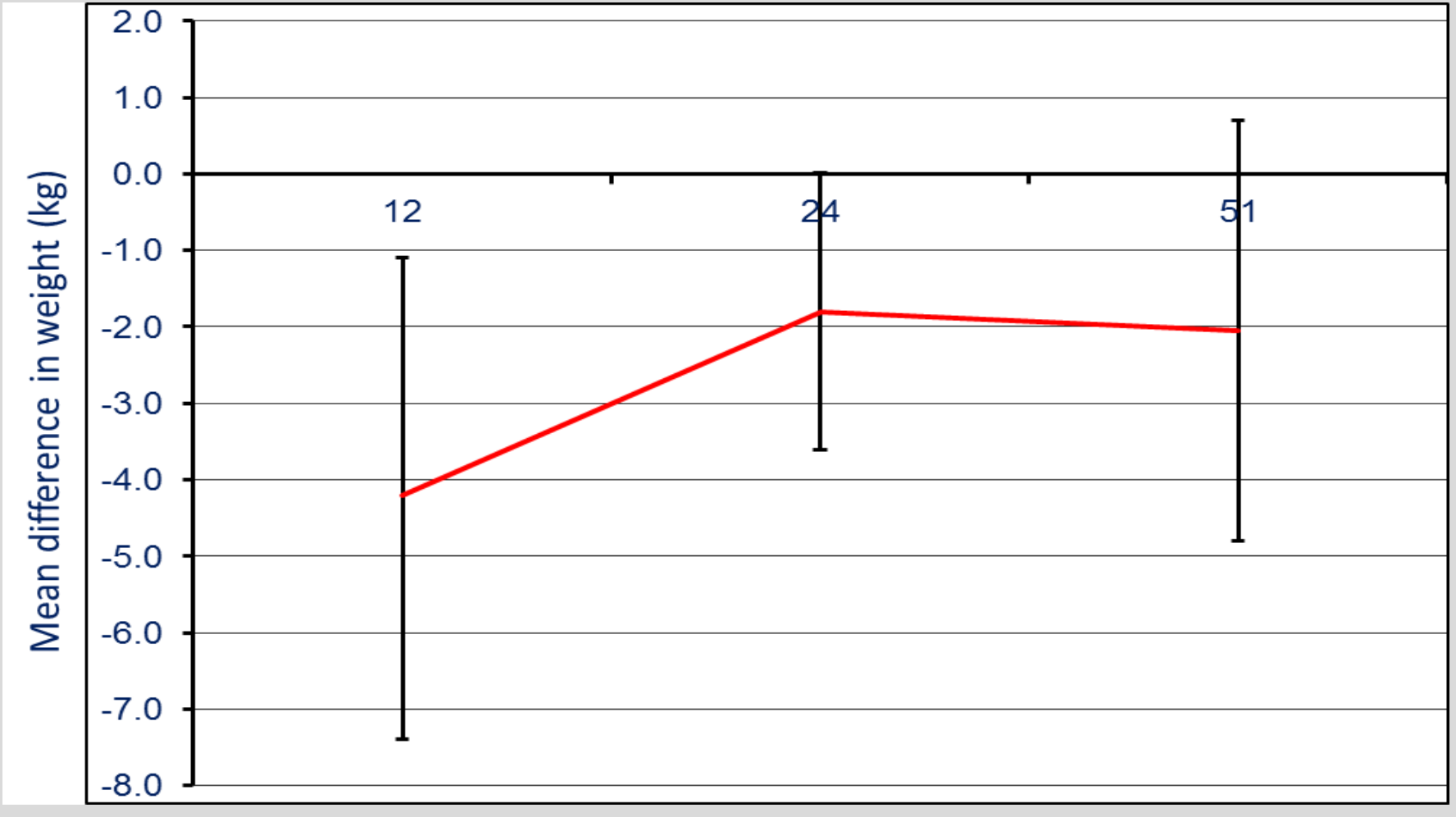
Meta-analysis 4-5 years



VLED with a behavioural programme achieved an additional

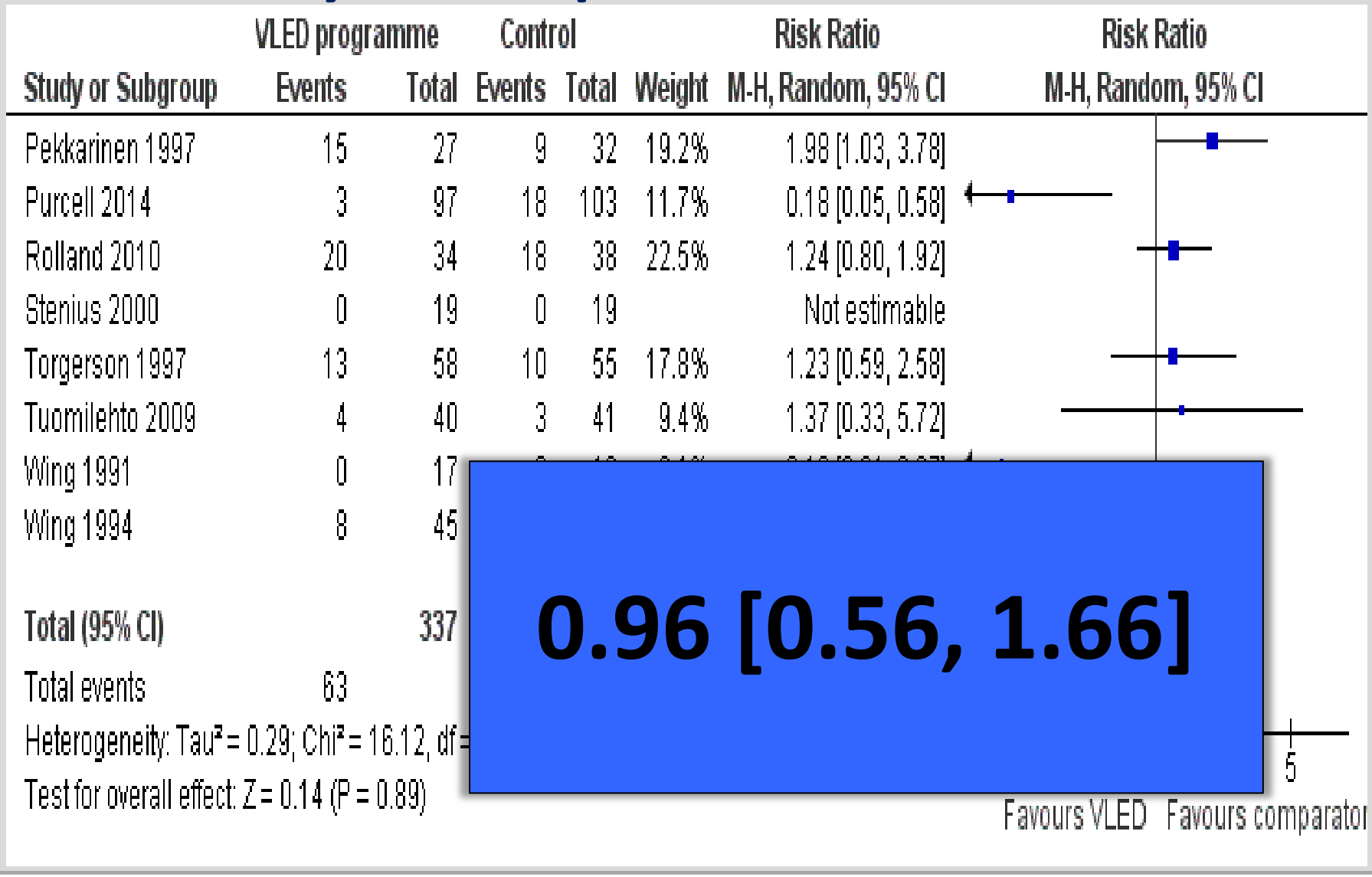
-2.1 kg (95% CI -4.8 to 0.67) greater weight loss at 42-60 months than behavioural programme alone

Meta-analysis



Difference between VLED with behavioural programme and a behavioural programme over time (BOCF results)

