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Diet, physical activity and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years (Review)

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TABLE OF CONTENTS

[Intervention Review]

Diet, physical activity and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years

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ABSTRACT

Background

Child and adolescent overweight and obesity has increased globally, and can be associated with significant short- and long-term health consequences. This is an update of a Cochrane review published first in 2003, and updated previously in 2009. However, the update has now been split into six reviews addressing different childhood obesity treatments at different ages.

Objectives

To assess the effects of diet, physical activity and behavioural interventions (behaviour-changing interventions) for the treatment of overweight or obese children aged 6 to 11 years.

Search methods

We searched CENTRAL, MEDLINE, Embase, PsycINFO, CINAHL, LILACS as well as trial registers ClinicalTrials.gov and ICTRP Search Portal. We checked references of studies and systematic reviews. We did not apply any language restrictions. The date of the last search was July 2016 for all databases.

Selection criteria

We selected randomised controlled trials (RCTs) of diet, physical activity, and behavioural interventions (behaviour-changing interventions) for treating overweight or obese children aged 6 to 11 years, with a minimum of six months' follow-up. We excluded interventions that specifically dealt with the treatment of eating disorders or type 2 diabetes, or included participants with a secondary or syndromic cause of obesity.

Data collection and analysis

Two review authors independently screened references, extracted data, assessed risk of bias, and evaluated the quality of the evidence using the GRADE instrument. We contacted study authors for additional information. We carried out meta-analyses according to the statistical guidelines in the *Cochrane Handbook for Systematic Reviews of Interventions*.

Main results

We included 70 RCTs with a total of 8461 participants randomised to either the intervention or control groups. The number of participants per trial ranged from 16 to 686. Fifty-five trials compared a behaviour-changing intervention with no treatment/usual care control and 15 evaluated the effectiveness of adding an additional component to a behaviour-changing intervention. Sixty-four trials were parallel RCTs, and four were cluster RCTs. Sixty-four trials were multicomponent, two were diet only and four were physical activity only interventions. Ten trials had more than two arms. The overall quality of the evidence was low or very low and 62 trials had a high risk of bias for at least one criterion. Total duration of trials ranged from six months to three years. The median age of participants was 10 years old and the median BMI z score was 2.2.

Primary analyses demonstrated that behaviour-changing interventions compared to no treatment/usual care control at longest follow-up reduced BMI, BMI z score and weight. Mean difference (MD) in BMI was -0.53 kg/m^2 (95% confidence interval (CI) -0.82 to -0.24); P < 0.00001; 24 trials; 2785 participants; low-quality evidence. MD in BMI z score was -0.06 units (95% CI -0.10 to -0.02); P = 0.001; 37 trials; 4019 participants; low-quality evidence and MD in weight was -1.45 kg (95% CI -1.88 to -1.02); P < 0.00001; 17 trials; 1774 participants; low-quality evidence.

Thirty-one trials reported on serious adverse events, with 29 trials reporting zero occurrences RR 0.57 (95% CI 0.17 to 1.93); P = 0.37; 4/2105 participants in the behaviour-changing intervention groups compared with 7/1991 participants in the comparator groups). Few trials reported health-related quality of life or behaviour change outcomes, and none of the analyses demonstrated a substantial difference in these outcomes between intervention and control. In two trials reporting on minutes per day of TV viewing, a small reduction of 6.6 minutes per day (95% CI -12.88 to -0.31), P = 0.04; 2 trials; 55 participants) was found in favour of the intervention. No trials reported on all-cause mortality, morbidity or socioeconomic effects, and few trials reported on participant views; none of which could be meta-analysed.

As the meta-analyses revealed substantial heterogeneity, we conducted subgroup analyses to examine the impact of type of comparator, type of intervention, risk of attrition bias, setting, duration of post-intervention follow-up period, parental involvement and baseline BMI z score. No subgroup effects were shown for any of the subgroups on any of the outcomes. Some data indicated that a reduction in BMI immediately post-intervention was no longer evident at follow-up at less than six months, which has to be investigated in further trials.

Authors' conclusions

Multi-component behaviour-changing interventions that incorporate diet, physical activity and behaviour change may be beneficial in achieving small, short-term reductions in BMI, BMI z score and weight in children aged 6 to 11 years. The evidence suggests a very low occurrence of adverse events. The quality of the evidence was low or very low. The heterogeneity observed across all outcomes was not explained by subgrouping. Further research is required of behaviour-changing interventions in lower income countries and in children from different ethnic groups; also on the impact of behaviour-changing interventions on health-related quality of life and comorbidities. The sustainability of reduction in BMI/BMI z score and weight is a key consideration and there is a need for longer-term follow-up and further research on the most appropriate forms of post-intervention maintenance in order to ensure intervention benefits are sustained over the longer term.

PLAIN LANGUAGE SUMMARY

Diet, physical activity and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years

Review question

How effective are diet, physical activity and behavioural interventions in reducing the weight of overweight or obese children aged 6 to 11 years?

Background

Across the world more children are becoming overweight and obese. These children are more likely to suffer from health problems, both while as children and in later life. More information is needed about what works best for treating this problem.

Study characteristics

We found 70 randomised controlled trials (clinical trials where people are randomly put into one of two or more treatment groups) comparing diet, physical activity, and behavioural (where habits are changed or improved) treatments to a variety of control groups delivered to 8461 overweight or obese children aged 6 to 11 years. We reported on the effects of 64 multicomponent interventions (different combinations of diet and physical activity and behaviour change), four physical activity interventions and two dietary interventions

compared with no intervention, 'usual care' or some other therapy if it was also delivered in the intervention arm. The children in the included studies were followed up between six months and three years.

Key results

The average age of the children was 10 years. Most studies reported the body mass index (BMI) z score: BMI is a measure of body fat and is calculated by dividing weight (in kilograms) by the square of the body height measured in metres (kg/m^2). In children, BMI is often measured in a way that takes into account sex and age, weight, and height changes as children grow older (BMI z score).

We summarised the results of 37 trials in 4019 children reporting the BMI z score, which on average was 0.06 units lower in the intervention groups compared with the control groups. We summarised the results of 24 trials in 2785 children reporting BMI, which on average was 0.53 kg/m^2 lower in the intervention groups compared with the control groups. We summarised the results of 17 trials in 1774 children reporting weight, which on average was 1.45 kg lower in the intervention groups compared with the control groups.

Other effects of the interventions, such as improvements in health-related quality of life were less clear. No study investigated death from any cause, morbidity or socioeconomic effects. Serious adverse events were rare: only two of 31 trials with data reported any serious adverse events (4/2105 participants in the behaviour-changing intervention groups compared with 7/1991 participants in the comparator groups). This evidence is up to date as of July 2016.

Quality of the evidence

The overall quality of the evidence was low or very low, mainly because of limited confidence in how studies were performed, and the results were inconsistent between the studies. Also there were just a few studies for some outcomes, with small numbers of included children.

SUMMARY OF FINDINGS

Summary of findings for the main comparison. Diet, physical activity and behavioural interventions for the treatment of overweight or obesity in children aged 6 to 11 years

Diet, physical activity and behavioural interventions for the treatment of overweight or obesity in children aged 6 to 11 years

Population: children (aged 6 to 11 years) being overweight or obese

Settings: various

Intervention: behaviour-changing interventions (behavioural, diet and/or physical activity components)

Comparison: no treatment or usual care

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	No treatment or usual care	Behaviour-changing intervention				
Change in BMI (kg/m^2) Follow-up: 6 to 36 months	The mean change in BMI ranged across control groups from -0.3 to 2.8 kg/m2	The mean change in BMI in the intervention groups was **0.53 kg/m^2 lower** (0.82 lower to 0.24 lower)	-	2785 (24) 4019 (37)	⊕⊕⊝⊝ **low**[a]	Lower units indicate weight loss
Change in BMI z score[b] **(units)** Follow-up: 6 to 36 months	The mean change in BMI z score ranged across control groups from -1.1 to 0.26 units	The mean change in BMI z score in the intervention groups was **0.06 units lower** (0.10 lower to 0.02 lower)		1774 (17)	⊕⊕⊝⊝ **low**[a]	Lower units indicate weight loss
Change in weight (kg) Follow-up: 6 to 36 months	The mean change in weight ranged across control groups from 1.95 to 17.1 kg	The mean change in weight in the intervention group was **1.45 kg lower** (1.88 lower to 1.02 lower)				
Adverse events (serious adverse events) Follow-up: 0 to 36 months	**4 per 1000**	**2 per 1000** (1 to 7)	RR 0.57 (0.17 to 1.93)	4096 (31)	⊕⊕⊝⊝ **low**[c]	No adverse events occurred in 29 trials. Only two of 31 trials with data reported the occurrence of serious adverse events

Change in health-related quality of life (SMD) **Parent-reported measures** Instruments: PedsQL parent proxy: 23 items that yield total, physical summary, and psychosocial summary scores, each with a possible range of 0-100 (100 = best possible health); Child Health Questionnaire, parent version (CHQ-PF50), physical and psychosocial concepts Follow-up: 6 to 15 months **Child-reported measures** Instrument: PedsQLchild self-report: 23 items that yield total, physical summary, and psychosocial summary scores, each with a possible range of 0-100 (100 = best possible health); KINDL-R questionnaire: total score includes domains of well-being, emotional well-being, self-esteem, family, friends, school. 5-point Likert scale Follow-up: 6 months	The mean in caregiver PedsQL ranged across control groups from -4.2 units to 3.6 units The mean in child PedsQL ranged across control groups from -1.4 units to 4.01 units	The SMD in caregiver PedsQL in the intervention groups was **0.13 units higher** (0.06 lower to 0.32 higher) The mean change in child PedsQL in the intervention group was **0.15 units higher** (0.34 lower to 0.64 higher)	-	718 (5) 164 (3)	⊕⊕⊖⊖ **low**[d] ⊕⊖⊖⊖ **very low**[e]	Higher units indicate improvements. The minimal clinically important difference (MCID) for a PedsQL parents' proxy report is 4.50 raw units. When converting the SMD back to raw units, the MCID was not met in either meta-analysis Higher units indicate improvements. The minimal clinically important difference (MCID) for a PedsQL child's self-report is 4.36 raw units. When converting the SMD back to raw units, the MCID was not met in either meta-analysis
All-cause mortality	See comment	See comment	See comment	See comment	See comment	No deaths were reported in any of the trials
Morbidity	See comment	See comment	See comment	See comment	See comment	No trials reported morbidity
Socioeconomic effects	See comment	See comment	See comment	See comment	See comment	No trials reported socioeconomic effects

*The basis for the **assumed risk** (e.g. the median control group risk across studies) was derived from the event rates in the comparator groups. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
BMI: body mass index;**CI:** confidence interval; **PedsQL:** Pediatric Quality of Life Inventory;**RR:** risk ratio; **SMD:** standardised mean difference

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

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[a]Downgraded by two levels because of risk of performance and detection bias and inconsistency - see Appendix 12.
[b]"A BMI z score or standard deviation score indicates how many units (of the standard deviation) a child's BMI is above or below the average BMI value for their age group and sex. For instance, a z score of 1.5 indicates that a child is 1.5 standard deviations above the average value, and a z score of -1.5 indicates a child is 1.5 standard deviations below the average value" (NOO NHS 2011).
[c]Downgraded by two levels because of risk of performance and detection bias, and imprecision (low event rate) - see Appendix 12
[d]Downgraded by two levels due to risk of bias (performance bias and a subjective measure used) and inconsistency (inconsistent direction of effect) - see Appendix 12
[e]Downgraded by three levels due to risk of bias (performance bias and a subjective measure used), inconsistency (inconsistent direction of effect) and imprecision (small sample size and number of studies) - see Appendix 12

BACKGROUND

The prevalence of overweight and obese children and adolescents has increased throughout the world, presenting a global public health crisis (Ng 2014; WHO 2015). Although once considered to be a condition affecting only high-income countries, rates of paediatric overweight and obesity have recently started to rise dramatically in some low- and middle-income countries (Wang 2012). Using the International Obesity Task Force (IOTF) standard definition, the age-standardised prevalence of overweight and obesity in children and adolescents has increased in low-, middle-, and high-income countries over the last 30 years (Cole 2000). In 2013, the prevalence of overweight and obese children and adolescents in high-income countries was estimated at 23.8% (95% confidence interval (CI) 22.9 to 24.7) for boys and 22.6% (95% CI 21.7 to 23.6) for girls. In low- and middle-income countries, the prevalence was estimated as 12.9% (95% CI 12.3 to 13.5) for boys and 13.4% (95% CI 13 to 13.9) for girls (Ng 2014).

Inequalities in overweight and obesity prevalence have also been documented. Generally, socioeconomically disadvantaged children in high-income countries (Knai 2012; NCB 2015; Shrewsbury 2008), and children of higher socioeconomic status in low- and middle-income countries (Lobstein 2004; Wang 2012), are at greater risk of becoming overweight. However, this relationship may vary by population demographics (for example age, gender, ethnicity), and environment (for example country, urbanisation) (Wang 2012). The prevalence of obesity has been shown to vary by ethnicity, with large data sets showing substantial ethnic variation in English (HSCIC 2013), American (Freedman 2006; Skinner 2014), and New Zealand (Rajput 2014) child populations.

Whilst there is some evidence that the rate of increase in paediatric obesity may be slowing in some high-income countries, current levels remain too high, and continue to rise in many low- and middle-income countries (Olds 2011; Rokholm 2010). However, an additional concern in some high-income countries such as the USA, in Kelly 2013 and Skinner 2014, and the UK, in CMO 2015 and Ells 2015a, is the rise in severe paediatric obesity. Whilst the IOTF published an international definition for severe paediatric (morbid) obesity in 2012 (Cole 2012), often severe obesity prevalence is reported using country-specific cut points, making international comparisons difficult. However, data from the USA, in Skinner 2014, and England, in Ells 2015a, have shown that the prevalence of severe paediatric obesity varies by socioeconomic status and ethnicity, and may result in a greater risk of adverse cardiometabolic events and severe obesity in adulthood (Kelly 2013).

