

## A Cochrane review of 64 interventions for treating obesity in children: where to from here?

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Presenting on behalf of:  
Oude Luttikhuis H<sup>2</sup>, Baur L<sup>1</sup>, Jansen H<sup>2</sup>, O'Malley C<sup>3</sup>, Summerbell C<sup>3</sup>.

Interventions for treating obesity in children.  
Cochrane Database of Systematic Reviews 2009, Issue 1

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## Overview

- 2003 'child obesity treatment' Cochrane review
- 2009 'child obesity treatment' updated Cochrane review
  - methods
  - summary of findings & implications for practice
  - study limitations
  - improving study quality
  - future research questions
- 2005 'child obesity prevention' Cochrane review
- What's happening in Australia in treatment and prevention

## Interventions for treating obesity in children. 2003 Cochrane Review

Authors: Summerbell CD, Ashton V, Campbell KJ, Edmunds L, Kelly S, Waters E.

- Included analysis of 18 childhood obesity 'lifestyle' treatment RCTs published 1985-2001
- Many of the studies included in the review had:
  - small sample sizes
  - high drop-out rates
  - unreliable or limited outcome measurements or sampling problems
- This raised concerns about validity and generalisability of the findings
- Wide range of interventions tested made comparison of studies difficult
- No direct conclusions could be drawn from the review

## Interventions for treating obesity in children. 2009 Cochrane Review

Authors: Oude Luttikhuis H, Baur L, Jansen H, Shrewsbury V, O'Malley C, Summerbell C

- Update of 2003 review
- Inclusion criteria:
  - Randomised controlled trials aimed primarily at treating obesity
  - Mean age less than 18 years
  - Minimum of 6 months follow-up
  - Measured height and weight
  - Inclusion of drug therapy (orlistat, sibutramine, metformin - drug therapy had to be given for a minimum of 3 months)
  - Bariatric surgery considered (but no studies ultimately included, because no published RCTs, controlled clinical trials, controlled before & after trials, or interrupted time series trials)

## Methods described in the Cochrane Handbook were used



Available from [www.cochrane-handbook.org](http://www.cochrane-handbook.org)

## Search strategy

- Various databases from 2001 to 2008:
  - MEDLINE (Ovid)
  - EMBASE (Ovid)
  - CINAHL ARC Service (WinSPIRS online)
  - PsycINFO Silver Platter (WebSPIRS)
  - ISI Web of Science
  - Cochrane CENTRAL Register of Controlled Trials
  - DARE (Database of Abstracts of Reviews of Effects)
  - NHS EED (National Health Service Economic Evaluation Database)
  - Health Technology Assessment database
- Reference lists of several systematic reviews