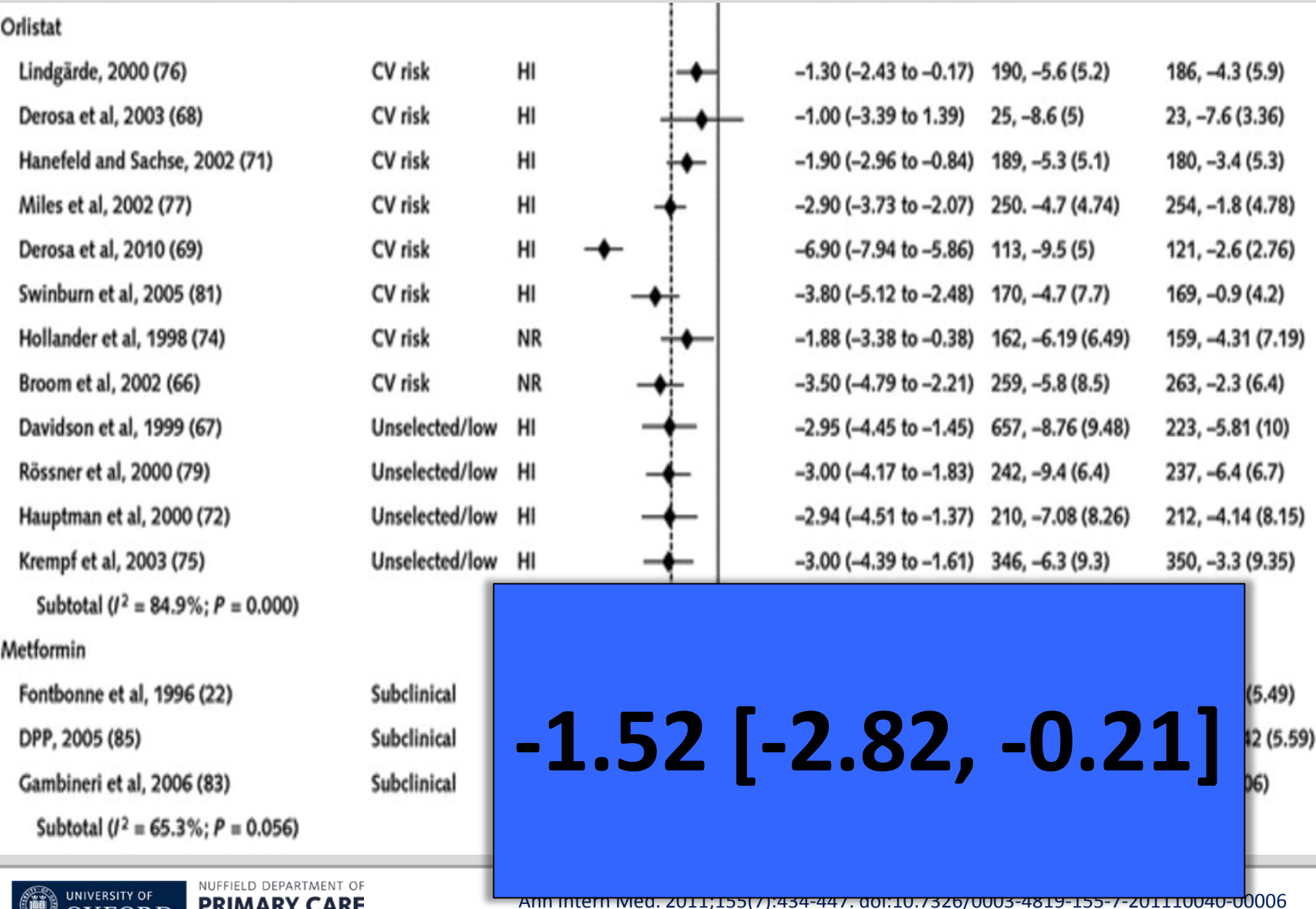
Meta-analysis - dropouts



Adverse events

	VLED (n= 258) percent (number)	Comparator (n= 205) percent (number)	Risk ratio (95% CI)
Any cardiovascular event	**0.39 (1)**	**1.46 (3)**	**0.2 (0.02 to 1.5)**
• *Abnormal ECG*	0.39 (1)	1.46 (3)	
Any skin or subcutaneous tissue event	**19.0 (49)**	**3.9 (8)**	**3.5 (0.8 to 15.4)**
• *Transient alopecia*	19.0 (49)	3.9 (8)	
Any musculoskeletal event	**0.39 (1)**	**0 (0)**	**3.3 (0.1 to 76.8)**
• *Raised serum urate requiring allopurinol*	**0.39** (1)	0 (0)	
Any deaths	**0 (0)**	**1.46 (3)**	**0.2 (0.01 to 3.1)**
• *Alcohol related*	0 (0)	0.49 (1)	
• *Heart failure*	0 (0)	0.49 (1)	
• *Suicide*	0 (0)	0.49 (1)	

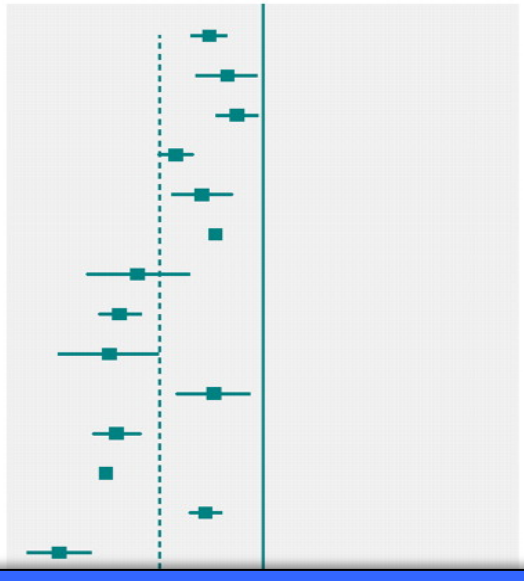
A WORD ABOUT MEDICATION



Ann Intern Med. 2011;155(7):434-447. doi:10.7326/0003-4819-155-7-201110040-00006

Meta-analysis of change in body weight (kg) in included trials after at least 20 weeks of treatment, using random effects model.