Description of the condition

Childhood overweight and obesity results from an accumulation of excess body fat, and can increase the risk of both short- and longer-term health consequences. Numerous obesity-related comorbidities can develop during childhood, which include muscular skeletal complaints (Paulis 2014); cardiovascular risk factors such as hypertension, insulin resistance, and hyperlipidaemia (Reilly 2003), even in very young children (Bocca 2013); motor and developmental delays (Cataldo 2016); and conditions such as sleep apnoea (Narang 2012), asthma (Egan 2013), liver disease, and type 2 diabetes (Daniels 2009b; Lobstein 2004). The condition can also affect psychosocial well-being, with obese young people being susceptible to reduced self esteem and quality of life (Griffiths 2010), as well as stigmatisation (Puhl 2007; Tang-Peronard 2008). Evidence also shows that childhood obesity can track into adulthood (Parsons 1999; Singh 2008; Whitaker 1997), and is therefore associated with an increased risk of ill health later in life (Reilly 2011).

Description of the intervention

Given the serious implications associated with childhood and adolescent obesity, effective treatment is imperative. Whilst the fundamental principles of weight management in children and adolescents are the same as in adults (that is, reduced energy intake and increased energy expenditure), the primary aim of treatment (that is, weight reduction or deceleration of weight gain) and the most suitable intervention approach vary, and are dependent on the child's age and degree of excess weight, among other considerations. Family-based interventions combining dietary, physical activity, and behavioural components have been shown to be effective and are considered the current best practice in the treatment of childhood obesity in children under 12 years of age (Oude Luttikhuis 2009).

Adverse effects of the intervention

It is not anticipated that diet, physical activity, and behavioural interventions will lead to adverse outcomes. However, as with all obesity treatment interventions in children and young people, potential adverse effects should be considered, including effects on linear growth, eating disorders and psychological well-being.

How the intervention might work

Obesity is a complex multifactorial condition with numerous possible biological, behavioural and environmental determinants (Butland 2007). Many children now grow up in an obesogenic environment that promotes energy imbalance through the marketing, affordability and availability of energy dense foods, coupled with decreases in physical activity and increases in screen-based sedentary pursuits (Kremers 2006). Therefore, behaviour-changing interventions that aim to improve dietary intake, increase physical activity levels and reduce sedentary behaviours are often prescribed, and were recommended as a treatment option for childhood obesity in the preceding Cochrane Review on the treatment of child and adolescent obesity (Oude Luttikhuis 2009). Behaviour-changing interventions may target just one behavioural component (e.g. diet, physical activity or sedentary behaviour) or combine several components, and are often supported by theory-based behaviour-change techniques to help sustain positive changes and prevent relapse. As the family environment (e.g. home activities, meal times and availability of unhealthy food) plays an important role in the aetiology of obesity, parents can be defined as the 'agents for change' particularly in children under 12 years of age (Golan 2004). Given the number of interacting components, difficulty of the target behaviours and variability in possible outcomes, behaviour-changing interventions are regarded as 'complex interventions' (Craig 2008).

Why it is important to do this review

The first version of this systematic review was published in 2003 and included analysis of childhood obesity treatment trials published up until July 2001 (Summerbell 2003). The second version was published in 2009, updating the 2003 review (Oude Luttikhuis 2009).

To reflect the rapid growth in this field, the third update to this review has been split across six reviews focusing on the following treatment approaches: surgery (Ells 2015b); drugs (Mead 2016a); parent-only interventions (Loveman 2015); diet, physical activity, and behavioural interventions for young children up to the age of six years (Colquitt 2016); schoolchildren aged 6 to 11 years; and adolescents aged 12 to 17 years.

The current review examines the effects of interventions for school-aged children aged from 6 years to 11 years. The results of this current review and other systematic reviews in this series will provide information on which to underpin clinical guidelines and health policy on the treatment of childhood obesity.

OBJECTIVES

To assess the effects of diet, physical activity and behavioural interventions (behaviour-changing interventions) for the treatment of overweight or obese children aged 6 to 11 years.

METHODS

Criteria for considering studies for this review

Types of studies

We included randomised controlled trials (RCTs) or cluster RCTs. Included studies observed participants for a minimum of six months (this time frame refers to the intervention itself or to a combination of the intervention with a follow-up phase).

Types of participants

Overweight or obese participants, with a mean age of six years and over, and under 12 years at the commencement of the intervention. Trials involving participants with comorbid disorders were eligible for inclusion as long as the primary focus of the intervention was to treat overweight and obese children. Parents could be involved in the intervention; however, interventions focused solely on the parents (with no child involvement) were excluded from this review as they are evaluated in another Cochrane Review: 'Parent-only interventions for childhood overweight or obesity' (Loveman 2015).

Types of interventions

Any behaviour-changing intervention (with any one or any combination of behavioural, nutritional and physical activity component) delivered as a single or multicomponent intervention, in any setting, using any delivery method, which aimed to treat paediatric obesity using any of the following intervention versus control sequences.

Intervention

- Behaviour-changing intervention (any forms of dietary, physical activity and/or behavioural therapy delivered as single- or multicomponent interventions)

Comparator

- No treatment (including wait-list control)
- Usual care
- Concomitant intervention (another behaviour-changing intervention, which was also delivered in the intervention group).

Minimum duration of intervention

No restriction on the length of intervention

Minimum duration of follow-up

Minimal duration of follow-up was six months from baseline.

Specific exclusion criteria

- Studies with pregnant participants
- Studies that included critically ill participants
- Interventions that specifically dealt with the treatment of eating disorders or type 2 diabetes
- Studies that included participants with a secondary or syndromic cause of obesity

Types of outcome measures

We did not exclude trials if one or several of the review primary or secondary outcomes were not reported.

Primary outcomes

- Changes in measured (not self-reported) body mass index (BMI), BMI z score and weight
- Adverse events

Secondary outcomes

- Health-related quality of life
- Self-esteem
- All-cause mortality
- Morbidity
- Anthropometric measures other than change in BMI, BMI z score and weight
- Behaviour change
- Participants' views of the intervention
- Socioeconomic effects

Method and timing of outcome measurement

- Changes in BMI (kg/m^2) and body weight (kg): measured at baseline and any time-point from six months' follow-up.
- Adverse events: defined as adverse outcome that occurs during or after the intervention but is not necessarily caused by it and measured at any time-point after the start of the intervention.
- Health-related quality of life: evaluated by a validated instrument such as Paediatric Quality of Life Inventory and measured at baseline and any time point from six months.
- Self-esteem: evaluated by a validated instrument and measured at baseline and any time point from six months.
- All-cause mortality: measured at any time-point after the start of the intervention.
- Morbidity: defined as illness or harm associated with the intervention and measured at baseline and any time point from six months' follow-up.
- Anthropometric measures other than change in BMI: defined by the use of validated tools (such as waist circumference, skin fold thickness, waist-to-hip ratio, dual X-ray absorptiometry or bioelectrical impedance analysis) and measured at baseline and any time point from six months' follow-up.

- Behaviour change: defined as validated measures of diet or physical activity and measured at baseline and any time point from six months' follow-up.
- Participants' views of the intervention: defined as documented or accounts from participant feedback and measured at baseline and any time point from six months' follow-up.
- Socioeconomic effects: defined as a validated measure of socioeconomic status such as parental income or educational status and measured at baseline and at least at six months.

Summary of findings

We have presented a 'Summary of findings' table to report the following outcomes, listed according to priority.

- Changes in BMI, BMI z score and weight
- Adverse events
- Health-related quality of life
- All-cause mortality
- Morbidity
- Socioeconomic effects

Search methods for identification of studies

Electronic searches

On 14 July 2016 we searched the following sources from inception of each database and placed no restrictions on the language of publication.

- Cochrane Central Register of Controlled Trials (CENTRAL; 2016, issue 6,) in the Cochrane Library
- Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) (from 1946 to Present)
- Embase Ovid (1974 to 2016 Week 28)
- PsycINFO (1806 to July Week 1 2016)
- CINAHL
- LILACS (Latin American and Caribbean Health Science Information database) (last update 08/07/2016)
- ClinicalTrials.gov (www.clinicaltrials.gov)
- World Health Organization International Clinical Trials Registry Platform (ICTRP) (www.who.int/trialsearch/)

For details on search strategies and search platforms see Appendix 1.

Searching other resources

We tried to identify other potentially eligible trials or ancillary publications by searching the reference lists of retrieved included trials, (systematic) reviews, meta-analyses and health technology assessment reports. We also contacted study authors of included trials to identify any further studies that we may have missed.

Data collection and analysis

Selection of studies

Two review authors (two of CO, EC, EM, KR, LA, LA-K, LE) independently scanned the abstract, title, or both, of every record we retrieved in the literature searches, to determine which trials we should assess further. We obtained the full texts of all potentially-relevant records. We resolved any discrepancies through consensus or by recourse to a third review author (EM, LE, TB). We have presented a PRISMA flow-chart showing the process of trial selection (Liberati 2009).

Data extraction and management

For trials that fulfilled our inclusion criteria, two review authors (two of CO, DJ, EB, EC, EM, GM, JO, KR, LA, LA-K, LB, LE, TB) independently abstracted key participant and intervention characteristics. We reported data on efficacy outcomes and adverse events using standard data extraction sheets from Cochrane Metabolic and Endocrine Disorders. We resolved any disagreements by discussion or, if required, by consultation with a third review author (EM, KR, LE, TB) for details, see Characteristics of included studies; Appendix 2; Appendix 3; Appendix 4; Appendix 5; Appendix 6; Appendix 7; Appendix 8; Appendix 9; Appendix 10; Appendix 11).

We have provided information including trial identifier about potentially relevant ongoing studies in the Characteristics of ongoing studies table. We attempted to locate the protocol of each included study and reported primary, secondary and other outcomes in comparison with data in publications in Appendix 6.

We attempted to email all authors of included trials to enquire whether they were willing to answer questions regarding their trials; Appendix 11 shows the results of this survey. Thereafter, we sought relevant missing information on the trial from the primary author(s) of the article, if required.

Dealing with duplicate and companion publications

In the event of duplicate publications, companion documents or multiple reports of a primary trial, we tried to maximise yield of information by collating all available data, and used the most complete dataset aggregated across all known publications.

We listed duplicate publications, companion documents, multiple reports of a primary trial and trial documents of included trials (such as trial registry information) as secondary references under the study ID of the included trial. Furthermore, we also listed duplicate publications, companion documents, multiple reports of a trial and trial documents of excluded trials (such as trial registry information) as secondary references under the study ID of the excluded trial.

Data from clinical trial registers

In case data from included trials were available as study results in clinical trials registers such as ClinicalTrials.gov or similar sources, we made full use of this information and extracted data. If there was also a full publication of the trial, we collated and critically appraised all available data. If an included trial was marked as a completed study in a clinical trials register but no additional information (study results, publication or both) was available, we added this trial to the table Characteristics of studies awaiting classification.

Assessment of risk of bias in included studies

Two review authors (two of EM, TB, LE, KR, DJ, JO, GM, EC, CO, EB, LA, LA-K, LB) independently assessed the risk of bias of each included trial. We resolved any disagreements by consensus or by consultation with a third review author (EM, TB, LE, KR). In case

of disagreement, we consulted the rest of the group and made a judgement based on consensus. If adequate information was not available from trial authors, trial protocols, or both we contacted trial authors for missing data on 'Risk of bias' items.

We used the Cochrane 'Risk of bias' assessment tool (Higgins 2011a) and judged 'Risk of bias' criteria as having low, high, or unclear risk. We evaluated individual bias items as described in the *Cochrane Handbook for Systematic Reviews of Interventions* according to the criteria and associated categorisations contained therein (Higgins 2011b).

Random sequence generation (selection bias due to inadequate generation of a randomised sequence) - assessment at trial level

For each included trial we described the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups.

- Low risk of bias: the trial authors achieved sequence generation using computer-generated random numbers or a random numbers table. Drawing of lots, tossing a coin, shuffling cards or envelopes, and throwing dice are adequate if an independent person performed this who was not otherwise involved in the trial. We considered the use of the minimisation technique as equivalent to being random.
- Unclear risk of bias: insufficient information about the sequence generation process.
- High risk of bias: the sequence generation method was non-random or quasi-random (e.g. sequence generated by odd or even date of birth; sequence generated by some rule based on date (or day) of admission; sequence generated by some rule based on hospital or clinic record number; allocation by judgement of the clinician; allocation by preference of the participant; allocation based on the results of a laboratory test or a series of tests; or allocation by availability of the intervention).

Allocation concealment (selection bias due to inadequate concealment of allocation prior to assignment) - assessment at trial level

We described for each included trial the method used to conceal allocation to interventions prior to assignment and assessed whether intervention allocation could have been foreseen in advance of or during recruitment, or changed after assignment.

- Low risk of bias: central allocation (including telephone, interactive voice-recorder, web-based and pharmacy-controlled randomisation); sequentially-numbered drug containers of identical appearance; sequentially-numbered, opaque, sealed envelopes.
- Unclear risk of bias: insufficient information about the allocation concealment.
- High risk of bias: using an open random allocation schedule (e.g. a list of random numbers); assignment envelopes were used without appropriate safeguards; alternation or rotation; date of birth; case record number; any other explicitly unconcealed procedure.

Blinding of participants and study personnel (performance bias due to knowledge of the allocated interventions by participants and personnel during the trial) - assessment at outcome level

We evaluated the risk of detection bias separately for self-reported ('subjective outcomes') versus investigator-assessed ('objective outcomes') outcomes (Hróbjartsson 2013). We noted whether endpoints were self-reported, investigator-assessed or adjudicated outcome measures (see below).