## These are only the Medline search terms!

#1 exp Obesity[MeSH]	#45 [aerobic or physical therapy or physical activity or physical conditioning].hw.	#83 sibutramine.hw.
#2 Weight Gain [MeSH]	#46 [obese or overweight or obese] or program[MeSH].hw.	#84 sibutramine.hw.
#3 Weight Loss [MeSH]	#47 physical education.hw.	#85 sibutramine.hw.
#4 obesity[MeSH]	#48 physical education.hw.	#86 sibutramine.hw.
#5 Weight gain or weight loss[MeSH]	#49 Physical Therapy [MeSH]	#87 sibutramine.hw.
#6 [overweight or over weight or overweight] or over eat[MeSH].hw.	#50 [exercise or aerobics].hw.	#88 sibutramine.hw.
#7 weight change[MeSH]	#51 Physical Activity [MeSH]	#89 sibutramine.hw.
#8 [loss of body mass index] or [loss or over eat[MeSH].hw.	#52 [exercise or aerobics].hw.	#90 sibutramine.hw.
#9 [BMI or BMI range]	#53 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#91 sibutramine.hw.
#10 exp Behavior Therapy [MeSH]	#54 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#92 sibutramine.hw.
#11 Support Group[MeSH]	#55 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#93 sibutramine.hw.
#12 Family Therapy [MeSH]	#56 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#94 sibutramine.hw.
#13 exp Psychotherapy, Group[MeSH]	#57 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#95 sibutramine.hw.
#14 Behavior Modification [MeSH]	#58 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#96 sibutramine.hw.
#15 Social support [MeSH]	#59 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#97 sibutramine.hw.
#16 [psychological or behavior] or [therapy or model or strategy or intervention].hw.	#60 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#98 sibutramine.hw.
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#18 [therapy or intervention] or [therapy or intervention].hw.	#62 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#100 sibutramine.hw.
#19 Counseling [MeSH]	#63 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#101 sibutramine.hw.
#20 Directive counseling [MeSH]	#64 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#102 sibutramine.hw.
#21 counseling[MeSH]	#65 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#103 sibutramine.hw.
#22 social support[MeSH]	#66 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#104 sibutramine.hw.
#23 behavior modification[MeSH]	#67 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#105 sibutramine.hw.
#24 Motivation [MeSH]	#68 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#106 sibutramine.hw.
#25 children or parent or parent[MeSH].hw.	#69 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#107 sibutramine.hw.
#26 Diet Therapy [MeSH]	#70 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#108 sibutramine.hw.
#27 Diet, Fat Restriction [MeSH]	#71 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#109 sibutramine.hw.
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#29 Caloric restriction [MeSH]	#73 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#111 sibutramine.hw.
#30 diet or diet or dieting[MeSH]	#74 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#112 sibutramine.hw.
#31 low calorie or calorie control or healthy eating[MeSH]	#75 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#113 sibutramine.hw.
#32 feeding or nutritional status[MeSH]	#76 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#114 sibutramine.hw.
#33 exp Dietary Fats [MeSH]	#77 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#115 sibutramine.hw.
#34 exp Fruit [MeSH]	#78 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#116 sibutramine.hw.
#35 exp Vegetables [MeSH]	#79 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#117 sibutramine.hw.
#36 fruit or vegetable[MeSH]	#80 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#118 sibutramine.hw.
#37 exp exp low fat or low fat[MeSH].hw.	#81 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#119 sibutramine.hw.
#38 exp exp low fat or low fat[MeSH].hw.	#82 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#120 sibutramine.hw.
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#88 exp exp low fat or low fat[MeSH].hw.	#132 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#170 sibutramine.hw.
#89 exp exp low fat or low fat[MeSH].hw.	#133 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#171 sibutramine.hw.
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#91 exp exp low fat or low fat[MeSH].hw.	#135 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#173 sibutramine.hw.
#92 exp exp low fat or low fat[MeSH].hw.	#136 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#174 sibutramine.hw.
#93 exp exp low fat or low fat[MeSH].hw.	#137 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#175 sibutramine.hw.
#94 exp exp low fat or low fat[MeSH].hw.	#138 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#176 sibutramine.hw.
#95 exp exp low fat or low fat[MeSH].hw.	#139 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#177 sibutramine.hw.
#96 exp exp low fat or low fat[MeSH].hw.	#140 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#178 sibutramine.hw.
#97 exp exp low fat or low fat[MeSH].hw.	#141 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#179 sibutramine.hw.
#98 exp exp low fat or low fat[MeSH].hw.	#142 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#180 sibutramine.hw.
#99 exp exp low fat or low fat[MeSH].hw.	#143 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#181 sibutramine.hw.
#100 exp exp low fat or low fat[MeSH].hw.	#144 [aerobic or diet or dieting] or [diet or organ[MeSH].hw.	#182 sibutramine.hw.

## Cochrane Review

- 6,496 papers identified on title and key word search
- 206 retrieved for more detailed search
- 64 trials eligible for inclusion...

### 54 lifestyle interventions with a focus on:

- Diet (6)
- Physical activity & sedentary behaviour (12)
- Behaviour orientated treatment (36)

### 5 Australian Studies

- Golley *et al* (2007)
- McCallum *et al* (2007)
- Srinivasan *et al* (2006)
- Duffy *et al* (1993)
- Senediak *et al* (1985)

### 10 lifestyle + drug interventions

- Metformin (2)
- Orlistat (3)
- Sibutramine (5)

## Assessment of study quality

- Study design
- Statistical power
- Method of allocation concealment
- Blinding of outcome assessment
- Comparability of participant baseline variables
- Drop out rates between study arms

All 64 included studies had some methodological weaknesses and therefore did not fulfil all quality criteria

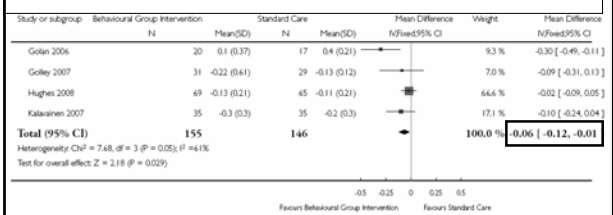
## Criteria for inclusion in meta-analyses

- Only like studies were pooled together i.e. comparable:
  - intervention content and duration
  - age group
  - outcomes (e.g. BMI-SDS, BMI) measured at the same time point (i.e. 6, 9, 12 or 24 months)
- Studies were eligible for inclusion in the meta-analysis if intention-to-treat principles were used.
- 8 separate meta-analyses were performed  
total studies included=12/64
- Results were reported independently if studies were not pooled

## So what were the main findings?!

## Lifestyle intervention versus self-help or control: children < 12 years

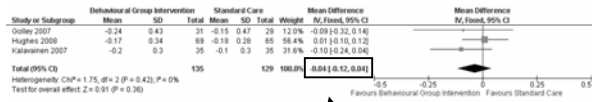
### Change in BMI-SDS at 6 months follow up



Oude Luttikhuis *et al*, 2009. Cochrane Review.