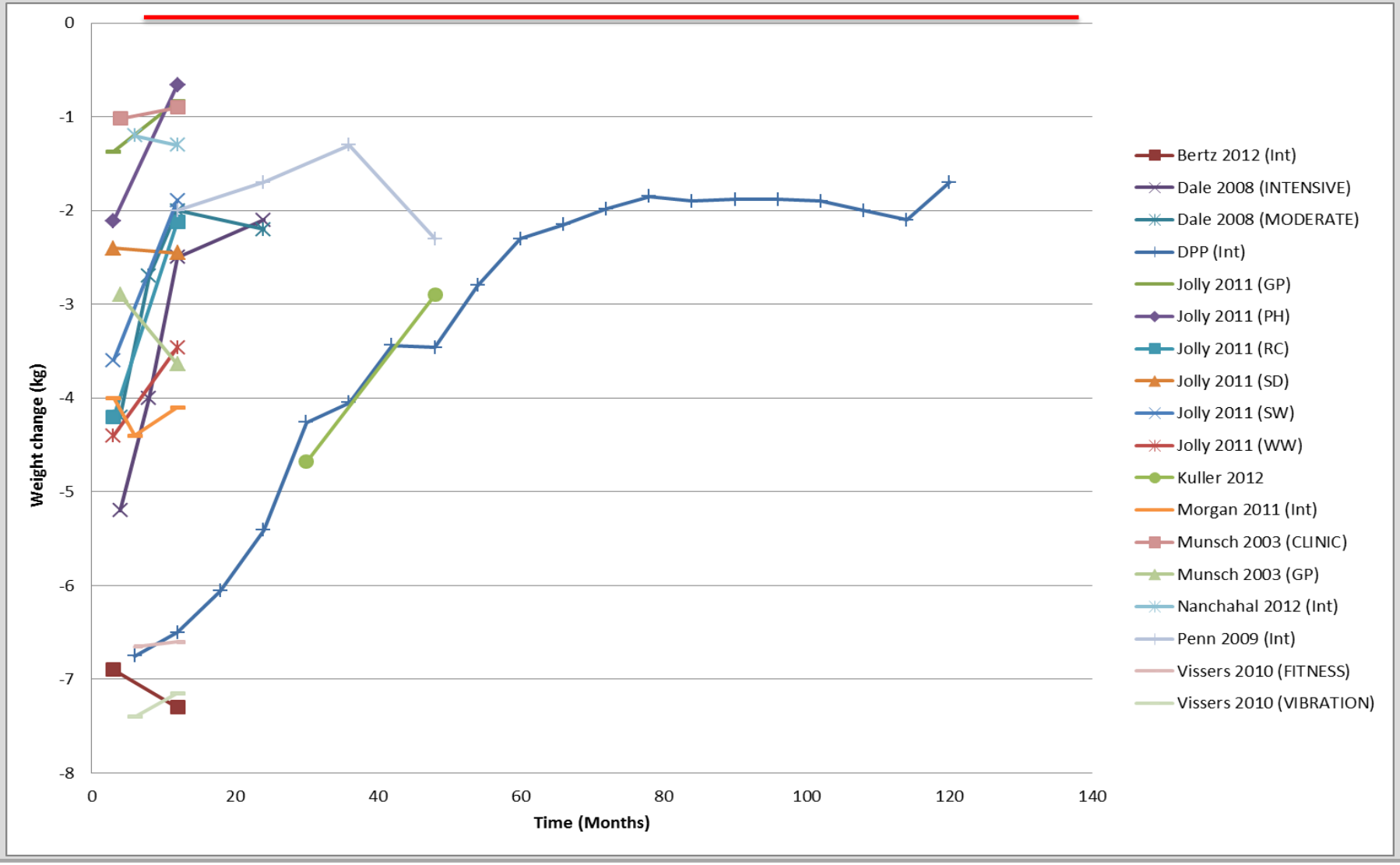
Trial	No of patients: GLP-1R agonist group	No of patients: Control group	Mean change (standard deviation): GLP-1R agonist group	Mean change (standard deviation): Control group	Weighted mean difference (95% CI)	Weight (%)	Weighted mean difference (95% CI)
Bergenstal 2010	160	166	-2.3 (3.0)	-0.8 (0.3)		4.98	-1.50 (-1.97 to -1.03)
Buse 2004	129	123	-1.6 (3.4)	-0.6 (3.3)		4.74	-1.00 (-1.83 to -0.17)
Kendall 2005	241	247	-1.6 (3.1)	-0.9 (3.1)		4.93	-0.70 (-1.26 to -0.14)
Pratley 2010	221	219	-3.4 (3.0)	-1.0 (1.8)		4.98	-2.42 (-2.88 to -1.96)
Moretto 2008	78	78	-3.1 (2.7)	-1.4 (2.7)		4.74	-1.70 (-2.53 to -0.87)
Nauck 2009	242	122	-2.8 (0.2)	-1.5 (0.3)		5.09	-1.30 (-1.36 to -1.24)
Garber 2009	246	248	-2.5 (7.8)	1.0 (7.9)		4.21	-3.50 (-4.89 to -2.11)
Diamant 2010	233	223	-2.6 (3.1)	1.4 (3.0)		4.93	-4.00 (-4.55 to -3.45)
DeFronzo 2010	45	45	-2.8 (3.4)	1.5 (3.4)		4.21	-4.30 (-5.69 to -2.91)
Russell-Jones 2009	230	114	-1.8 (5.0)	-0.4 (4.1)		4.59	-1.38 (-2.38 to -0.38)
Heine 2005	282	267	-2.3 (3.9)	1.8 (4.0)		4.86	-4.10 (-4.76 to -3.44)
Astrup 2009	93	98	-7.2 (0.5)	-2.8 (0.5)		5.08	-4.40 (-4.54 to -4.26)
Elkin 2010	20	20	-3.2 (0.5)	-1.6 (0.9)		4.99	-1.60 (-2.04 to -1.16)
Davies 2009	118	117	-2.7 (3.4)	3.0 (3.4)		4.72	-5.71 (-6.57 to -4.85)
Rosenstock 2010	73	70	-5.1 (0.5)	-1			
Zinman 2009	178	177	-2.0 (4.0)	0			
Apovian 2010	96	98	-6.2 (0.5)	-4			
Bergenstal 2009	124	124	-1.9 (3.8)	4			
Bunck 2009	36	33	-3.6 (3.6)	1			
Marre 2009	234	114	-0.2 (0.0)	-0			
Nauck 2007	253	248	-2.5 (3.2)	2			
Overall; P=0.00							

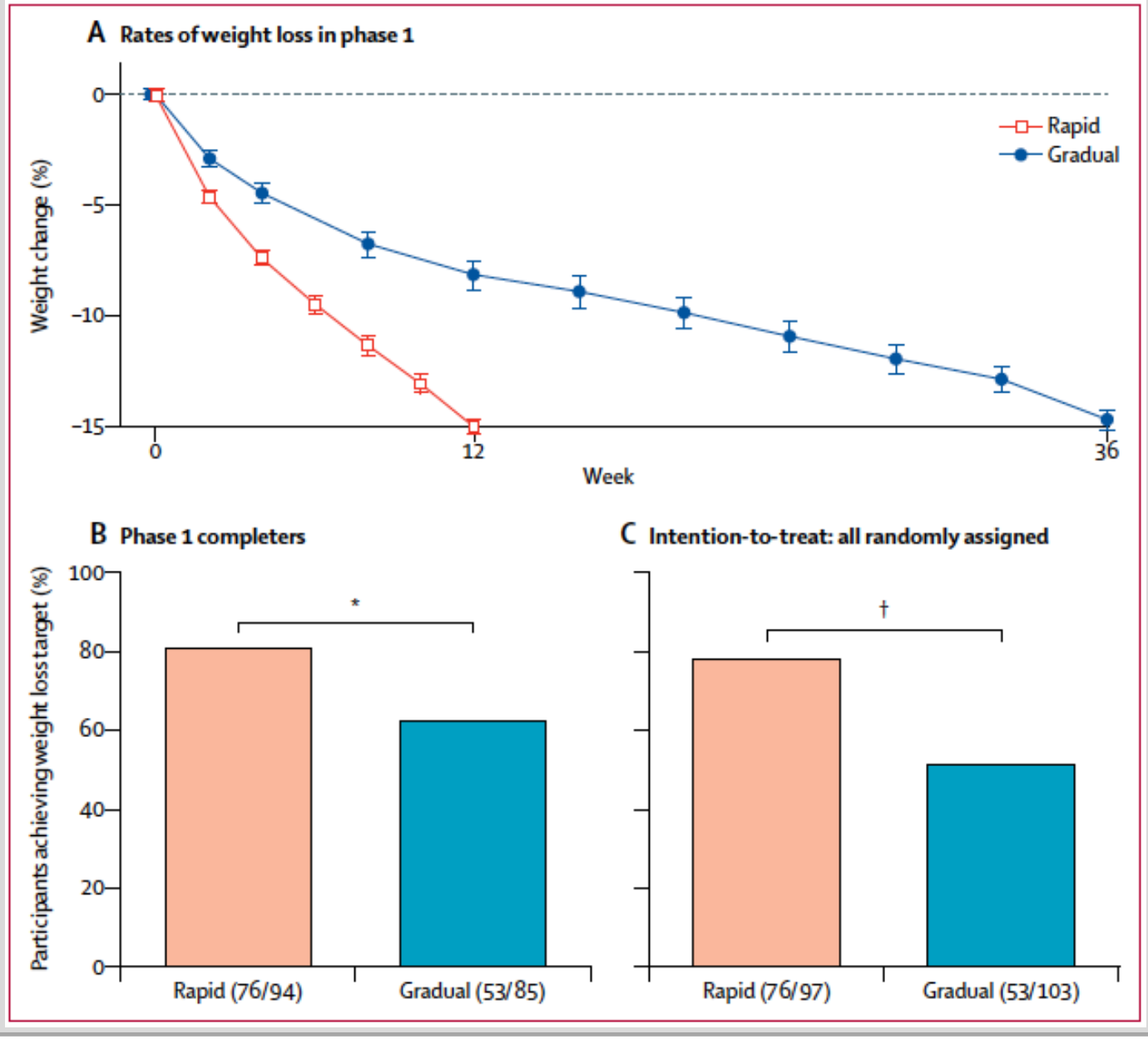


-2.90 [-3.59, -2.22]