- Low risk of bias: blinding of participants and key study personnel is ensured, and it was unlikely that the blinding could have been broken; no blinding or incomplete blinding, but we judge that the outcome is unlikely to have been influenced by lack of blinding.
- Unclear risk of bias: insufficient information about the blinding of participants and study personnel; the trial does not address this outcome.
- High risk of bias: no blinding or incomplete blinding, and the outcome is likely to have been influenced by lack of blinding; blinding of trial participants and key personnel attempted, but likely that the blinding could have been broken, and the outcome was likely to be influenced by lack of blinding.

Blinding of outcome assessment (detection bias due to knowledge of the allocated interventions by outcome assessment) - assessment at outcome level

We evaluated the risk of detection bias separately for self-reported ('subjective outcomes') versus investigator-assessed ('objective outcomes') outcomes (Hróbjartsson 2013). We noted whether endpoints were self reported, investigator-assessed or adjudicated outcome measures (see below).

- Low risk of bias: blinding of outcome assessment is ensured, and it was unlikely that the blinding could have been broken; no blinding of outcome assessment, but we judge that the outcome measurement was unlikely to have been influenced by lack of blinding.
- Unclear risk of bias: insufficient information about the blinding of outcome assessors; the trial did not address this outcome.
- High risk of bias: no blinding of outcome assessment, and the outcome measurement was likely to have been influenced by lack of blinding; blinding of outcome assessment, but likely that the blinding could have been broken, and the outcome measurement was likely to be influenced by lack of blinding.

Incomplete outcome data (attrition bias due to amount, nature or handling of incomplete outcome data) - assessment at outcome level

For each included trial and for self-reported ('subjective outcomes') versus investigator-assessed ('objective outcomes') outcomes, we described the completeness of data, including attrition and exclusions from the analyses. We stated whether the trial reported attrition and exclusions, and the number of participants included in the analysis at each stage (compared with the number of randomised participants per intervention/comparator groups). We also noted if the trial reported the reasons for attrition or exclusion and whether missing data were balanced across groups or were related to outcomes. We considered the implications of missing outcome data per outcome such as high dropout rates (e.g. above

15%) or disparate attrition rates (e.g. difference of 10% or more between trial arms).

- Low risk of bias: no missing outcome data; reasons for missing outcome data unlikely to be related to true outcome (for survival data, censoring unlikely to introduce bias); missing outcome data balanced in numbers across intervention groups, with similar reasons for missing data across groups; for dichotomous outcome data, the proportion of missing outcomes compared with observed event risk was not enough to have a clinically-relevant impact on the intervention effect estimate; for continuous outcome data, plausible effect size (mean difference or standardised mean difference) among missing outcomes is not enough to have a clinically relevant impact on observed effect size; appropriate methods, such as multiple imputation, were used to handle missing data.
- Unclear risk of bias: insufficient information to assess whether missing data in combination with the method used to handle missing data were likely to induce bias; the trial did not address this outcome.
- High risk of bias: reason for missing outcome data was likely to be related to true outcome, with either imbalance in numbers or reasons for missing data across intervention groups; for dichotomous outcome data, the proportion of missing outcomes compared with observed event risk enough to induce clinically-relevant bias in intervention effect estimate; for continuous outcome data, plausible effect size (mean difference or standardised mean difference) among missing outcomes enough to induce clinically-relevant bias in observed effect size; 'as-treated' or similar analysis done with substantial departure of the intervention received from that assigned at randomisation; potentially inappropriate application of simple imputation.

Selective reporting (reporting bias due to selective outcome reporting) - assessment at trial level

We assessed outcome reporting bias by integrating the results of Appendix 5, 'Matrix of trial endpoints (publications and trial documents)' (Boutron 2014; Jones 2015b; Mathieu 2009), with those of Appendix 6, 'High risk of outcome reporting bias according to ORBIT classification' (Kirkham 2010). This analysis formed the basis for the judgement of selective reporting.

- Low risk of bias: the trial protocol was available and all of the trial's pre-specified (primary and secondary) outcomes that were of interest in the review had been reported in the pre-specified way; the study protocol was unavailable, but it was clear that the published reports included all expected outcomes (ORBIT classification).
- Unclear risk of bias: insufficient information about selective reporting.
- High risk of bias: not all of the trial's pre-specified primary outcomes review were reported incompletely so that we could not enter them in a meta-analysis; the trial report failed to include results for a key outcome that we would expected to have been reported for such a trial (ORBIT classification).

Other bias (bias due to problems not covered elsewhere) - assessment at trial level

- Low risk of bias: the trial appears to be free of other sources of bias.
- Unclear risk of bias: there was insufficient information to assess whether an important risk of bias existed; insufficient rationale or evidence that an identified problem introduced bias.
- High risk of bias: the trial has a potential source of bias related to the specific trial design used; the trial has been claimed to have been fraudulent; or the trial had some other serious problem.

We have presented a 'Risk of bias' graph and a 'Risk of bias' summary figure.

We distinguished between self-reported, investigator-assessed and adjudicated outcome measures.

We defined the following endpoints as potentially self-reported outcomes.

- Adverse events, if reported by participants
- Health-related quality of life
- Self-esteem
- Participants views of the intervention
- Behaviour change, if reported by participants

We defined the following outcomes as potentially investigator-assessed outcomes.

- Changes in BMI and weight, if measured by trial personnel
- Adverse events, if measured by trial personnel
- All-cause mortality
- Morbidity
- Behaviour change, if measured by trial personnel

Summary assessment of risk of bias

Risk of bias for a trial across outcomes: some 'Risk of bias' domains such as selection bias (sequence generation and allocation sequence concealment), affect the risk of bias across all outcome measures in a trial. In case of high risk of selection bias, we marked all endpoints investigated in the associated trial as high risk. Otherwise, we did not perform a summary assessment of the risk of bias across all outcomes for a trial.

Risk of bias for an outcome within a trial and across domains: we assessed the risk of bias for an outcome measure by including all entries relevant to that outcome (i.e. both trial-level entries and outcome-specific entries). We considered low risk of bias to denote a low risk of bias for all key domains, unclear risk to denote an unclear risk of bias for one or more key domains and high risk to denote a high risk of bias for one or more key domains.

Risk of bias for an outcome across trials and across domains: these were our main summary assessments that we incorporated into our judgements about the quality of evidence in the 'Summary of finding' tables. We defined outcomes as at low risk of bias when most information came from trials at low risk of bias, unclear risk when most information came from trials at low or unclear risk of bias, and high risk when a sufficient proportion of information came from trials at high risk of bias.

Measures of treatment effect

When at least two included trials were available for a comparison and a given outcome, we expressed dichotomous data as a risk ratio (RR) or odds ratio (OR) with 95% confidence interval

(CI). For continuous outcomes measured on the same scale (e.g. weight loss in kg) we estimated the intervention effect using the mean difference with 95% CI. For continuous outcomes measuring the same underlying concept (e.g. health-related quality of life) but using different measurement scales, we calculated the standardised mean difference (SMD). We expressed time-to-event data as hazard ratio with 95% CI.

Unit of analysis issues

We took into account the level at which randomisation occurred, such as cross-over trials, cluster-randomised trials and multiple observations for the same outcome. If more than one comparison from the same trial was eligible for inclusion in the same meta-analysis, we either combined groups to create a single pair-wise comparison (if the groups were suitably similar interventions) or appropriately reduced the sample size so that the same participants did not contribute multiple times (splitting the 'shared' group into two or more groups). While the latter approach offers some solution to adjusting the precision of the comparison, it does not account for correlation arising from the same set of participants being in multiple comparisons (Deeks 2011).

We analysed cluster RCTs separately from individually randomised trials.

Dealing with missing data

If possible, we obtained missing data from the authors of the included trials. We carefully evaluated important numerical data such as screened, eligible, randomly-assigned participants as well as intention-to-treat, as-treated and per-protocol populations. We investigated attrition rates (e.g. dropouts, losses to follow-up, withdrawals), and we critically appraised issues concerning missing data and use of imputation methods (e.g. last observation carried forward).

Where standard deviations for outcomes were not reported, and we did not receive information from trial authors, we calculated these following the methods presented in the *Cochrane Handbook for Systematic Reviews of Interventions (* Higgins 2011c). Where papers did not report results as change from baseline, we calculated this and for the standard deviation differences followed the methods presented in the *Cochrane Handbook for Systematic Reviews of Interventions* for imputing these (Section 16.1.3.2 Imputing standard deviations for changes from baseline; Higgins 2011c), and assumed a correlation of 0.5 between baseline and follow-up measures as suggested by Follmann 1992.

Assessment of heterogeneity

In the event of substantial clinical, methodological or statistical heterogeneity, we did not report trial results as the pooled effect estimate in a meta-analysis.

We identified heterogeneity (inconsistency) by visually inspecting the forest plots and by using a standard Chi^2 test with a significance level of $\alpha = 0.1$ (Higgins 2002). In view of the low power of this test, we also considered the I^2 statistic (Higgins 2003), which quantifies inconsistency across trials to assess the impact of heterogeneity on the meta-analysis, where an I^2 statistic of 75% or more indicates a considerable level of inconsistency (Deeks 2011).

When we found heterogeneity, we attempted to determine potential reasons for it by examining individual study and subgroup characteristics.

Assessment of reporting biases

If we included 10 studies or more for a given outcome, we used funnel plots to assess small study effects. Due to several explanations for funnel plot asymmetry we interpreted results carefully (Sterne 2011).

Data synthesis

We undertook a meta-analysis only if we judged participants, interventions, comparisons and outcomes to be sufficiently similar. We included all relevant trials regardless of risk of bias assessments using random-effect models; subgrouping was undertaken according to risk of bias (high, low, unclear risk). We performed statistical analyses according to the statistical guidelines presented in the *Cochrane Handbook for Systematic Reviews of Interventions* (Deeks 2011).

Quality of evidence

We have presented the overall quality of the evidence for each outcome specified under 'Types of outcome measures: Summary of findings' according to the GRADE approach (gradeworkinggroup.org), which takes into account issues related to internal validity (risk of bias, inconsistency, imprecision, publication bias) and also to external validity, such as directness of results. Two review authors (EM, TB) independently rated the quality of the evidence for each outcome. We have presented a summary of the evidence in a 'Summary of findings' table. This provides key information about the best estimate of the magnitude of the effect, in relative terms and as absolute differences, for each relevant comparison of alternative management strategies, numbers of participants and trials that address each important outcome and a rating of overall confidence in effect estimates for each outcome. We created the 'Summary of findings' table based on the methods described in the *Cochrane Handbook for Systematic Reviews of Interventions (* Schünemann 2011) using Review Manager 5 (RevMan 5) table editor (RevMan 2014). We have included an appendix titled 'Checklist to aid consistency and reproducibility of GRADE assessments' (Meader 2014), to help with standardisation of the 'Summary of findings' tables. Alternatively, we planned to use the GRADEpro Guideline Development Tool (GDT) software (GRADEproGDT 2015) and would have presented evidence profile tables as an appendix. We have presented results for the outcomes as described in the Types of outcome measures section. If meta-analysis was not possible, we presented the results narratively in the 'Summary of findings' table. We justified all decisions to downgrade the quality of trials using footnotes and we made comments to aid the reader's understanding of the Cochrane Review where necessary.

Subgroup analysis and investigation of heterogeneity

We expected the following characteristics to introduce clinical heterogeneity, and we planned to carry out the following subgroup analyses including investigation of interactions (Altman 2003).

- Type of control (no treatment, usual care or another intervention with the same components)

- Type of intervention (diet, physical activity and/or behavioural therapy)
- Attrition bias (low, high, unclear)
- Setting
- Duration of post-intervention follow-up
- Parental involvement
- Baseline BMI z score

There is no single accepted classification for severe obesity in school children; we used the 2.67 BMI z score which equates to the 99.6th centile for severe obesity (Ells 2015a). We put studies into subgroups based on a whether their mean baseline BMI z score was less than 2.67 units, or 2.67 units or over.

Sensitivity analysis

We investigated the impact of imputation on meta-analyses by performing sensitivity analyses, and we reported per outcome which trials were included with imputed SDs.

RESULTS

Description of studies

For an overview of study populations please see Table 1; for a detailed description of trials, see 'Characteristics of included studies', 'Characteristics of excluded studies, and 'Characteristics of ongoing studies' sections.

Results of the search

One overarching search was conducted for all the behaviour-changing reviews:

- Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in adolescents aged 12 to 17 years.
- Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in schoolchildren from the age of 6 to 11 years.
- Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in preschool children up to the age of 6 years.
- Parent-only interventions for childhood overweight or obesity.

Our comprehensive literature searches identified 25,483 records, after duplicates were removed this left 16,106 records. From these 15,491 records were excluded based on the title/abstract. We obtained 615 records as full-text articles and screened them for inclusion or exclusion (see Figure 1 for the PRISMA flow diagram) (Liberati 2009). We included 70 trials (164 articles) in the review and 55 trials in the meta-analyses. Twenty trials are awaiting classification (Characteristics of studies awaiting classification) and 20 trials are ongoing (Characteristics of ongoing studies).