### Lifestyle intervention versus self-help or control: children < 12 years

Change in BMI-SDS at 12 months follow up was available for  
3/4 studies on the previous slide

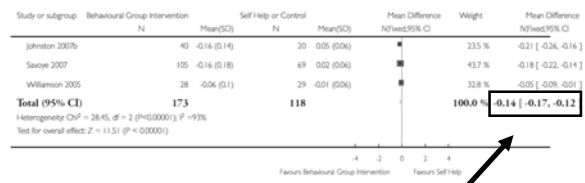


-0.06 (-0.12, -0.01)  
at 6 months (4 studies)

Oude Luttikhuis et al, 2009, Cochrane Review.

### Lifestyle intervention versus self-help or control: children ≥ 12 years

Change in BMI-SDS at 6 months follow up

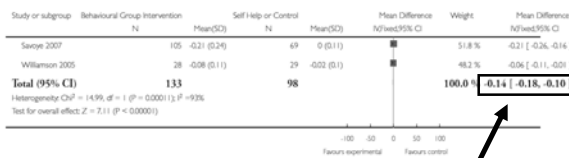


Change in BMI at 6 months (4 studies)  
-3.04 (-3.14, -2.94)

Oude Luttikhuis et al, 2009, Cochrane Review.

### Lifestyle intervention versus self-help or control: children ≥ 12 years

Change in BMI-SDS at 12 months follow up was available for  
2/3 studies shown on previous slide

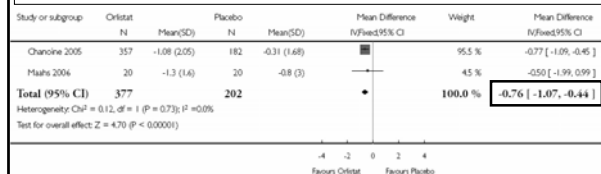


Change in BMI at 12 months (3 studies)  
-3.27 (-3.38, -3.17)

Oude Luttikhuis et al, 2009, Cochrane Review.

### Drug therapy – effect of orlistat: children ≥12 years

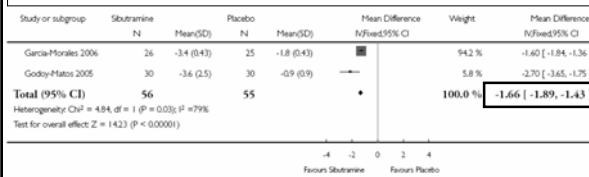
Change in BMI at 6 months follow up



Oude Luttikhuis et al, 2009, Cochrane Review.

### Drug therapy – effect of sibutramine: children ≥12 years

Change in BMI at 6 months follow up



Oude Luttikhuis et al, 2009, Cochrane Review.

### Implications for practice

## Family-based lifestyle interventions can be effective

- Family-based, lifestyle interventions with a behavioural program aimed at changing diet and physical activity provide significant and clinically meaningful decreases in overweight in both children and adolescents, compared to standard care or self-help, after 6 and 12 months.



## Obesity pharmacotherapy can be effective

- In obese adolescents, consideration should be given to the use of either orlistat or sibutramine, in the context of a lifestyle change program
- Such therapy needs to be carefully weighed up against the potential for adverse events

## Considerations

- Care needs to be taken in extrapolating implications for practice directly from one group to another.
- The majority of studies have been conducted in motivated, middle class, Caucasian populations.
- Attention needs to be given to:
  - social and economic circumstances
  - ethnicity and cultural factors
  - available resources for local health service delivery

## Limitations of included studies

- Validity issues remain:
  - number of studies had small sample sizes
  - relatively high drop-out rates
  - unadjusted outcome measurements
- Failure to address and measure important psychological and social factors hinders the potential to fully assess intervention effectiveness
- Other than in the drug trials, adverse effects of the interventions were infrequently considered
- Reporting of long-term outcomes beyond one year is limited

## Areas for improvement

- Development of appropriate and universally accepted short-and long-term outcomes for children of various weight levels
- Large multi-centre trials are needed to assess intervention efficacy in a range of cultural settings.
- Adherence to the Consolidated Standards of Reporting Trials (CONSORT) statement
- Incorporate and report on process evaluations
- Embed qualitative research within interventions
- Consider the cost-effectiveness of interventions

## Future research questions

- What interventions work best for:
  - Different levels of obesity severity, ages, & developmental stages?
  - Long-term maintenance of reduced weight following initial treatment of obesity?
  - Specific ethnicities, religious groups or culturally diverse populations?
- What family characteristics promote weight outcome success?
- What is the role of self-esteem & the family's capacity to change behaviour in effective treatment?