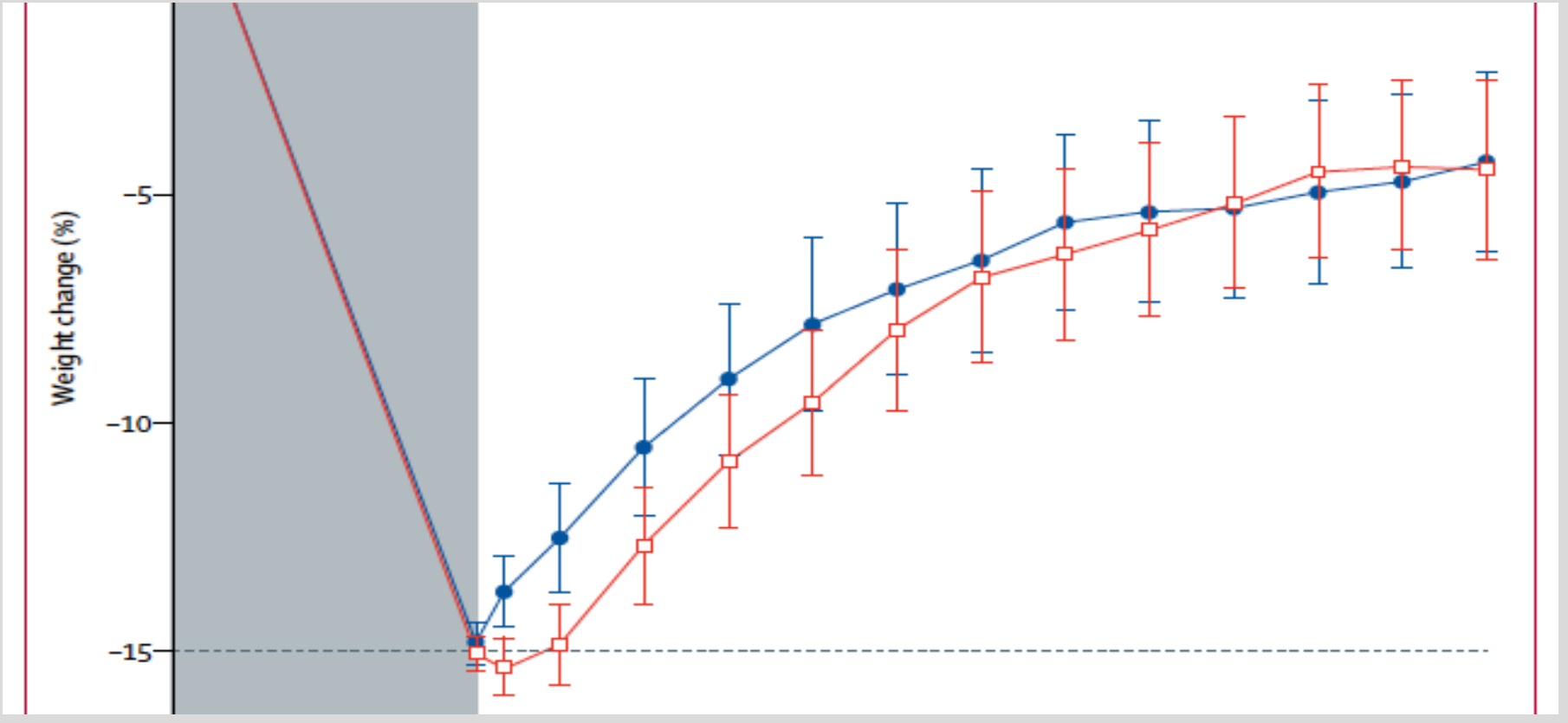
THE PROBLEM OF WEIGHT REGAIN

Weight regain after programme end





Lancet Diabetes and Endocrinology 2014:2:954-962

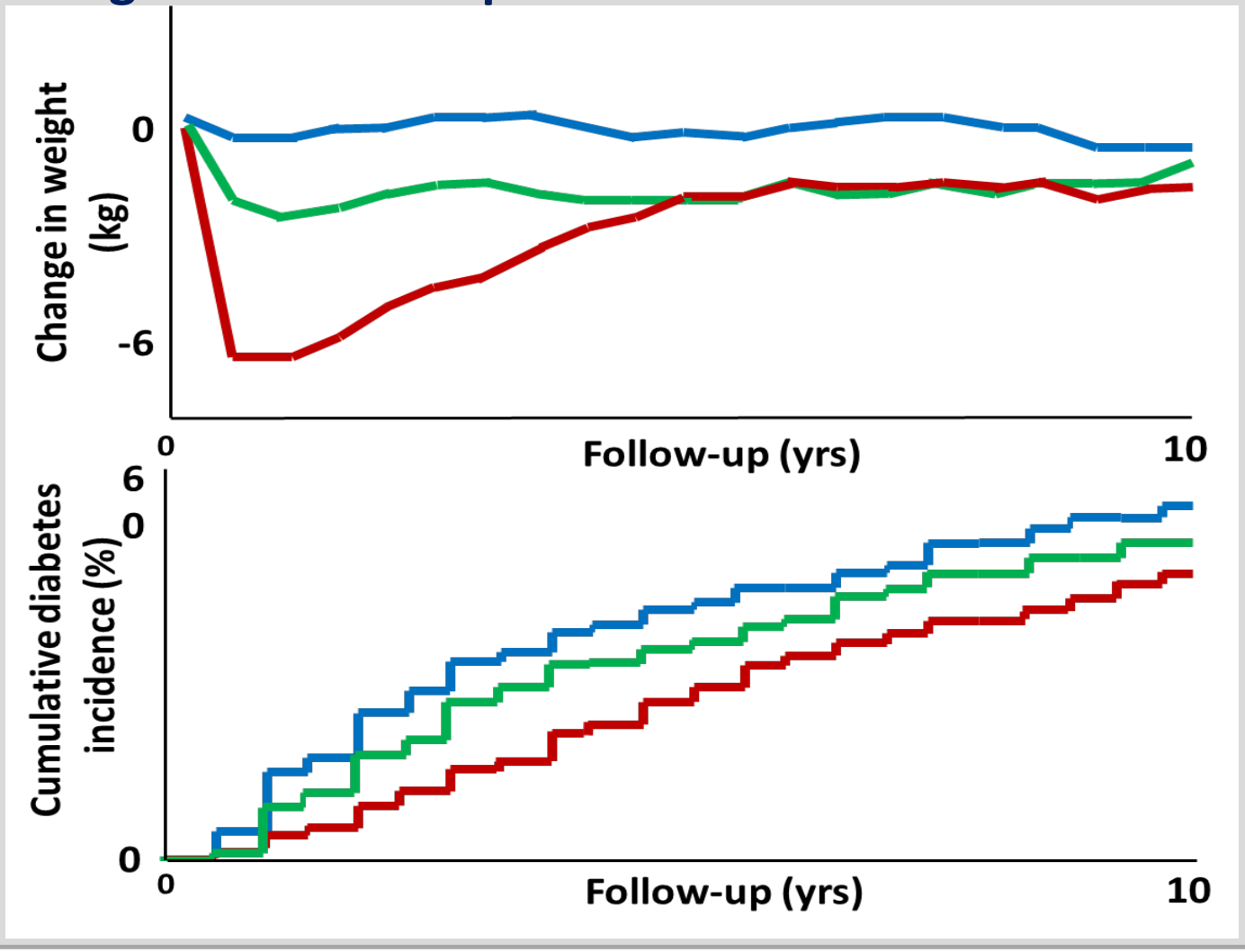

Weight change (%)
-5
-10
-15

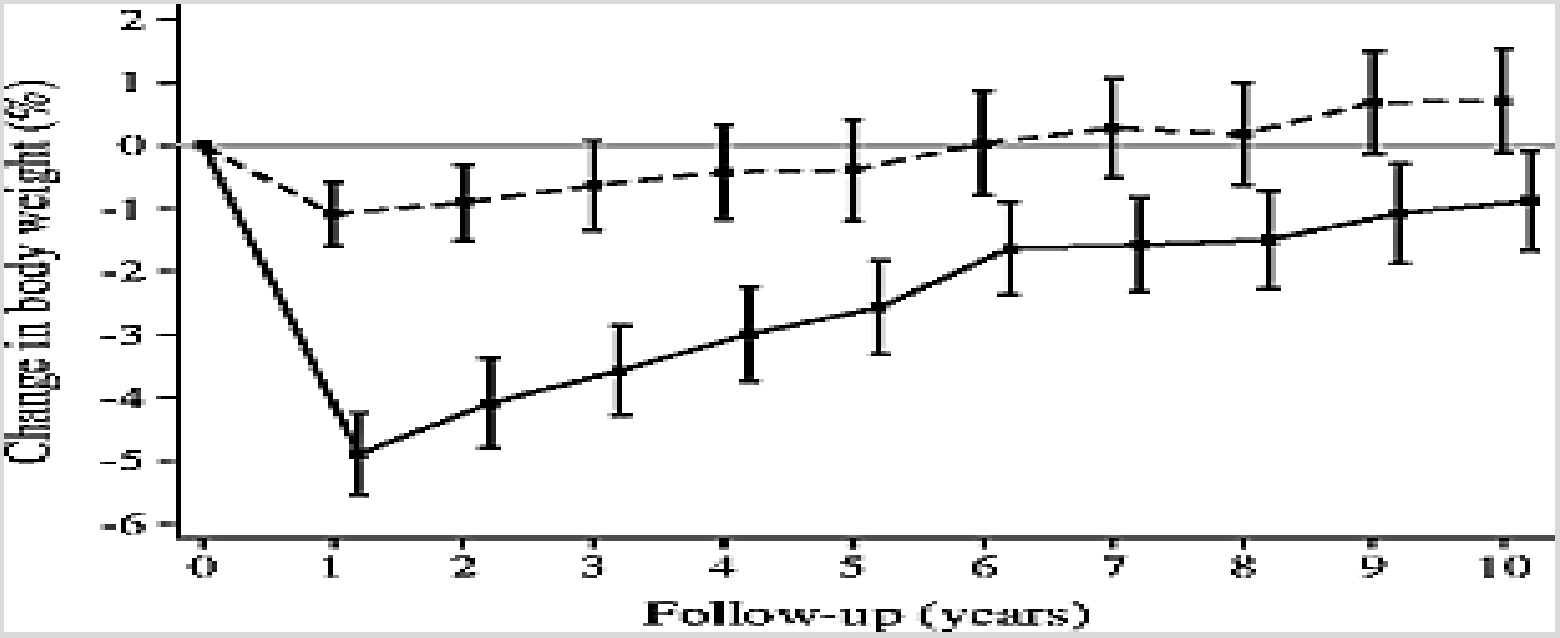
Evidence that length of time you are obese matters for health