Figure 1. Trial flow diagram

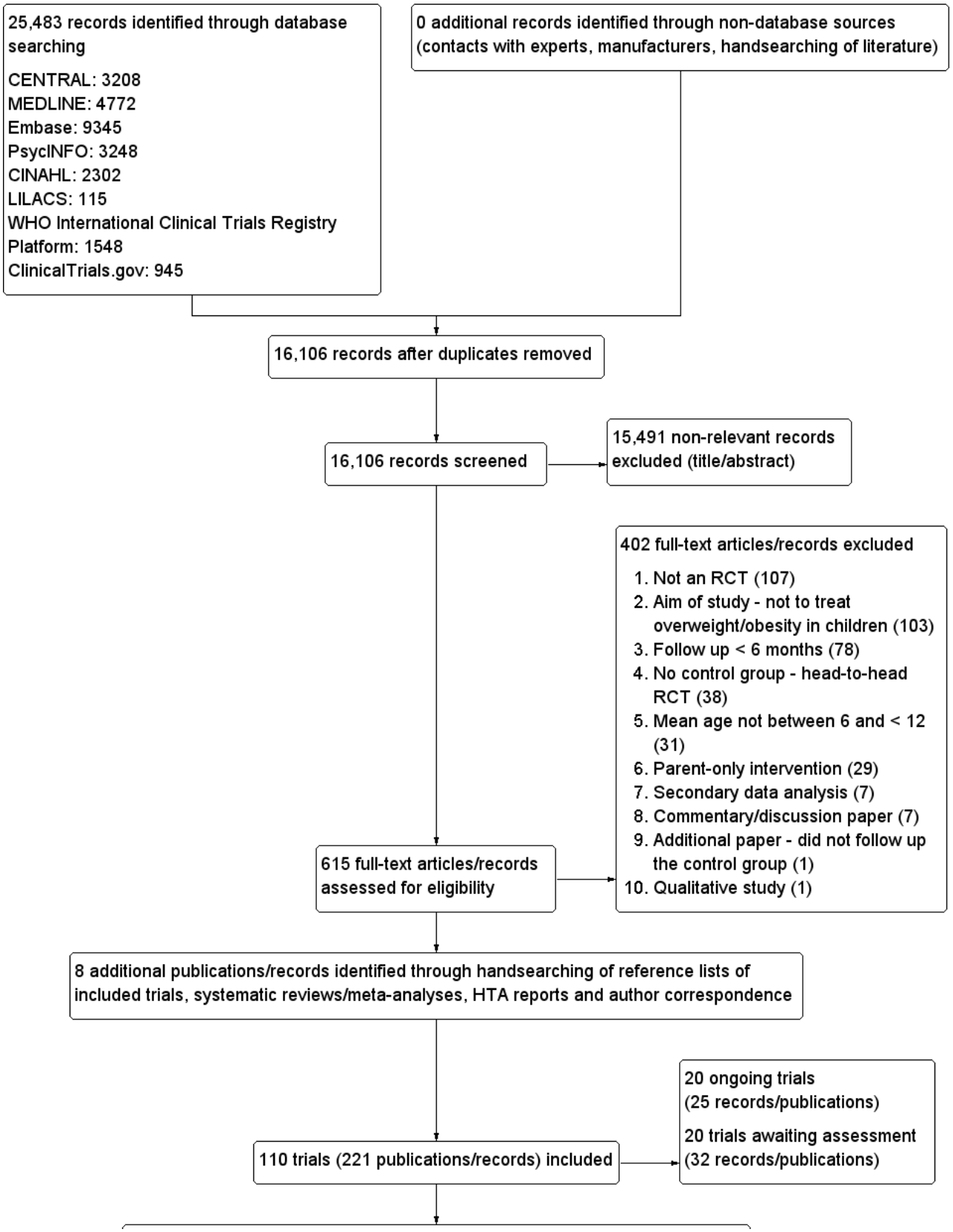
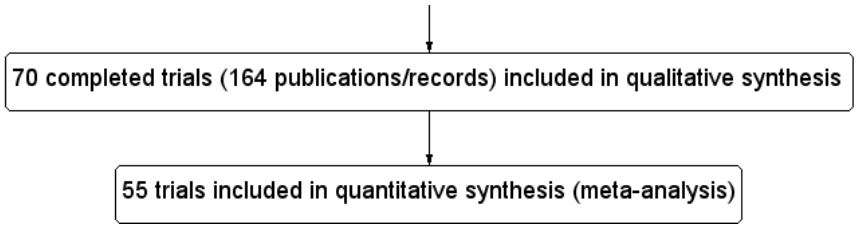


Figure 1. (Continued)



Ongoing studies

We found 20 ongoing RCTs, see Characteristics of ongoing studies. All but one are parallel RCTs. Five of the 20 ongoing studies only include participants within the age range of this review (between six years and less than 12 years). This includes: ChiCTR-IOB-15005874; NCT01642836; NCT02258126; NCT02343367; RBR-8ttw64. Eleven studies have age ranges which include children 12 years or older. This includes: DRKS00007879 (8 years to 16 years old), Moore 2013 (11 years to 12 years old), NCT01221220 (8 years to 15 years old), NCT01574352 (10 years to 13 years old), NCT01736748 (6 years to 18 years old), ACTRN12613001037796 (7 years to 16 years old), NCT02082080 (9 years to 14 years old), NCT02560493 (10 years to 12 years old), NCT02711488 (9 years to 15 years old), NCT02720302 (9 years to 12 years old), and NCT02773823 (8 years to 12 years old). Three studies include children younger than six years old: ISRCTN81798055 (4 years to 11 years old), NCT02573142 (5 years to 11 years old), and NCT02684214 (4 years to 10 years old). In addition, one study has an age range that include children both younger and older than six years to less than 12 years old: NCT02124460 (2 years to 12.9 years old). Many studies include both overweight and obese participants, while eight studies only include obese participants. In one ongoing trial (NCT02720302) only overweight children are included.

The majority of interventions (N = 14) have a behavioural, diet and physical activity component. The remaining studies are diet and exercise component only (ChiCTR-IOB-15005874; NCT02082080; RBR-8ttw64), physical activity and behavioural only (NCT01736748), physical activity only (ACTRN12613001037796) and behavioural only (DRKS00007879; no mention of a diet or physical activity component). Eleven studies have a usual care/standard treatment control group while four studies include a no-treatment control group (NCT02082080; NCT02560493; NCT02711488; NCT02773823). The remaining five trials compare a behaviour-changing intervention plus component with the same behaviour-changing intervention without the additional component (DRKS00007879; NCT01221220; NCT02560493; NCT02684214; NCT02720302). The most common primary outcome is BMI/BMI z score (N = 17 trials). No trial reported adverse events as a primary outcome.

Studies awaiting classification

Twenty studies are awaiting classification. Seventeen trials were identified on a clinical trial register website as completed; however, no results are available. For the remaining three studies we were unable to obtain a full publication; therefore, we are unable to assess whether the trial met the inclusion of this review.

Included studies

We have presented a detailed description of the characteristics of the 70 included trials in Characteristics of included studies, and in Appendix 2; Appendix 3; Appendix 4. The following is a succinct overview.

Source of data

We obtained the majority of data presented in the review from published literature, including supplementary published data and trials registers where available. Some data were requested from study authors (see Appendix 11 for an overview). Only one study did not have data published in a journal article and all data were obtained from the clinical trial record (NCT02436330).

Comparisons

Of the 70 studies included in this review, only 21 studies included a true control; hence, the control groups received no treatment throughout the duration of the study (Arauz Boudreau 2013; Boutelle 2014; Bryant 2011; Coppins 2011; Croker 2012; de Niet 2012; Eddy Ives 2012; Epstein 1984a; Maddison 2011; Maddison 2014; Markert 2014; McCallum 2007; Nowicka 2009; Reinehr 2010; Sacher 2010; Satoh 2007; Siwik 2013; Vann 2013; Wafa 2011; Wake 2009; Wake 2013).

Control group participants in 34 studies were given usual/standard care, either as defined by the study authors or assessed by the review authors (Alves 2008; Barkin 2011; Berry 2014; Davis 2013; Davoli 2013; Diaz 2010; Epstein 2000a; Faude 2010; Gillis 2007; Gunnarsdottir 2011a; Hamilton-Shield 2014; Ho 2016; Hughes 2008; Kalarchian 2009; Kalavainen 2007; Kirk 2012; Lison 2012; Lochrie 2013; Looney 2014; Mirza 2013; Nemet 2005; Nova 2001; O'Connor 2013; Rodearmel 2007; Saelens 2013; Serra-Paya 2015; Taveras 2015; Taylor 2015; Waling 2012; Warschburger 2016; Weigel 2008; Weintraub 2008; Wilfley 2007; Wright 2012)

The remaining 15 studies (Bathrellou 2010; Berry 2007; Duffy 1993; Duggins 2010; Epstein 1985a; Epstein 1985b; Epstein 1985c; Epstein 2001; Epstein 2005; Epstein 2015; Flodmark 1993; Larsen 2015; NCT02436330; Schwingshandl 1999; Woo 2004) included a control condition in which the participants received an intervention that was also provided in the intervention group, with the intervention group also receiving an additional component (for example, diet plus physical activity plus behavioural therapy versus diet plus physical activity). Five of these trials had multiple comparator arms and could also be evaluated as intervention versus control (either usual care or no treatment) (Epstein 1984a; Epstein 2000a; Looney 2014; Taveras 2015; Vann 2013); hence, both comparator types were evaluated where appropriate.

Overview of trial populations

Individual study sample size at randomisation ranged from 16 (eight in the intervention group, eight in the control group) (Gunnarsdottir 2011a) to 686 (336 in the intervention group, 350 in the control group) (Warschburger 2016). Twenty-one studies had a sample size less than 50 at baseline, 21 studies had between 50 and 100 participants, 17 studies had between 100 and 200 participants, four studies had between 200 and 300 participants, and finally, seven studies had more than 300 participants at baseline; these included Berry 2014; Davoli 2013; Maddison 2011; Markert 2014; Taveras 2015; Warschburger 2016 and Wright 2012. Only 39 studies clearly reported using a power calculation in their methods; only 10 of these studies actually achieved their target sample size at follow-up, after dropout (Croker 2012; Davis 2013; Davoli 2013; Hughes 2008; Lison 2012; McCallum 2007; Nemet 2005; Wafa 2011; Wilfley 2007; Wright 2012).

A total of 8461 participants were randomised to either the intervention or control groups. In three studies, it was unclear how many participants were measured at the endpoint (i.e. completed the whole study) (Berry 2014, Epstein 2015, Woo 2004). Therefore, in the remaining 67 studies, 5960 participants out of the 7997 randomised were measured at the study's endpoint (74.5%). The endpoints varied across studies with the shortest follow-up time from baseline being 24 weeks and the longest being three years. The number and proportions of participants completing the study, where reported, ranged from 2899 participants (71.9%) in the intervention groups and 2737 participants (76.9%) in the control groups.

Trial design

All 70 studies had a superiority design. All but six studies were parallel RCTs; four studies (Berry 2007; Berry 2014; Taveras 2015; Wright 2012) were cluster RCTs. Coppins 2011 and Siwik 2013 were presented as cross-over trials; these were treated as parallel RCTs where only the first phase was analysed before crossover and the control groups were treated as waiting-list controls.

Twenty trials were multi-centre (Barkin 2011; Berry 2014; Davis 2013; Davoli 2013; de Niet 2012; Duggins 2010; Eddy Ives 2012; Gillis 2007; Hamilton-Shield 2014; Larsen 2015; McCallum 2007; O'Connor 2013; Reinehr 2010; Sacher 2010; Satoh 2007; Serra-Paya 2015; Taveras 2015; Wake 2009; Wake 2013; Wright 2012), ranging from 2 to 69 centres.

Trials were published between 1984 and 2016.

One study (Hamilton-Shield 2014) was terminated before the endpoint due to recruitment issues and technical problems with the intervention equipment.

The length of the interventions ranged from 10 days to two years. Just over half (N = 37) trials had a period of post intervention follow-up (defined as the period after the active intervention and up to the final measurement) with a median duration of 10 months; follow-up from end of the intervention period ranged from one month to two years. We did not extract any information on whether the post-intervention period was passive (i.e. just measurement) or active (i.e. a maintenance intervention period with the aim of helping children to sustain the weight status they had achieved).

Settings

Thirty of the included studies were conducted in the USA, six in the UK, five in Germany, four in Australia, three each in Sweden, New Zealand and Spain, and two each in Israel and in Italy. The remaining studies were conducted in Austria, Brazil, Canada, Denmark, Finland, Greece, Hong Kong, Iceland, Japan, Malaysia, Mexico and the Netherlands. Twenty-five studies were conducted in secondary care, eleven in primary care, seven in university research clinics, seven in the community, four in homes and four in schools. Ten studies were based in more than one setting and in two studies the setting was unclear (Duffy 1993, NCT02436330).

Participants

All participants included in this review were overweight, obese or severely obese at baseline; various diagnostic criteria were applied across the trials. Thirty-two studies included children who were overweight or obese (including morbidly obese) while 26 studies only included children who were obese (including morbidly obese). Overweight children only (not obese) were included in five studies (Davoli 2013; Duffy 1993; Faude 2010; Larsen 2015; Reinehr 2010). Six studies included both overweight and obese children but did not include morbidly/severely obese children (Eddy Ives 2012; Epstein 2001; McCallum 2007; O'Connor 2013; Saelens 2013; Wake 2009). Only one study included just severely obese children (Kalarchian 2009).

All but three studies were conducted in upper-income countries (defined using the World Bank classification). Alves 2008; Diaz 2010 and Wafa 2011 included participants from upper middle-income countries.

Of the 38 studies that clearly reported the ethnic group(s) of their participants, six studies reported that all of their participants were white (Coppins 2011; Epstein 1985a; Epstein 1985b; Epstein 1985c; Lison 2012; Warschburger 2016). In 23 studies participants were of mixed ethnic groups, but the majority ethnic group was white (Alves 2008; Boutelle 2014; Bryant 2011; Croker 2012; Davis 2013; Epstein 2000; Epstein 2001; Epstein 2005; Hamilton-Shield 2014; Kalarchian 2009; Kirk 2012; Lochrie 2013; Looney 2014; NCT02436330; Reinehr 2010; Rodearmel 2007; Sacher 2010; Saelens 2013; Siwik 2013; Taveras 2015; Wake 2009; Wake 2013; Wilfley 2007). Berry 2007 had a similar number of white and black participants, and also some Hispanic participants. Berry 2014 and Vann 2013 had a higher percentage of African American children in their studies while O'Connor 2013 had a higher percentage of Hispanic/Latino/Mexican American participants. In Mirza 2013, Weintraub 2008 and Wright 2012, the majority of participants were Hispanic/Latino. Woo 2004 included participants who were all Hong Kong Chinese and Wafa 2011 included participants who were of Malay ethnicity.