- What are the most cost- and resource-effective methods of treating paediatric obesity in different health care settings?
- What is the role of bariatric surgery in the treatment of severely obese adolescents?
- What are the potential harms as well as benefits of different interventions?

## Interventions for preventing obesity in children.

Summerbell CD, Waters E, Edmunds LD, Kelly S, Brown T, Campbell KJ.  
Cochrane Database Syst Rev. 2005 Jul 20;(3):CD001871.

- **SELECTION CRITERIA:** RCTs and controlled clinical trials, minimum duration 12 weeks, published between 1990-2005.
- **MAIN RESULTS:**
  - 22 studies included; 10 long-term (at least 12 months) and 12 short-term (12 weeks to 12 months).
  - 19 school/preschool-based interventions, 1 community-based intervention targeting low-income families, and 2 family-based interventions
  - Studies that combined dietary and physical activity approaches did not significantly improve BMI.
  - Some studies that focused on dietary or physical activity approaches showed a small but positive impact on BMI status.
  - Nearly all studies included resulted in some improvement in diet or physical activity.
- **Limitations**
  - Heterogeneous studies: in terms of study design, quality, target population, theoretical underpinning, and outcome measures, making it impossible to combine study findings using statistical methods.
- **Recommendations**
  - Appropriateness of design, duration and intensity of interventions to prevent obesity in childhood needs to be reconsidered alongside comprehensive reporting of the intervention scope and process

## What's happening in Australia?

## Treatment trials

<http://www.acaorn.med.usyd.edu.au/streams/management/trials/index.php>

The screenshot shows the ACAORN website interface. The main navigation bar includes 'Home', 'About ACAORN', and 'Childhood obesity streams'. Below this, there are tabs for 'At a glance', 'Management', 'Prevention', 'Outcomes & complications', 'Food & nutrition', and 'Physical activity'. The 'Management' section is active, displaying a list of Australian trials regarding treatment and management of child and adolescent obesity. The trials listed include:
 

- Metformin treatment of obesity and insulin resistance
- KOALA
- Community-based weight management of overweight and obese adolescents: The Lookit trial
- The LEAP (Live, Eat & Play) Study
- Parenting, eating, activity for child health: PEACH
- HOPSOTCH
- The 'Eat Smart' study
- RESIST
- HBCURS
- Wollongong Sport
- WASPA
- An intervention to reduce sedentary behaviour, promote physical activity and improve children's health

 A 'Listing trials' sidebar on the right provides a brief overview of the network's interest in high-quality Australian trials.

## Prevention trials

<http://www.acaorn.med.usyd.edu.au/streams/prevention/studies/index.php>

The screenshot shows the ACAORN website interface for prevention studies. The main navigation bar is similar to the treatment trials page. The 'Prevention' section is active, displaying a list of Australian studies regarding prevention of child and adolescent obesity. The studies listed include:
 

- Healthy Beginnings Trial
- Evaluation of the 'Healthy Dads, Healthy Kids' study: An RCT targeting overweight dads
- APPLE Study: A Pilot Programme for Lifestyle and Exercise
- Prevention of Overweight in Infancy POI.nz
- The FSA Program: The Fitness Improvement and Lifestyle Awareness Program RCT
- The Wollongong Sport pilot randomised controlled trial: Single-sex after-school activity program for overweight and at-risk of overweight 8- to 11-year-old children
- The Melbourne Infant Feeding Activity and Nutrition Trial (InfANT) Program
- Promoting Physical Activity and Preventing Obesity in Economically Disadvantaged Schools: The Physical Activity Leaders Program for Adolescent Boys
- Pacific GPIC study
- Kump & Chong
- Jump Start - A physical activity program for preschool children
- NOURISH - Positive feeding practices and food preference in very young children: an innovative approach to obesity prevention

 A 'Listing Studies' sidebar on the right provides information about the network's interest in identifying current obesity prevention activities for children and adolescents in Australia and New Zealand.

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