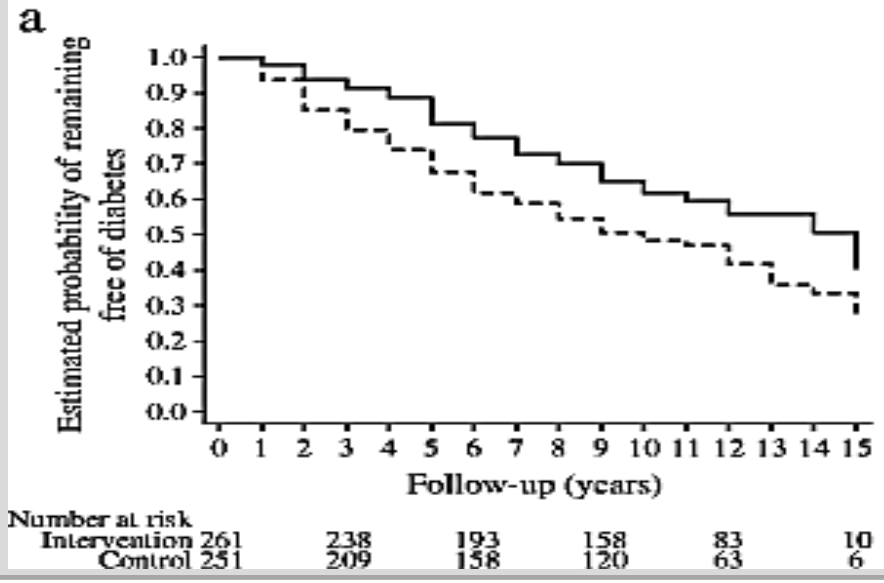
- Years obese
  - Up to 5 HR 1.51,
  - 5-14.9 HR 1.94
  - 15-24.9 HR 2.25
  - >25 HR 2.52
  - All adjusted for degree of obesity
    - International Journal of Epidemiology 2011;40:985–996
- Similar study J*AMA*. 2013;310(3):280-288
- Rats compared
  - Overfed
  - Healthy diet
  - Intermittent dieting
    - International Journal of Obesity (2013) 37, 1088–1094

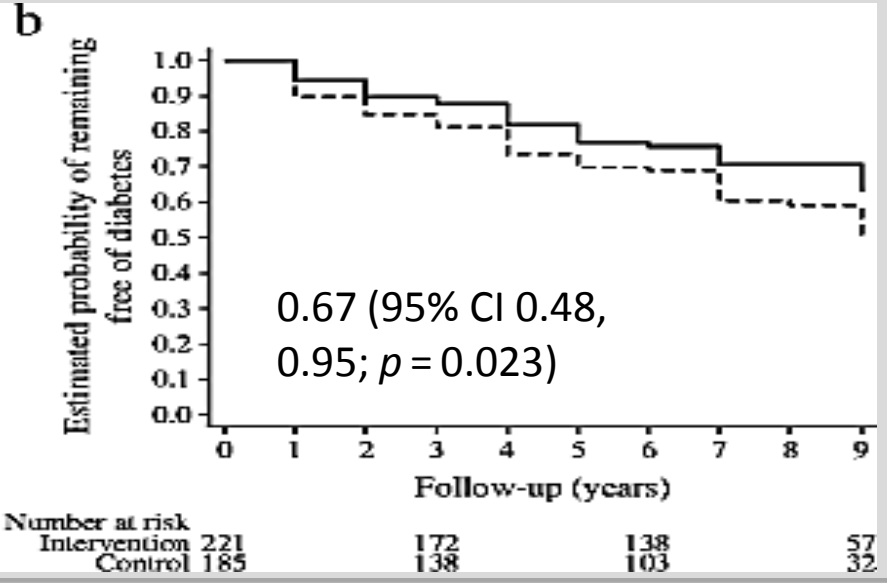
Diabetes Prevention Program

Long-term follow-up









Diabetelogia 2013:56:284-293

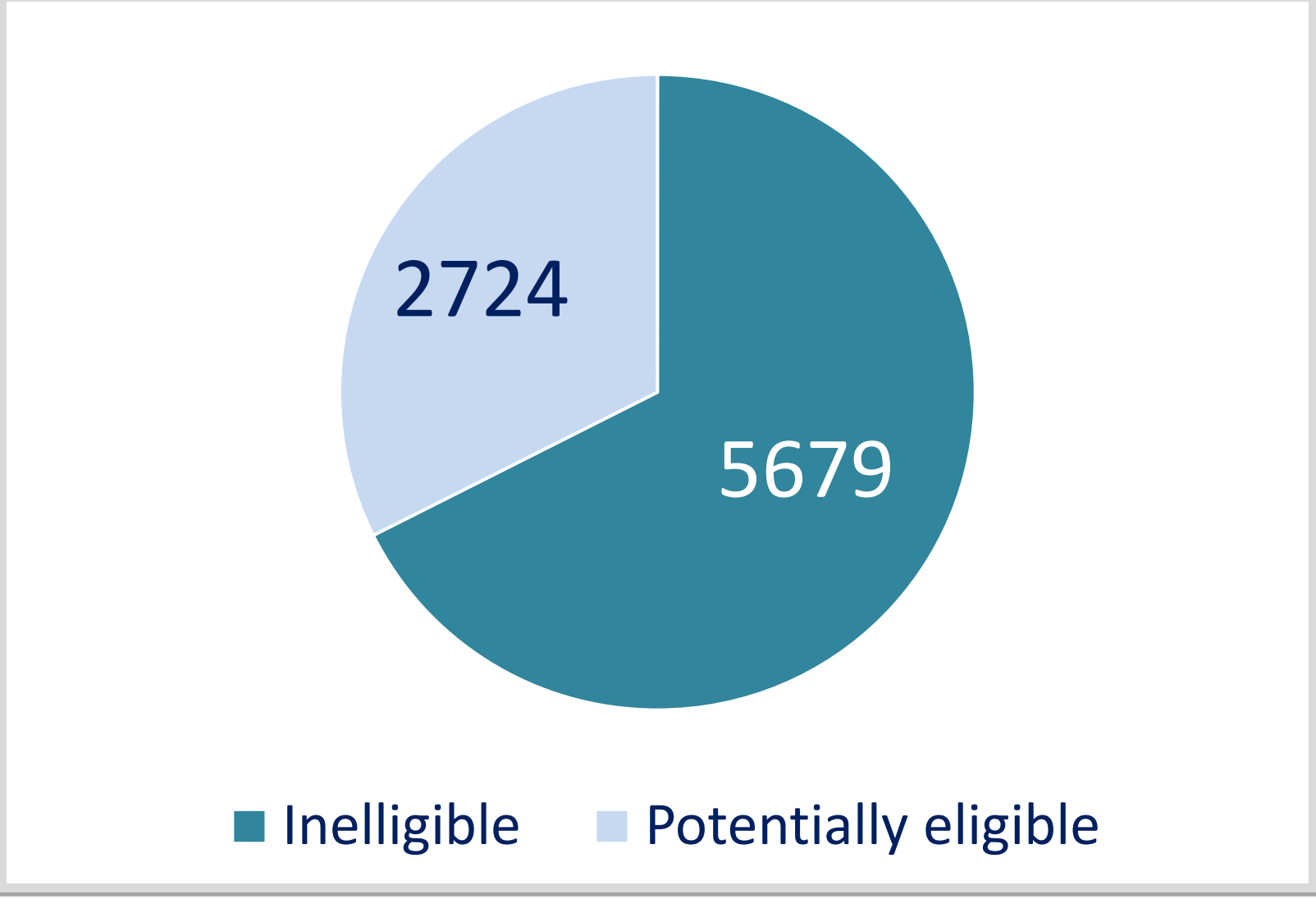
SHOULD YOU BROACH THE TOPIC AND, IF SO, HOW?