The mean age (SD) of participants at baseline ranged from 6.2 (1.2) years (Larsen 2015) to 11.9 (2.4) years (Berry 2007), with the majority of studies including participants with a mean age over nine years but under 12 years of age; only 17 studies included participants with a mean age under nine years old (Alves 2008; Bryant 2011; Coppins 2011; Davis 2013; Davoli 2013; Epstein 1985c; Hughes 2008; Kalavainen 2007; Larsen 2015; Looney 2014; McCallum 2007; Nova 2001; O'Connor 2013; Taylor 2015; Wake 2009; Wake 2013; Wright 2012). One study (Lison 2012) had three groups with one group having a mean age of 12.3 years; however, the average age across all three groups fell under the cut-off of 12 years.

Twenty-six studies had roughly an equal number of boys and girls at baseline, while in 27 studies, 55% to 69% of participants were female at baseline. In six studies, there were 70% or more girls at baseline; this included two studies that only recruited girls (Epstein 1985b; Epstein 1985c). Seven studies had more boys than girls at baseline but only two of these had more than 70% boys (Davis 2013; Maddison 2011). No study included boys only. In five studies it was unclear how many boys and girls were included at baseline (Epstein 1984a; Gunnarsdottir 2011a; Nowicka 2009; Weintraub 2008). Socioeconomic status was recorded in 32 studies at baseline (no studies reported on socioeconomic effects as an outcome); however, the variables and tools used varied greatly between the studies.

Mean BMI or BMI z score, or both, at baseline were reported in 63 studies. Mean BMI (kg/m^2) value at baseline ranged from 18.3 kg/m^2 to 41.1 kg/m^2 in the intervention group and 18.2 kg/m^2 to 36.7 kg/m^2 in the control group with a median values of 26.6 kg/m^2 and 26.5 kg/m^2, respectively. Mean BMI z score at baseline ranged from 1.3 units to 5.6 units in the intervention group and 1.3 units to 5.3 units in the control group with median values of 2.2 units and 2.2 units, respectively. Only one study reported the mean duration at which their participants had been overweight or obese prior to starting the trial. Davoli 2013 reported 63.6% and 64.3% of intervention and control participants, respectively, were overweight before five years old.

Comorbidites at baseline were reported in five studies (Eddy Ives 2012; Gunnarsdottir 2011a; Kalavainen 2007; Satoh 2007; Waling 2012) and included asthma, type 2 diabetes, metabolic syndrome, depression, anxiety and fatty liver diagnoses. None of the interventions had a pharmacological component; however participants in all three groups in one study were encouraged to take a vitamin/mineral supplement throughout the study (Kirk 2012).

Diagnosis

A number of different growth chart references/criteria were used to categorise overweight and obesity. The 'United States Centers for Disease Control and Prevention (CDC) 2000 growth reference' (cdc.gov/growthcharts) was used to define overweight and obesity in 31 studies while the 'International Obesity Task Force (IOTF) cut-offs' (worldobesity.org/resources/child-obesity/newchildcutoffs) were used in 12 studies. Four studies based in the UK used the 'British 1990 growth reference (UK90)' (noo.org.uk) to define the weight status categories (Bryant 2011; Hamilton-Shield 2014; Hughes 2008; Sacher 2010), while only one study used the 'World Health Organization (WHO) Child Growth Standard' (who.int/childgrowth) (Eddy Ives 2012). The remaining studies used references specific to their country, raw BMI or percentage overweight cut off references - but in four studies it was unclear which growth references were used to define overweight and obesity (Duffy 1993; Ho 2016; NCT02436330; Schwingshandl 1999).

Interventions

The majority of studies in this review had a behavioural, diet and physical activity component (N = 49). Two studies included both a behavioural and diet component but had no physical activity (Boutelle 2014; Flodmark 1993). Barkin 2011 and Maddison 2014 were the only studies to have both a behavioural and physical activity intervention without a diet component. Four studies had only a physical activity arm (Alves 2008; Faude 2010; Maddison 2011; Weintraub 2008). Eleven studies had no behavioural arm (Duggins 2010; Eddy Ives 2012; Kirk 2012; Larsen 2015; Lison 2012; Nova 2001; Nowicka 2009; Rodearmel 2007; Schwingshandl 1999; Vann 2013; Woo 2004). Ho 2016 and Satoh 2007 were the only studies to include a diet component alone.

The majority of studies (N = 65) included the child and parent/caregiver (or child's family). Four of these 65 studies involved both the child and parent/caregiver; however, the main aim of the intervention was to target the parent (McCallum 2007; Taveras 2015; Wafa 2011; Warschburger 2016). Five studies only involved the child in the intervention and there was no input from the parent/caregiver (Alves 2008; Faude 2010; Maddison 2011), Schwingshandl 1999, Vann 2013). One study directly investigated whether parental involvement or parental control would add benefit to an intervention aimed at the child (Bathrellou 2010).

Participants in two studies were given treatment before randomisation, this included de Niet 2012 where a behavioural-changing treatment (BFC) programme was given to all participants, then they were randomised to receive a short message service maintenance treatment (via text messages) plus BFC follow-up sessions or BFC follow-up sessions only for an additional nine months. Wilfley 2007 included a weight-loss treatment and then participants were randomised to three different maintenance arms. These two studies were the only two studies that specifically investigated the impact of a maintenance programme (rather than treatment programme).

Treatments provided to the intervention and comparator groups were mainly led (or co-led) by registered dietitians, therapists or psychologists. Other professionals involved in providing treatment included nutritionists, paediatricians, nurses, physical activity teachers/coaches, exercise consultants/specialists, undergraduates/postgraduates studying nutrition or physical activity-related or medical degrees, GPs, physicians, physiotherapists, exercise psychologists, health educators/trainers, research assistants, trained study members and community workers.

Outcomes

Fifty-one trials explicitly stated a primary/secondary endpoint in their publications (Appendix 5). The most commonly defined primary outcome was BMI or BMI z score (SDS). A median of seven outcomes was collected by the 70 studies, ranging between two and 27 outcomes. All 70 studies measured at least one outcome defined in this review - for a detailed description of how each outcome was measured in each study see Appendix 7. A total of 67 studies reported measuring BMI or BMI z scores in their publications. Only six studies reported adverse events occurring (it was unclear whether any adverse events occurred in 29 studies). Forty-seven studies measured additional body fat distribution measures such as waist circumference, body fat percentage and percent overweight. Fifty-six studies measured behaviour-change outcomes using validated tools, such as physical activity via accelerometry data, and dietary behaviours via food frequency questionnaires. Health-related quality of life or self-esteem was measured by 21 studies, while participants' views of the intervention was reported by nine studies. Only two studies reported morbidity data such as number of participants with

metabolic syndrome. No studies reported socioeconomic effects or all-cause mortality.

We found differences between defined primary outcomes in publication and trials registers/protocols eight studies (Boutelle 2014; de Niet 2012; Epstein 2015; Kalarchian 2009; Kirk 2012; Lochrie 2013; Looney 2014; Taveras 2015) - see Appendix 5 and Appendix 6 for more details on outcome reporting bias.

Excluded studies

We excluded 402 full-text articles after evaluation, see Characteristics of excluded studies. The main reasons for exclusions was the trial not being an RCT, mean age was not six years to less than 12 years old, the aim of the study was preventing overweight/obesity, and length of follow-up was less than six months from baseline.

Risk of bias in included studies

For details on the risk of bias of the included trials see Characteristics of included studies. For an overview of review authors' judgements about each risk of bias item for individual trials and across all trials see Figure 2 and Figure 3.

Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies (blank cells indicate that the particular outcome was not investigated in some studies)

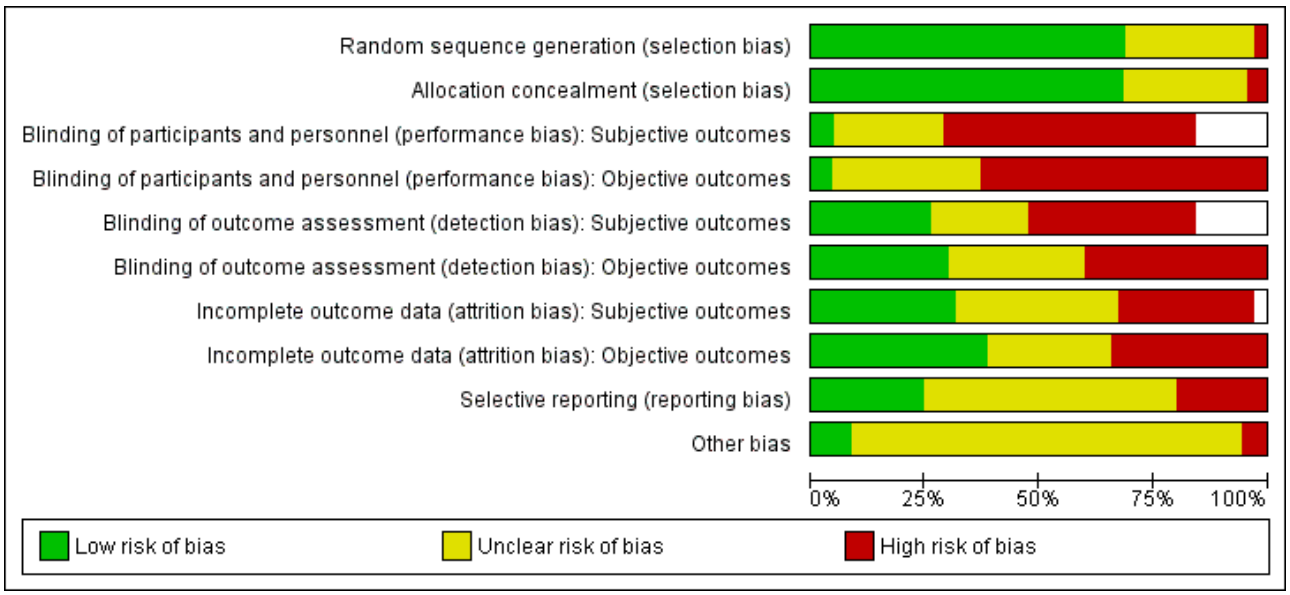


Figure 3. Risk of bias summary: review authors' judgements about each risk of bias item for each included study (blank cells indicate that the study did not report that particular outcome)

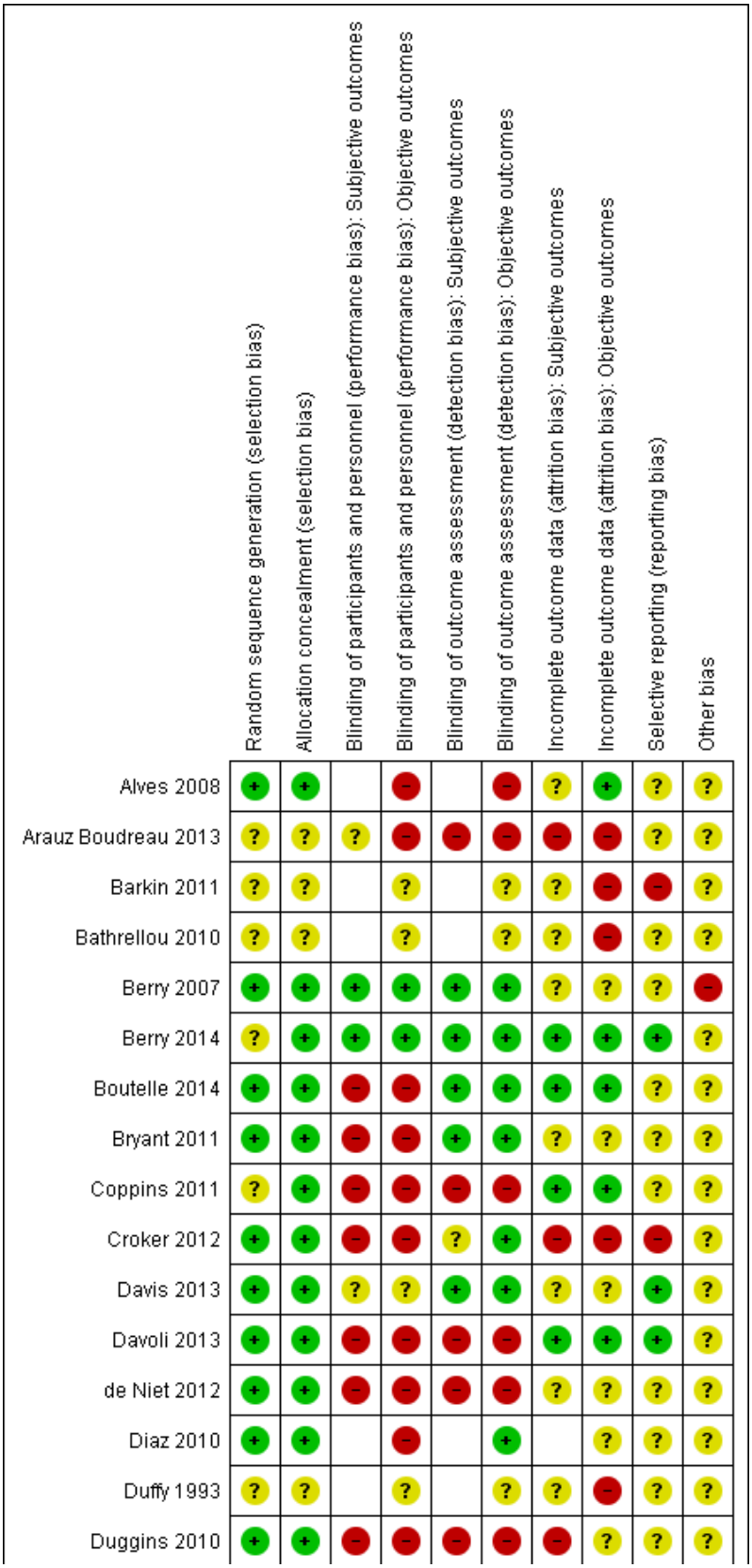


Figure 3. (Continued)