The brief intervention

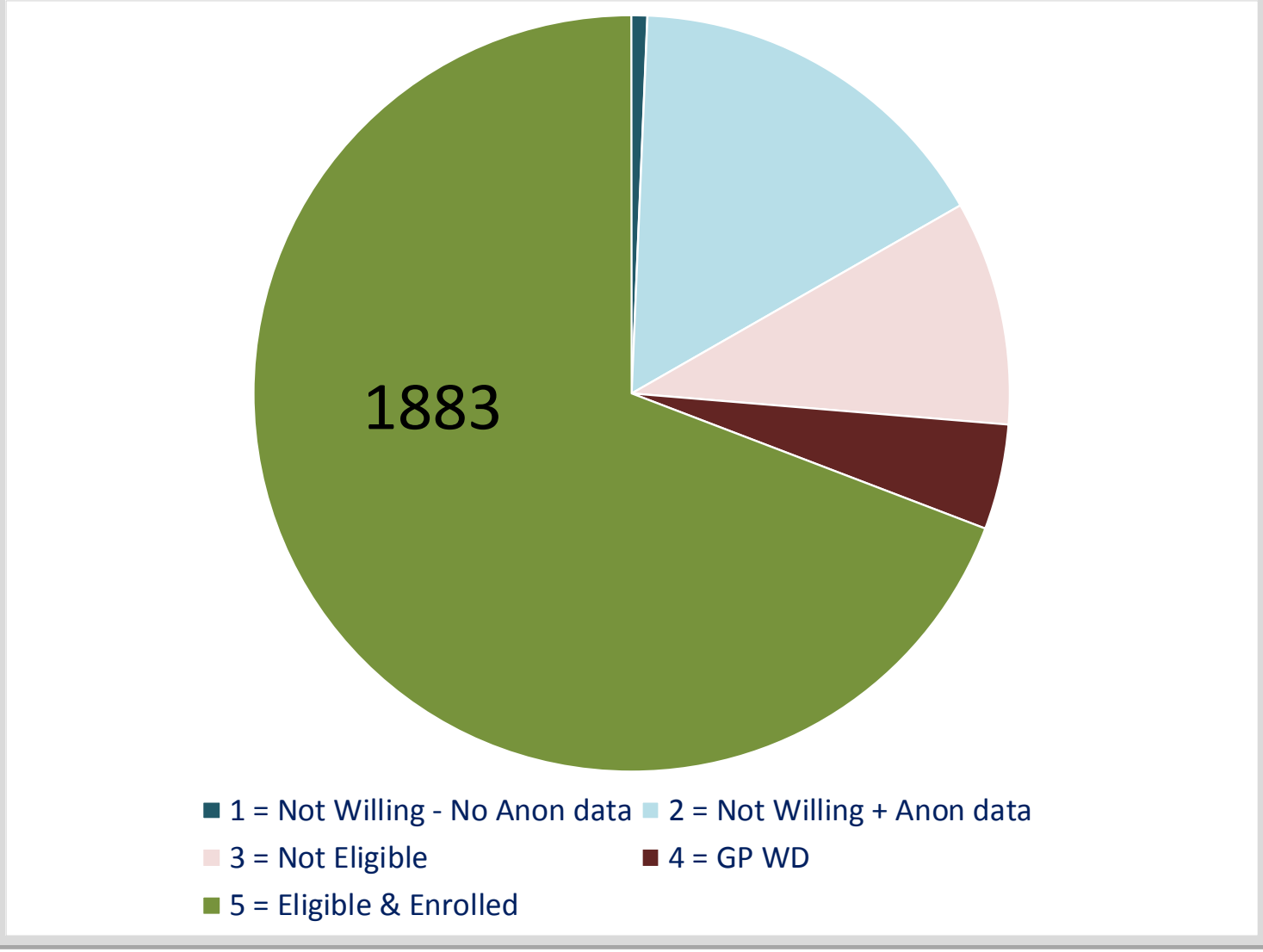
- Offer help
- Book them in
- Create accountability

- To create momentary motivation
- To capitalise on the moment
- To create lasting motivation