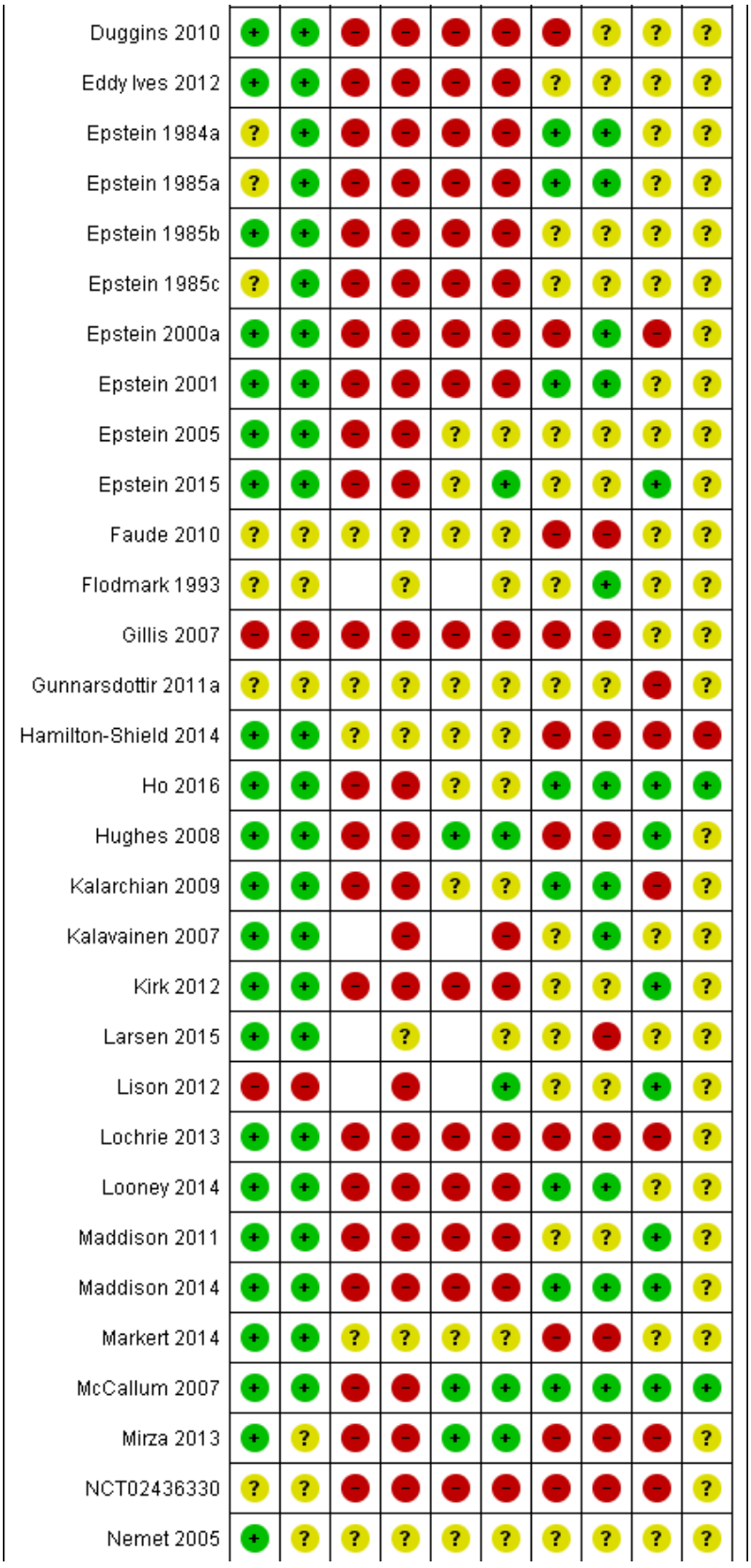
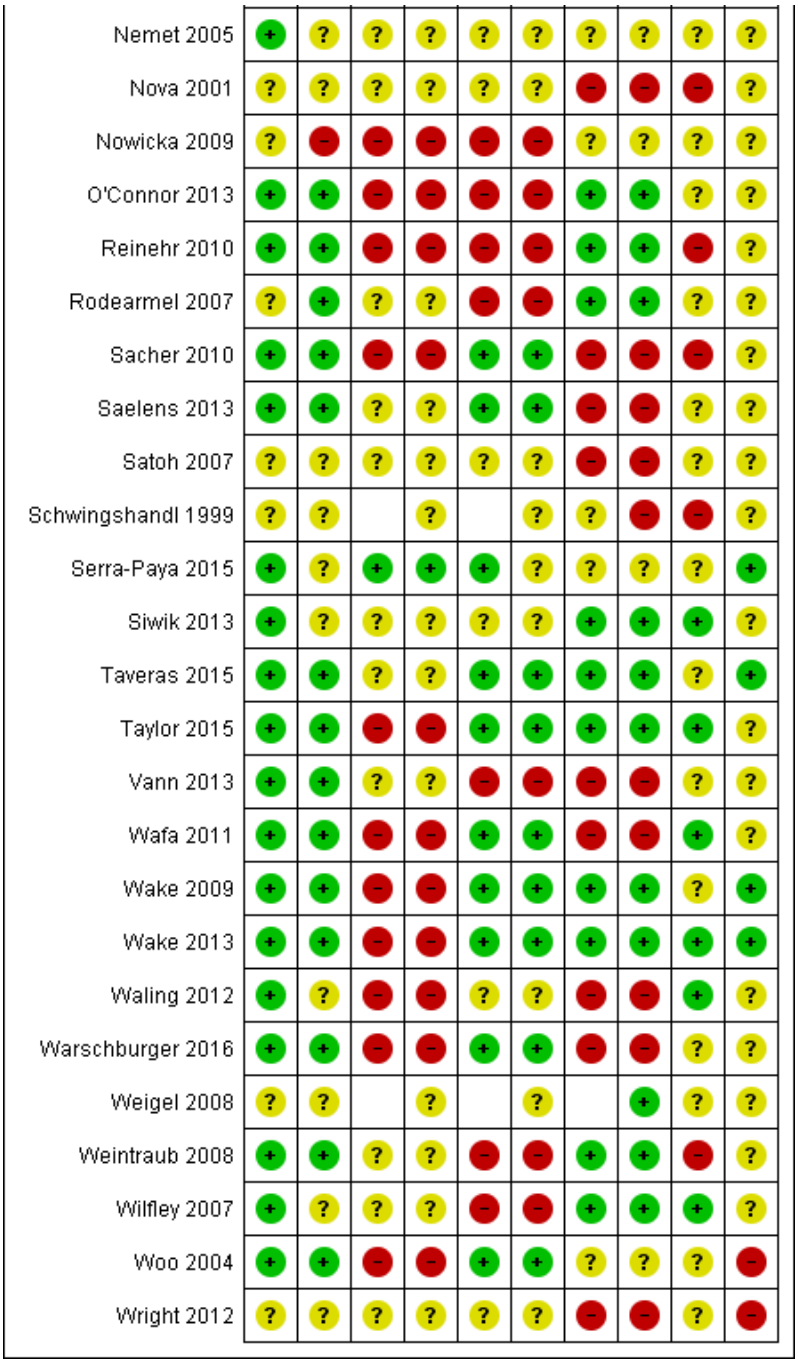


Figure 3. (Continued)



Allocation

Forty-eight studies reported adequate sequence generation (i.e. low risk), 20 were unclear, and two were high risk due to the randomisation method they used. We rated 49 studies low risk (i.e. adequate allocation concealment), 18 were unclear and three were high risk of allocation concealment. Overall, the risk of selection bias was low for 42 studies, unclear for 26 studies and high for two studies (Gillis 2007; Lison 2012).

Blinding

Forty-four studies did not blind their participants or study personnel to study group allocation with regards to objective measures and we assessed them as high risk. We rated 23 studies as unclear and three studies as low risk for performance bias because participants and study personnel were both blinded to study group allocation. With regards to subjective measures, we judged all bias assessments to be at the same level of risk as the objective measures unless a study did not have any subjective outcomes,

then the risk was left blank in the risk of bias table and figures (this also applied to detection and attrition bias).

Outcome assessors collecting objective outcomes were blinded to the study group in 21 studies and we assessed them as low risk, while in 21 studies it was unclear whether outcome assessment was blinded; we rated 28 studies as high risk of detection bias because outcome assessment was not blinded. If a study had subjective outcomes, then we gave the detection bias assessment the same classification as for objective measures.

Incomplete outcome data

Dropout rates were classed as low if less than 15%; high if more than 25% in studies with follow-up from baseline of six to 12 months or more than 30% in studies with over 12 months' follow-up; unclear if more than 15% but less than 25% in studies with follow-up from six to 12 months, or less than 30% in studies with follow-up more than 12 months. We also took into consideration whether a study used intention-to-treat and also what method it used to impute missing data. For objective outcomes, we rated 27 studies as low risk; 24 studies at high risk; and 19 studies at unclear risk.

Selective reporting

To assess selective outcome reporting we checked whether publications reported outcomes described in the publication itself and in a protocol/clinical trials register entry. We rated 17 studies as low risk because they provided results for all outcomes described. Studies could only be rated as low risk if they had published a protocol or registered the trial on a clinical trials website because there was no other way to determine if the publication had reported all outcomes intended to be measured.

We classified 14 studies as having a high risk of selective outcome reporting. In Kalarchian 2009 the clinical trials register stated BMI and cardiovascular risk factors as the primary outcome; however, in the publication it was percentage overweight. In Barkin 2011 they did not report BMI outcome results for the intervention and control groups separately, only for the group combined. Epstein 2000a also combined all three groups together in the additional publication (Epstein 2001), likely due to non-significant results. Lochrie 2013 did not report raw data at baseline and follow-up (or mean change) for each group, while Gunnarsdottir 2011a failed to compare intervention and control outcomes and did not present raw results for many of its intended measured outcomes, including health-related quality of life. Reinehr 2010 did not provide quality-of-life measures separately for each group. Mirza 2013 also failed to present the results for many of its outcomes, including outcomes described on a clinical trials website. Croker 2012 also did not provide the results for all outcomes reported on the clinical trials website. Nova 2001 did not provide behavioural outcome results at follow-up, or results at 24 months' follow-up (endpoint) while Schwingshandl 1999 did not provide any BMI data at the study's endpoint (12 months). Hamilton-Shield 2014 terminated the trial before its endpoint; however, it failed to provide any data on outcomes collected before termination.

The remaining 39 studies we rated as unclear risk of selective outcome reporting bias primarily because the trial protocol was not published in advance of the study or registered on a clinical trials website. There were however, additional reasons why we classified risk of bias as unclear: Boutelle 2014 had a clinical trials entry but we rated it as unclear because the entry stated that there were three intervention groups and one control group; however, in the publication there was only one intervention and one control group. In addition, Bryant 2011; Coppins 2011; Eddy Ives 2012; Markert 2014; Wake 2009 and Warschburger 2016 had clinical trials entries but they were retrospectively entered, while O'Connor 2013 only provided one outcome measure (family attendance) on its clinical trials register entry. Potential bias may also occur in Coppins 2011 due to only reporting some outcomes as significant or non-significant (no raw results). Looney 2014 reported measuring cost-effectiveness on the clinical trials entry; however, this is not reported in the publication. In addition Sacher 2010; Serra-Paya 2015 and Taveras 2015 reported a number of outcomes in their clinical trials register entries that were not reported in the main publications.

Other potential sources of bias

We rated 60 studies as unclear, mainly because of a lack of detail in the publication or an unclear risk of bias for the other domains resulting in uncertainty of the presence of other biases. Six studies were low risk because the trials were generally well-conducted and well-reported (Ho 2016; McCallum 2007; Serra-Paya 2015; Taveras 2015; Wake 2009; Wake 2013). Four studies were high risk - Berry 2007 and Wright 2012 were cluster RCTs but did not adjust for clustering in their analyses, Woo 2004 non-randomly split their intervention group into two groups at six weeks, and Hamilton-Shield 2014 was terminated before the study's endpoint because of problems with recruitment and equipment.

Effects of interventions

See: **Summary of findings for the main comparison** Diet, physical activity and behavioural interventions for the treatment of overweight or obesity in children aged 6 to 11 years

Baseline characteristics

For details of baseline characteristics, see Appendix 3 and Appendix 4.