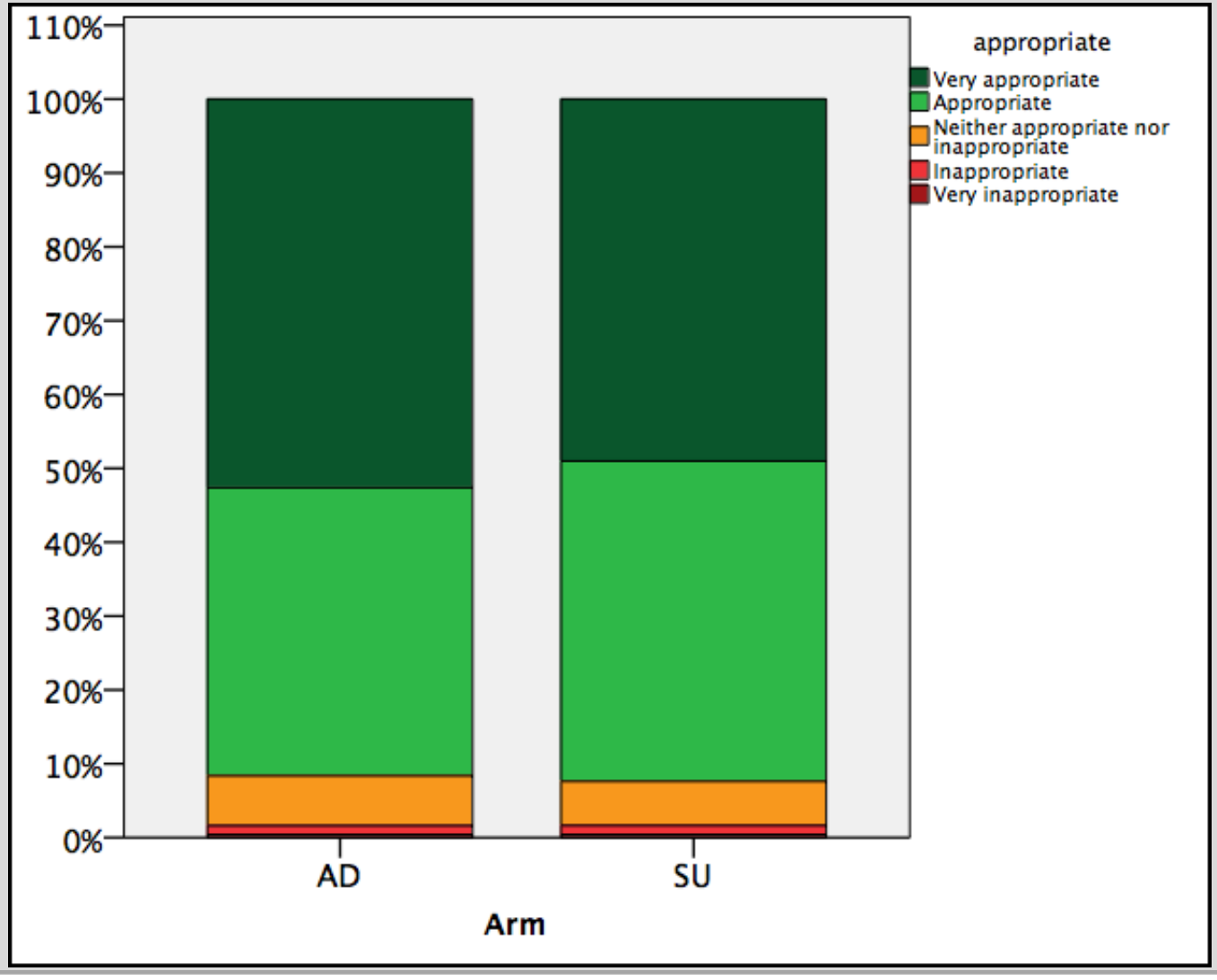
Screened and potentially eligible



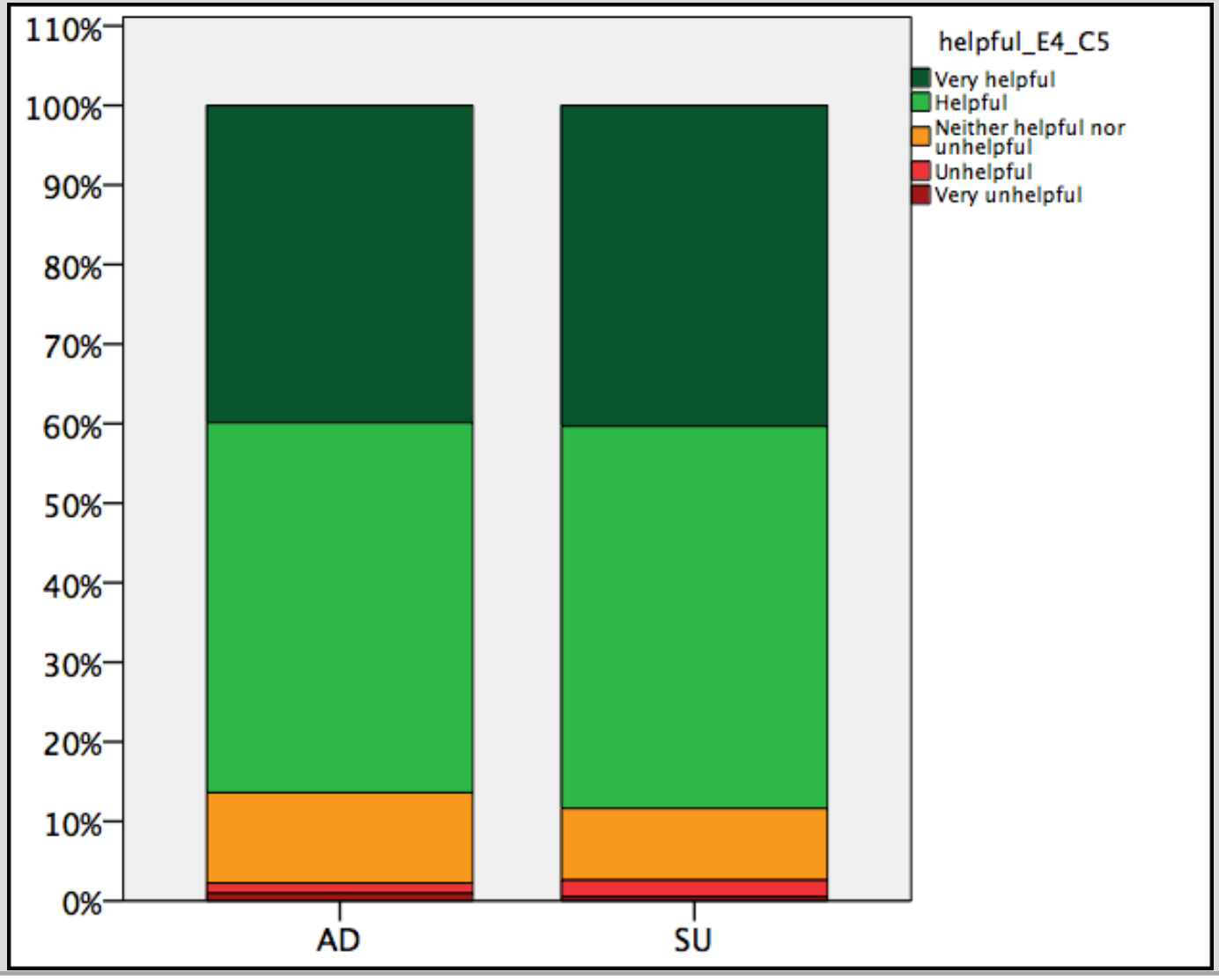
What happened to the potentially eligible



Ratings of appropriateness by trial arm



Ratings of helpfulness by trial arm



When it goes wrong

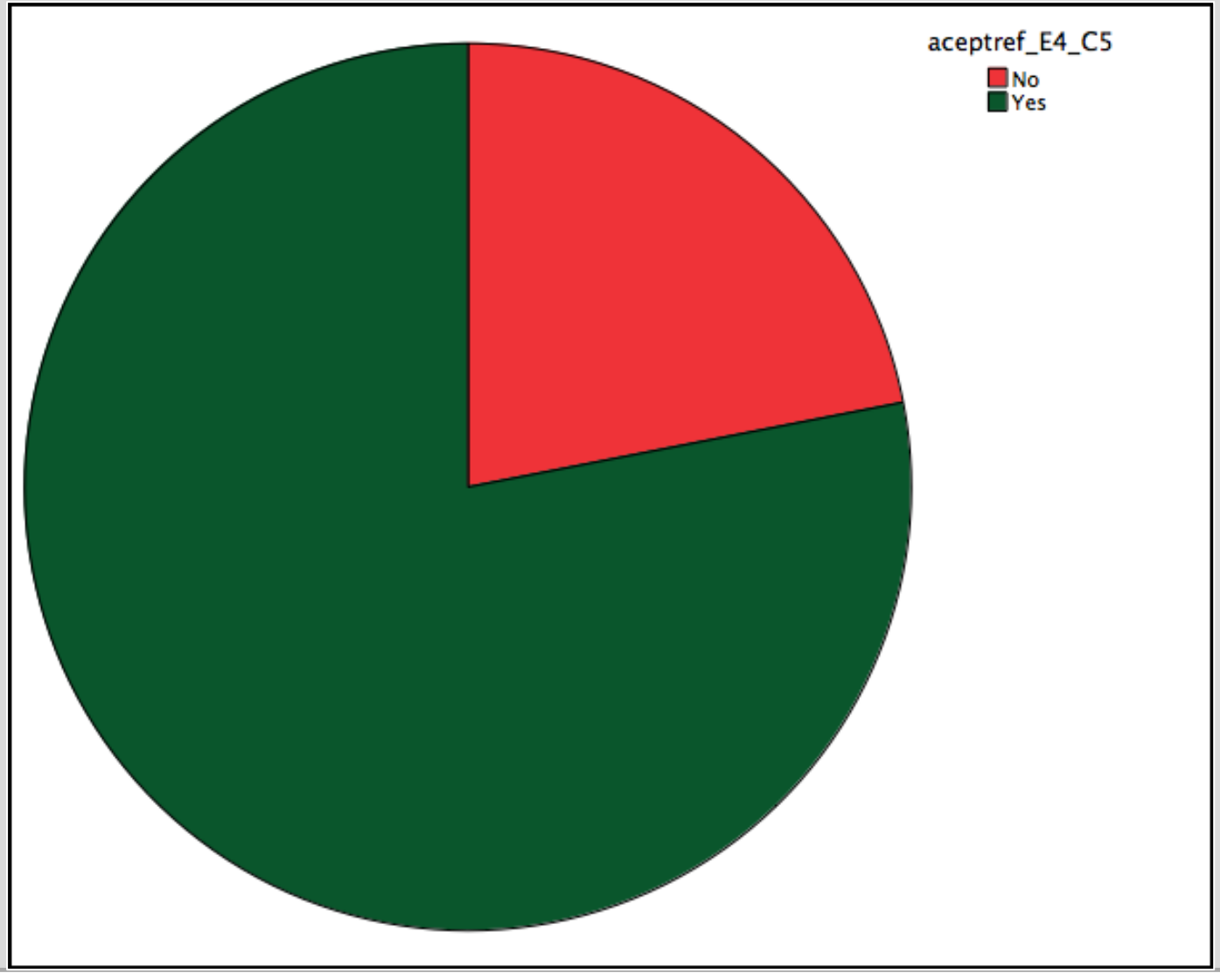
Su

Neither appropriate nor inappropriate
Unhelpful

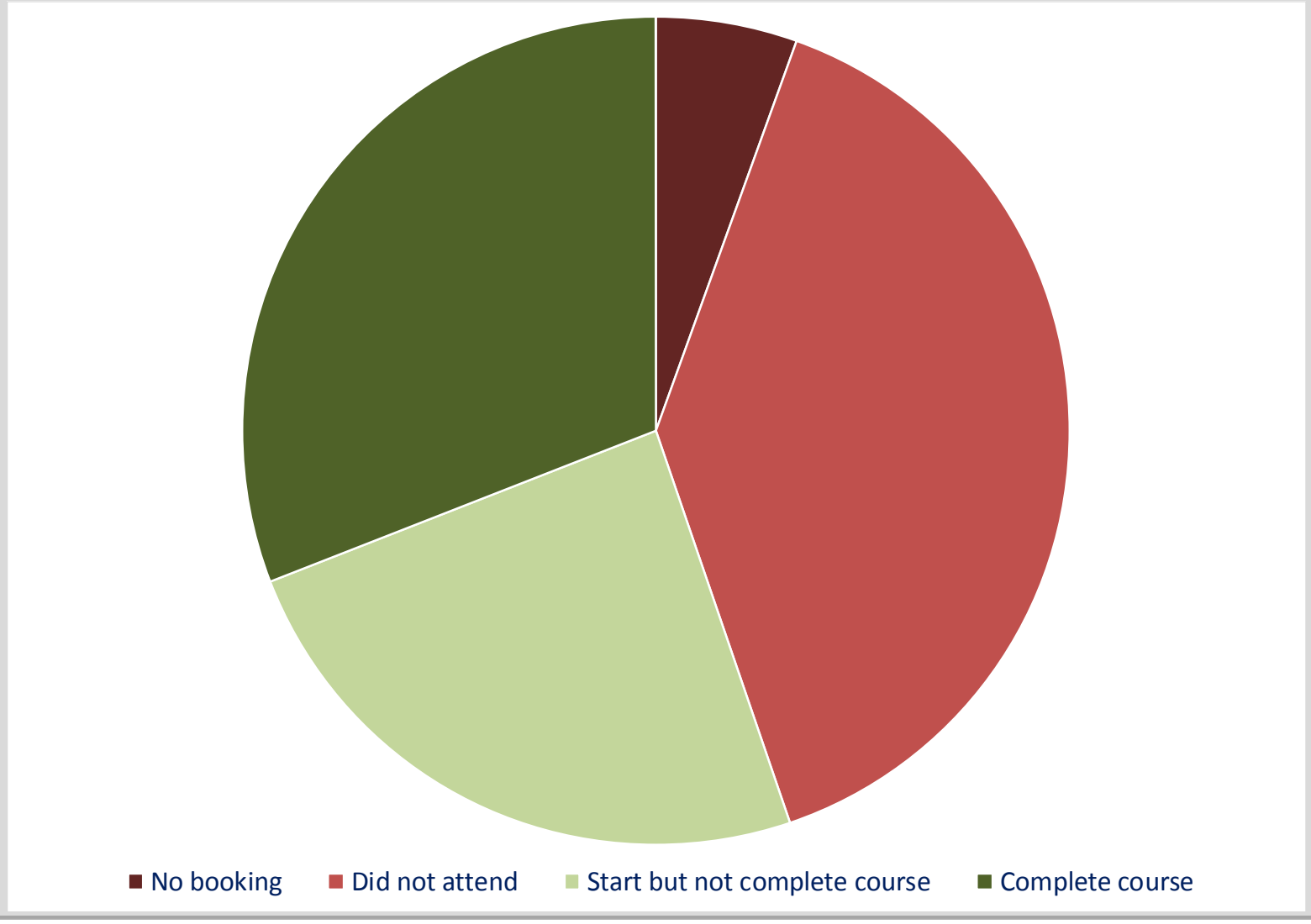
Ad

Very inappropriate
Neither helpful nor unhelpful

Acceptance of referral



Of those who accepted referral…



CAN WE RECOGNISE OBESITY BY EYE?

Online GP Study

315 GPs and newly qualified GP trainees (109 M, 206 F)
(West Midlands GP training centre)

GPS viewed and rated 15 photographs - matched
5 healthy weight (M BMI = 22)
5 overweight (M BMI = 27)
5 obese (M BMI = 32)

For each photo:
1. Categorized into ‘underweight’ ‘healthy weight’ ‘overweight’ ‘obese’
2. Estimated BMI
3. Rated whether would consider talking to the person about their weight

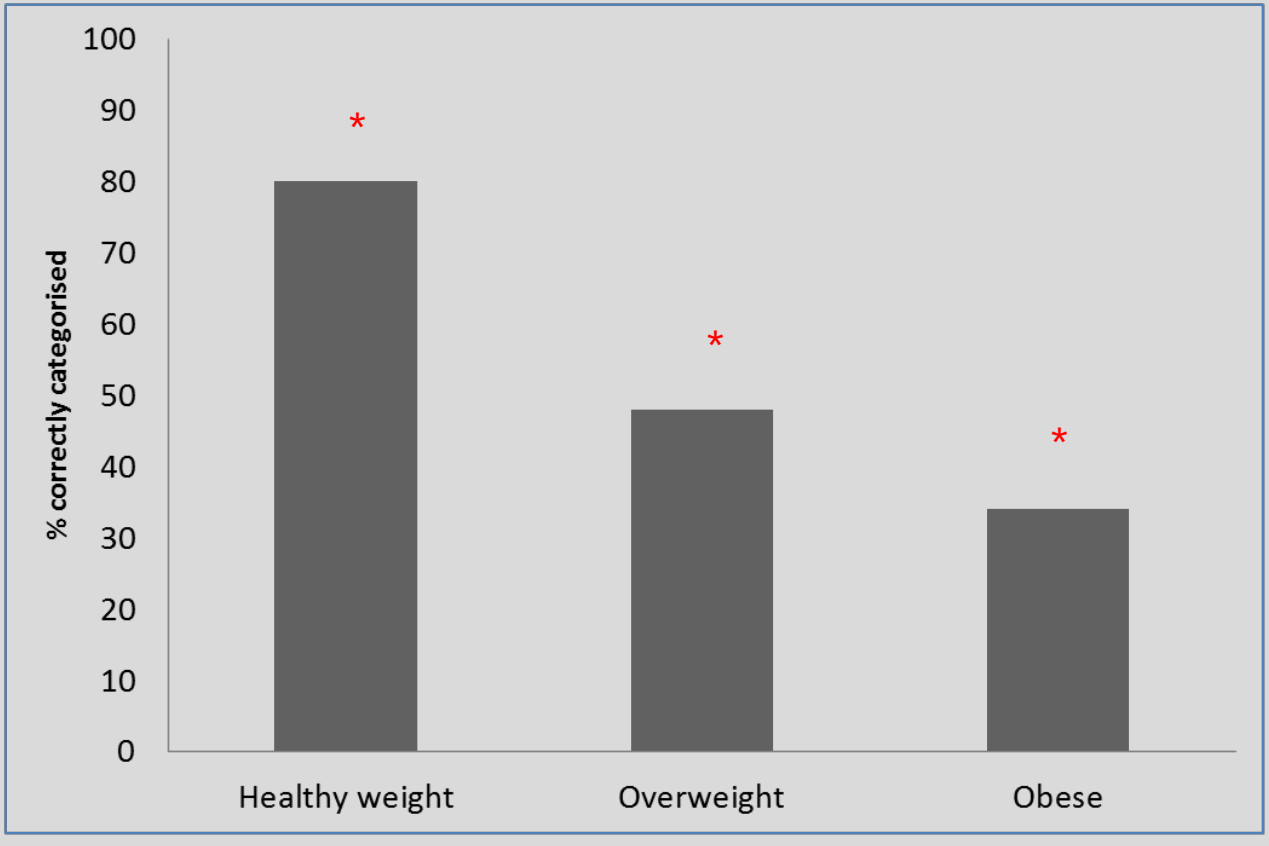
This person is*

[ ] Underweight [ ] Healthy weight [ ] Overweight [ ] Obese

I think this person has a BMI of*

_____

Online GP Study



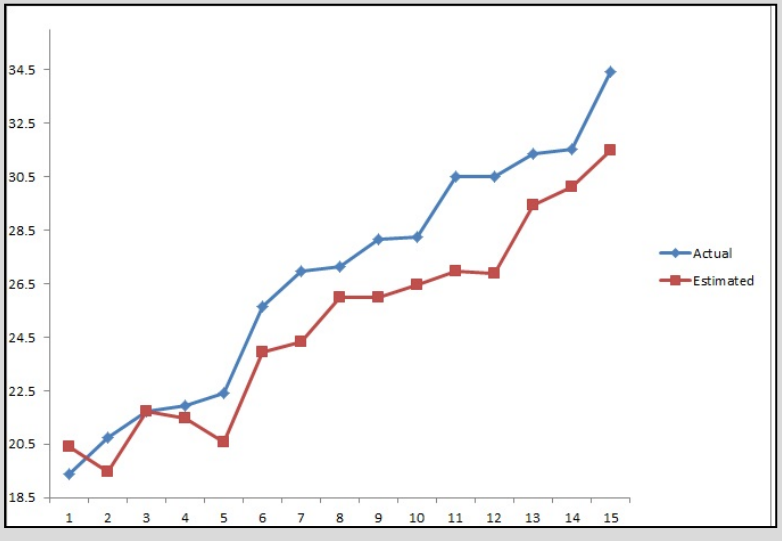
* All groups differ at p < 0.001

Why does inaccurate categorization occur?

To test whether there was an association between the size of relative error and actual BMI of each model:

Regression coefficient for the slope of BMI estimation error of each model, for each PPS.

Mean coefficient for the slope of BMI estimation error =
- 0.20 (SD = 0.17, CIs = - 0.22. - 0.18).



88% of GPs had negative slopes (indicating underestimation), whilst 12% had slopes of 0 or above.

Conclusions

- Modest temporary weight loss can lead to health benefits- weight loss does not need to be permanent
- Left alone, most people who seek help to lose weight do so
- Self-help programmes can be effective
- Modest benefits from group-based commercial programmes
- No benefits from programmes delivered by in routine clinical care
- VLEDs seem effective, safe, and well tolerated
- Orlistat, metformin (unlicensed), and liraglutide are effective
- People who are overweight are happy to discuss it with a doctor and accept help when it is given

Thank you for listening

For questions or a copy of the slides email:

paul.aveyard@phc.ox.ac.uk