Behaviour-changing interventions versus no treatment or usual care

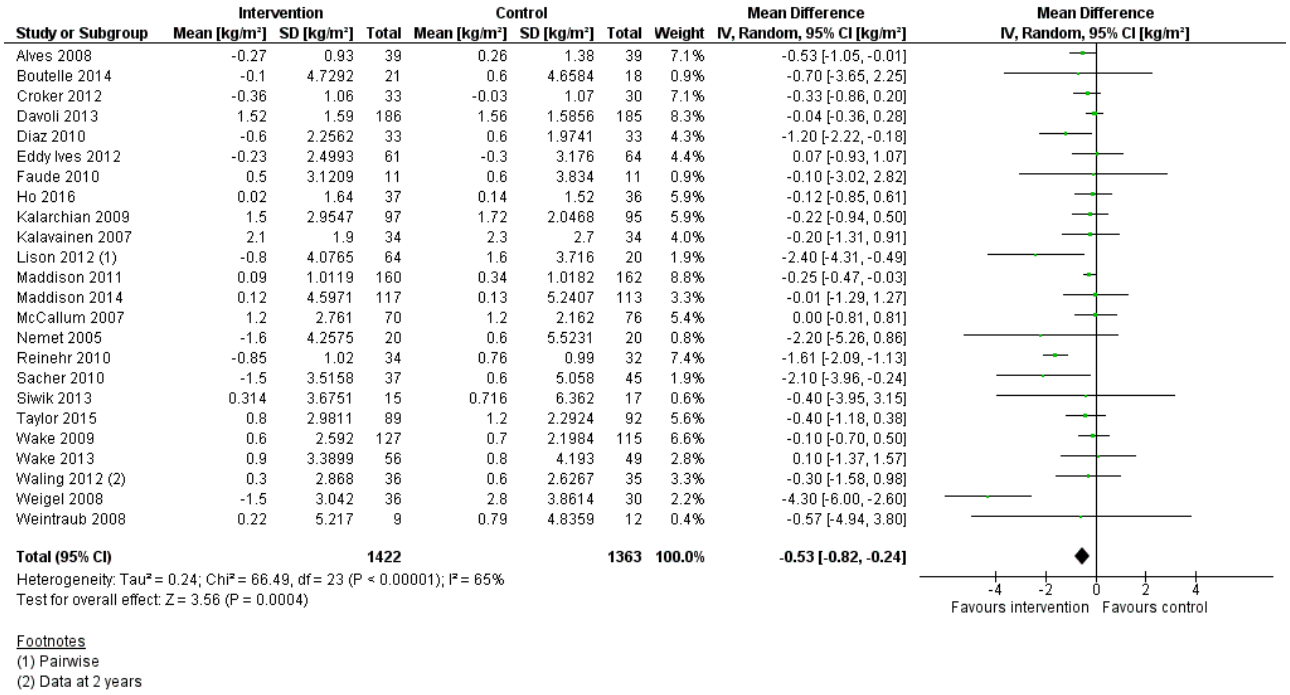
Fifty-five trials compared behaviour-changing (diet and/or physical activity and/or behavioural therapy) interventions, usual care, enhanced usual care, information control, or wait-list control. Excluding cluster RCTs and weight maintenance trials (N = 5) there were 20 trials in which the control groups received no treatment throughout the duration of the study and 30 trials in which the control group participants were given usual care, either defined by the trial author or assessed by the review authors. We considered outcomes here at the longest follow-up point reported for each trial.

Primary outcomes

Changes in body mass index (BMI), BMI z score and body weight

Twenty-four trials reported BMI change data that could be meta-analysed. Pooling the effects in a random-effects meta-analysis (Analysis 1.1; Figure 4) demonstrated a reduction in BMI in the intervention groups compared with controls at the final follow-up: MD -0.53 kg/m^2 (95% CI -0.82 to -0.24); P = 0.0004; 24 trials; 2785 participants; low-quality evidence.

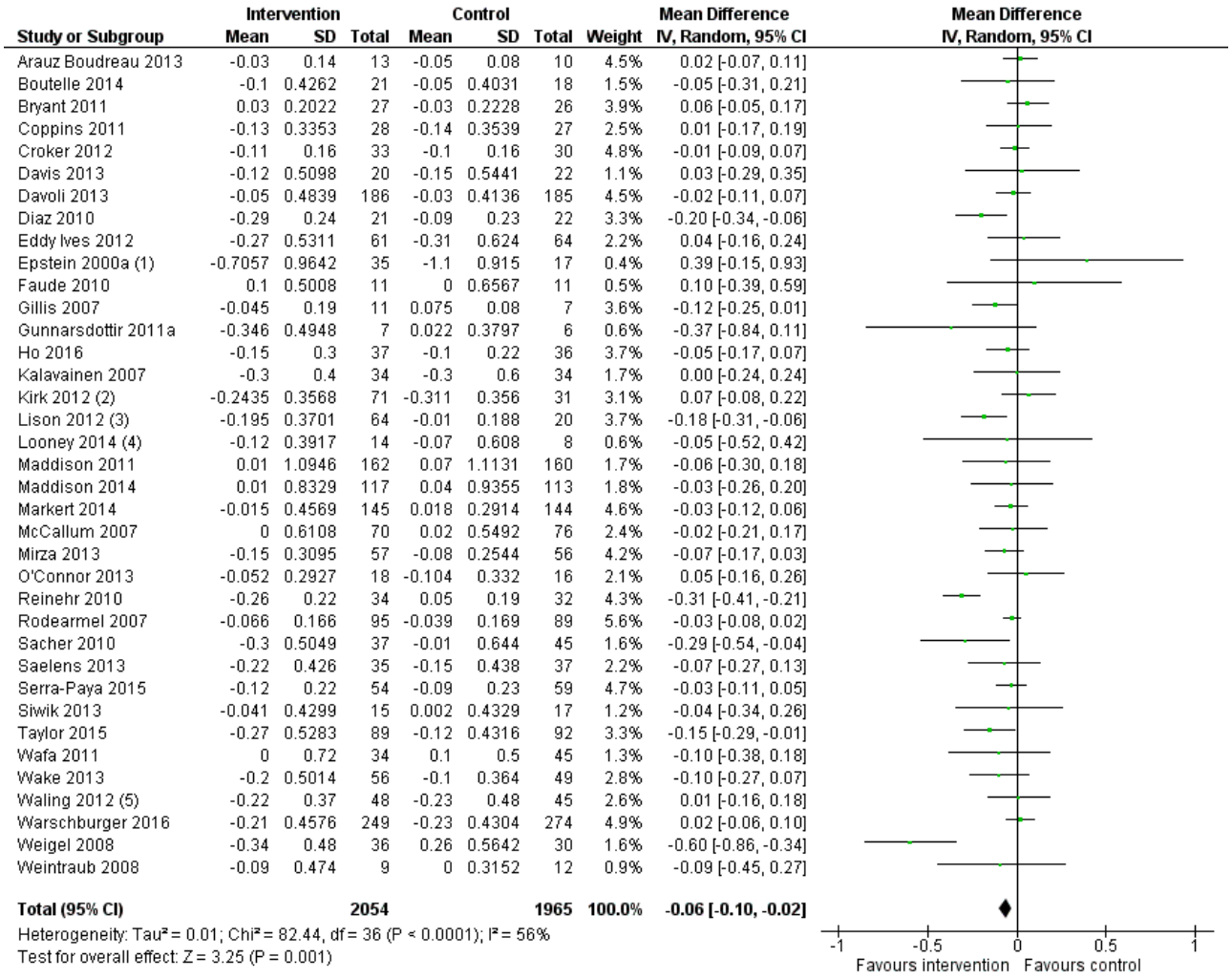
Figure 4. Forest plot of comparison: 1 Lifestyle intervention versus no treatment/usual care, outcome: 1.1 Change in BMI (all trials) (kg/m²)



Footnotes
(1) Pairwise
(2) Data at 2 years

Thirty-seven trials reported BMI z score change data that could be meta-analysed. Pooling the effects in a random-effects meta-analysis (Analysis 1.2; Figure 5) demonstrated a reduction in BMI z score in the intervention groups compared with controls at the final follow-up: MD -0.06 units (95% CI -0.10 to -0.02); P = 0.001; 37 trials; 4019 participants; low-quality evidence.

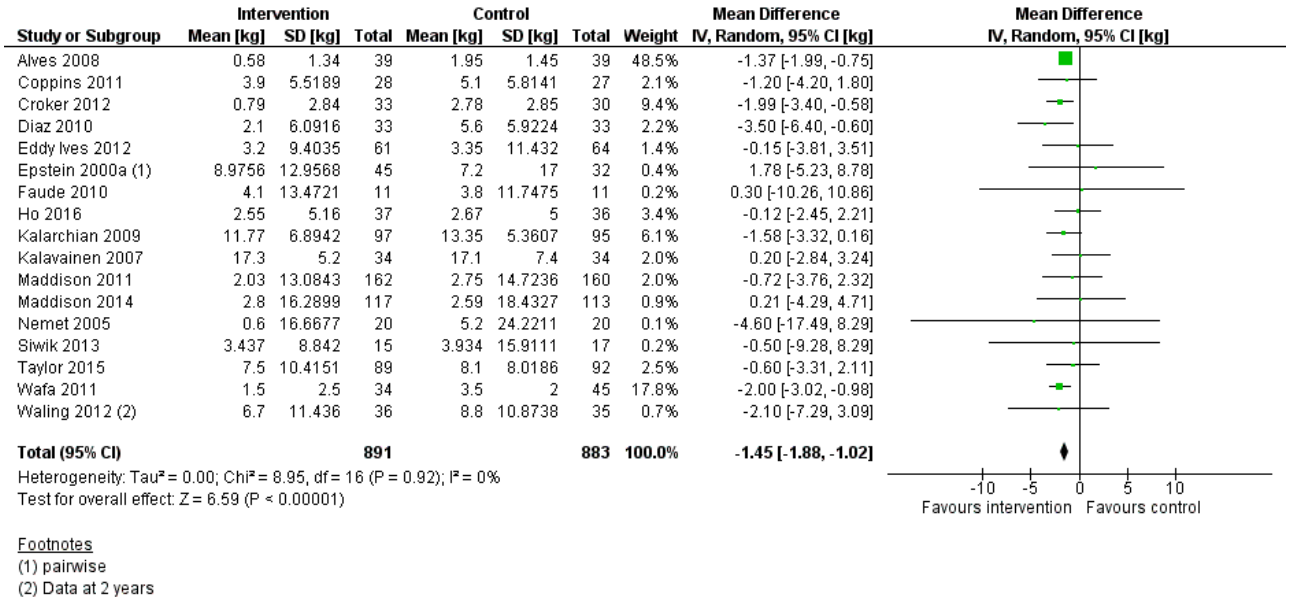
Figure 5. Forest plot of comparison: 1 Lifestyle intervention versus no treatment/usual care, outcome: 1.2 Change in BMI z score (all trials)



Footnotes
(1) pairwise
(2) Pairwise (diet)
(3) Pairwise
(4) Pairwise
(5) Data at 1 year

Seventeen trials reported data on change in body weight that could be meta-analysed. Pooling the effects in a random-effects meta-analysis (Analysis 1.3; Figure 6) demonstrated a reduction in body weight in the intervention groups compared with controls at the final follow-up: MD -1.45 kg (95% CI -1.88 to -1.02); P < 0.00001; 17 trials; 1774 participants; low-quality evidence.

Figure 6. Forest plot of comparison: 1 Lifestyle intervention versus no treatment/usual care, outcome: 1.3 Change in weight (all trials)



Footnotes
(1) pairwise
(2) Data at 2 years

Some meta-analyses revealed substantial heterogeneity which we explored by subgroup analysis by type of control, type of intervention, risk of attrition bias, setting of intervention and period of post-intervention follow-up. The heterogeneity was not fully explained by any of these factors (see "Subgroup analyses" section below).

We were unable to include nine trials with no treatment or usual care control groups in the BMI and BMI z score meta-analyses and so they are narratively reported: Satoh 2007, Epstein 1984a and Nova 2001 only presented data for percent overweight. Nowicka 2009 reported no differences in follow-up outcome measures between the intervention and control groups. We could not include Vann 2013 in the meta-analyses because they did not provide SDs for BMI values at baseline and follow-up (or effect sizes and P values). A small decrease of 0.1 kg/m^2 was seen in the pedometer plus DVD group; however, an increase in BMI was observed in the two other intervention groups and the control group. Barkin 2011 only provided BMI data for the intervention and control groups combined - in a linear regression model they observed that parent-child dyads in the control group were more likely to decrease their BMI over the six-month study. Lochrie 2013 only provided means and standard errors at follow-up - the SD at baseline was unclear. The study found a larger reduction in BMI z score at 12 months' follow-up in the intervention group. Finally, Hughes 2008 only presented change in BMI z score as median and IQR, which cannot be converted into mean and SD (or 95% CI). At six months and 12 months the median difference between groups was not substantially different (P = 0.4 and P = 0.5, respectively). No BMI/BMI z score data were available in Hamilton-Shield 2014 because the study was terminated.

In the weight meta-analyses, we were unable to include Hughes 2008 as this study only presented weight data as median and IQR - a non-substantial difference between groups was found at both six months' and 12 months' follow-up (P = 0.1 and P = 0.9, respectively). In addition, Lison 2012 did not provide any SD values for weight at follow-up so could not be included in the analyses. The control group increased their weight over the six-month period while a smaller increase in weight was seen in the hospital clinic group along with a small reduction in weight in the home-based group. Epstein 1984a provided weight data in an additional secondary analysis paper; however, they only presented data for the two intervention groups. Hence, we decided not to include these data in the weight meta-analyses because data were not reported for the control group. The authors found a reduction in weight in the two treatment groups combined. We were unable to include the remaining studies in the weight meta-analysis because no weight data were provided in the publications.

Adverse events

The majority of publications did not report whether or not any adverse events occurred; hence, we had to contact most study authors to obtain this information. As a result, it was confirmed that no adverse events occurred in 28 trials with a no-treatment/usual-care control group. In 16 trials it was unclear whether any adverse events had occurred. The remaining six studies reported adverse events occurring: Maddison 2011 and Maddison 2014 provided data on serious adverse events, as described below. Croker 2012 reported that one participant in the control group had a very high reduction in BMI and standardised BMI (BMI SDS). Kirk 2012 reported that some participants in both groups developed elevated triglycerides (12.2%), elevated blood pressure (3.6%), elevated LDL cholesterol (3.5%) and/or elevated fasting glucose (3.5%); however, there were no substantial differences by group. Weintraub 2008 reported that three adverse events occurred in the intervention group (skin rash, diagnosis of hypothyroidism, car collision) and six events in the control group (foot injury, eye pain and headaches, ingrown toenail, ear infection, knee pain, skin rash); however, none of these were considered to be related to the study, and it was unclear if any of these were considered serious adverse events. Mirza 2013 reported that no serious adverse events occurred; however, one child in the control group reported feeling faint

during the three-month blood taking. Adverse events and the level of severity were author-assessed, often using pre-defined criteria; however, these criteria varied between the studies leading to potential inconsistency between the studies and this should be borne in mind when evaluating the adverse events outcomes.

Thirty-one trials reported serious adverse event data that could be meta-analysed. Pooling the effects in a random-effects meta-analysis (Analysis 1.4) demonstrated a RR of 0.57 (95% CI 0.17 to 1.93); P = 0.37; 31 trials; 4096 participants; low-quality evidence), in favour of the intervention group. Only two of the 31 trials reported any serious adverse events; the other 29 reported zero serious adverse events. Serious adverse events were reported by Maddison 2011 and these included seasonal influenza that required hospitalisation (N = 3), hip surgery due to a chronic condition (N = 1), an ankle injury (N = 1), diagnosis of type 1 diabetes (N = 1), a blood clot (N = 1) and observation after a fall (N = 1); none of these were seen as related to the study. Maddison 2014 also reported a small number of serious adverse events but none of these were considered as related to the study; they included two events in the intervention group (bowel replacement surgery and a dislocated hip) and three events in the control group (an operation to remove a cyst, a broken ankle, and two broken fingers).

These data were based on the total number of participants who suffered at least one serious adverse event (4/2105 participants in the behaviour-changing intervention groups compared with 7/1991 participants in the comparator groups). We were unable to include studies where they reported adverse events but did not define if they were serious or if they did not provide the number of participants in each group who had at least one adverse event.

We aimed to provide a meta-analysis showing the number of participants in each group who discontinued due to adverse events. However, of those studies that reported adverse events occurring, only three actually reported if any participants discontinued (Croker 2012; Mirza 2013; Weintraub 2008) and they all reported that no participants dropped out due to adverse events.

Secondary outcomes

Health-related quality of life and self-esteem

Appendix 13 details the instruments that were used for analysis of health-related quality of life in the included trials. However, we were unable to meta-analyse all of the studies for the following reasons: unable to calculate mean change from data provided (Wake 2013, Warschburger 2016); no raw data were provided (Bryant 2011; Hamilton-Shield 2014; Lochrie 2013; Markert 2014; Reinehr 2010), no SDs given (Arauz Boudreau 2013), the study only presented results via domains, not overall score (Taylor 2015), and data were presented as median and interquartile ranges (IQR) (Hughes 2008). Four trials (Croker 2012, McCallum 2007; Wafa 2011; Wake 2009) reported the Pediatric Quality of Life Inventory (PedsQL) generic core scales, using the total score, either via parental or child report (Analysis 1.5; Analysis 1.6). An additional study measured health-related quality of life using the CHQ-PF50 global score (parental-report) (Kalarchian 2009) and Faude 2010 used the KINDL-R questionnaire (child-report). Using standardised mean differences (SMD), there were no substantial differences between intervention and control (higher scores indicate better quality of life) in the change in health-related quality of life at the final follow-up for parent/caregiver-reported data, demonstrating a SMD of 0.13 units (95% CI -0.06 to 0.32); P = 0.17; 5 trials; 718 participants; low-quality evidence. There were no substantial differences between intervention and control (higher scores indicate better quality of life) in the change in health-related quality of life at the final follow-up for child-reported data, demonstrating a SMD of 0.15 units (95% CI -0.34 to 0.64); P = 0.55; 3 trials; 164 participants; very low-quality evidence. The minimal clinically important difference (MCID) for a PedsQL child's self-report is 4.36 units and for PedsQL parents' (proxy) report 4.50 units (Varni 2007); when converting the SMD back to raw units, the MCID was not met in either meta-analysis.

Two trials reported a measure of self-esteem using the Harter global score that could be meta-analysed (Analysis 1.7). There were no substantial differences between intervention and control (higher scores indicate better self-esteem) in the change in self-esteem found at the final follow-up, demonstrating a MD of 0.19 units (95% CI -0.04 to 0.42); P = 0.11; 2 trials; 144 participants; very low-quality evidence.

All-cause mortality

No deaths were reported in any of the trials.

Morbidity

No trials measured morbidities.

However, metabolic syndrome (which is a composite of risk indicators such as elevated blood lipids, insulin resistance, obesity and high blood pressure) was mentioned in Mirza 2013 using the National Cholesterol Education Program (Adult treatment panel III). Approximately 40% of the low glycaemic index dietary group (intervention) and 30% of the low fat dietary group (comparator) had the metabolic syndrome at baseline; at 24 months there was slight reduction in the percentage of participants with metabolic syndrome in both groups. However, there were no substantial differences between groups. Waling 2012 also measured the metabolic syndrome prevalence at baseline and follow-up using the International Diabetes Federation (IDF) definition. At baseline one participant in the intervention group and two participants in the control group had the metabolic syndrome; at one year's follow-up the number of participants with the metabolic syndrome was three in the intervention group and two in the control group.

Anthropometric measures other than change in BMI

Eleven trials reported waist circumference data that could be meta-analysed (Analysis 1.8). Meta-analysis demonstrated a reduction in waist circumference in the intervention groups compared with controls at the final follow-up: MD -2.41 cm (95% CI -3.59 to -1.23); P < 0.0001; 11 trials; 1325 participants.

Three trials reported percentage overweight data that could be meta-analysed (Analysis 1.9). Meta-analysis demonstrated no substantial difference in percentage overweight in the intervention groups compared with controls at the final follow-up: MD -3.27% (95% CI -7.47 to 0.92); P = 0.13; 3 trials; 347 participants).

Eleven trials reported percentage body fat data that could be meta-analysed (Analysis 1.10). Meta-analysis demonstrated no substantial difference in percentage body fat in the intervention groups compared with controls at the final follow-up using (1) bioelectrical impedance analysis: MD -1.25% (95% CI -2.62 to 0.12); P = 0.07; 5 trials; 1004 participants; and (2) using dual energy X-ray

absorptiometry (DEXA): MD -1.04% (95% CI -2.88 to 0.80); P = 0.27; 5 trials; 443 participants.

Behaviour change

Two trials reported total kcals per day data that could be meta-analysed (Analysis 1.11). Meta-analysis demonstrated no substantial difference in total kcals per day in the intervention groups compared with controls at the final follow-up: MD -161.53 total kcals/day (95% CI -583.79 to 260.73); P = 0.45; 2 trials; 168 participants.

Two trials reported total minutes per day for television viewing data that could be meta-analysed (Analysis 1.12). Meta-analysis demonstrated a reduction in total minutes per day in the intervention groups compared with controls at the final follow-up: MD -6.60 minutes per day (95% CI -12.88 to -0.31); P = 0.04; 2 trials; 55 participants.

Six trials reported physical activity using accelerometers and total minutes per day data that could be meta-analysed (Analysis 1.13). Meta-analysis demonstrated no substantial difference in total minutes per day of physical activity in the intervention groups compared with controls at the final follow-up: MD -0.76 minutes per day (95% CI -5.30 to 3.78); P = 0.74; 6 trials; 744 participants.

Participants' views of the intervention

Eight studies asked parents, the children or both for their views on the intervention (or comparator) given. Gunnarsdottir 2011a used an acceptability questionnaire to rate how satisfied families were with the intervention; the majority gave ratings of 1 to 3 (Likert scale, 1 = very satisfied, 5 = not satisfied). The most liked components were the individual sessions and the traffic light diet food guide, and the least liked was a behavioural change technique called "token economies" which were defined as establishing goals, determining preferred rewards and providing them contingently upon achieving behavioural goals) and self-monitoring diet and physical activity.

Boutelle 2014 also asked all children and parents in the intervention group whether they liked the intervention: 50% of children liked the intervention a lot or loved it and 85% of them believed other children would like the intervention; 67% of parents in the intervention group liked it a lot or loved it, while 47% believed their child liked it a lot. Participants in Looney 2014 also undertook a process evaluation at the end of the study. There were no substantial differences in ratings between the three groups and 90% of families rated the programme as very good or excellent; 90% also said it was easy to understand. O'Connor 2013 also reported that 85% of the intervention group were positive about the treatment given.

Satoh 2007 interviewed 17 out of 21 children who completed the one-month intervention. Sixteen children said the intervention was easy to understand; however 14 children said completing the meal chart was a burden. Wake 2013 reported that the majority of parents thought the clinicians and GPs providing the intervention understood the challenges faced by the family and were confident that the intervention would make a difference.

Bryant 2011 randomly selected 10% of their sample to answer feedback about the study. The majority of parents and children reported positive experiences; however, those in the waiting list control group were disappointed that they had to wait for the intervention. Children were generally positive about the assessment but thought the worst part was the blood taking.

Hamilton-Shield 2014 collected qualitative data on treatment acceptance. The study involved an electrical device which included a weighing scale to measure food and provided feedback on satiety. Even though some parents gave some positive comments on the intervention, there were many technical problems with the device and some found it confusing to use. This may have contributed to the early termination of the study.

Socioeconomic effects

No trials measured socioeconomic effects.

Behaviour-changing intervention plus additional component versus behaviour-changing intervention alone

These interventions had the same components in the intervention and comparator groups to establish fair comparisons, and an additive component in the intervention arm. For example, diet plus physical activity plus behaviour therapy versus diet plus physical activity (with behaviour therapy being the additive component). We identified 15 trials in this category.

Of these studies, five studies also had a no-treatment or usual-care-condition group as they were at least three-arm studies (Epstein 1984a; Epstein 2000a; Looney 2014; Taveras 2015; Vann 2013). Davis 2013 compared the addition of telemedicine to standard physician visits and Duggins 2010 investigated adding a YMCA membership (physical activity) to nutrition classes led by dieticians. Epstein 2015 investigated whether adding a different nutritional component to a multi-component intervention was more beneficial. One study compared whether increasing physical activity or decreasing sedentary behaviours was more beneficial (Epstein 2001), while Epstein 1985a investigated adding a physical activity component (aerobic or behaviour-changing activity) to diet and behaviour therapy (with calisthenic exercise as a placebo).

Five studies investigated whether adding a physical activity component to a nutritional intervention improved weight-related outcomes (Duggins 2010; Epstein 1984a; Epstein 1985b; Schwingshandl 1999; Woo 2004). NCT02436330 added an exergaming component (classed as physical activity) to a didactic health teaching intervention. Vann 2013 also included two trial arms adding a physical activity component (fitness DVD or pedometers).

Bathrellou 2010 investigated whether adding a parental involvement to a diet and physical activity intervention would be beneficial. Duffy 1993 added cognitive self-management to a behavioural intervention and Epstein 2005 added a behavioural element with regards to alternative behaviours to eating. Behavioural therapy was also an additional component in Epstein 1985c and Flodmark 1993. Larsen 2015 added an educational consultation to a diet and physical activity intervention, and Epstein 2000a assessed adding problem solving with or without parental involvement. Looney 2014 added a behavioural therapy component to a growth-monitoring intervention. Taveras 2015 (cluster RCT) also looked at adding individual family coaching to a clinical-support intervention.

Primary outcomes

Changes in body mass index (BMI), BMI z score and weight

Four trials reported BMI data that could be meta-analysed (Analysis 2.1). Meta-analysis demonstrated a reduction in BMI in the intervention groups compared with controls at the final follow-up: MD -0.75 kg/m^2 (95% CI -1.42 to -0.09); P = 0.03; 4 trials; 195 participants.

Five trials reported BMI z score data that could be meta-analysed (Analysis 2.2). Meta-analysis demonstrated no substantial difference in BMI z score in the intervention groups compared with controls at the final follow-up: MD -0.03 units (95% CI -0.10 to 0.04); P = 0.37; 5 trials; 212 participants.

Four trials reported data for change in body weight that could be meta-analysed (Analysis 2.3). Meta-analysis demonstrated no difference in body weight in the intervention groups compared with controls at the final follow-up: MD 1.59 kg (95% CI -4.58 to 7.77); P = 0.61; 4 trials; 106 participants.

We were unable to include seven trials in the BMI/BMI z score meta-analyses. Bathrellou 2010 and Epstein 2015 only presented BMI values at baseline but did not present them at follow-up (only gave percent overweight). Epstein 1985a measured BMI but did not provide any data (only provided data for weight and percent overweight). Duffy 1993 and Epstein 1985b did not measure or present BMI values. Duggins 2010 presented mean change in BMI at the end of the study but did not provide any SDs. Hence, we could not use these data in the meta-analyses. At 12 months, a mean change of +10.2 units in the treatment group versus +6.5 units in the control group was reported (no P value was given). Schwingshandl 1999 found a change in BMI SDS of -0.53 units in the intervention group versus -0.51 units in the control group after the 12-week intervention. The participants were followed up one year after baseline; however, the publication only provides results for fat free mass at one year, no BMI results were given.

Adverse events

In two trials, no adverse events occurred in either group (Woo 2004 - confirmed through author correspondence, and NCT02436330 - data given in clinical trials register). In 12 trials it was unclear whether adverse events occurred. This included six Epstein studies (Epstein 1985a; Epstein 1985b; Epstein 1985c; Epstein 2001; Epstein 2005; Epstein 2015) where it was unclear from the publications whether any adverse events occurred; however, after correspondence with the studies' author they highlighted that no adverse events were related to study participation but it was still unclear which studies had adverse events and what they were.

Secondary outcomes

The additive components across the studies varied greatly, therefore we analysed these comparisons in a separate meta-analysis from the usual-care and no-treatment controls for the primary analyses (see above) and have not used these comparisons in subgrouping. We have narratively described the secondary outcomes, as meta-analyses were not possible because the additive components that were investigated varied greatly between the studies.

Health-related quality of life and self-esteem

No trials measured health-related quality of life. However, NCT02436330 measured physical self-worth and global self-worth using the Children and Youth Physical Self-Perception Profile; no substantial differences between groups were found in changes from baseline to six months' follow-up.

All-cause mortality

No deaths were reported in any of the trials.

Morbidity

No trials measured morbidity.

Anthropometric measures other than change in BMI

Fourteen studies reported measuring other anthropometric measures; three of the eight studies that reported percent overweight found a significant difference in favour of the intervention group at the longest follow-up (Epstein 1985a; Epstein 1985c; Epstein 2015).

Waist circumference was measured in two studies (Larsen 2015; NCT02436330) but only Larsen 2015 found a difference in favour of the intervention group at the study's two-year endpoint (a similar finding was also seen for waist-to-height ratio). Woo 2004 measured waist-to-hip ratio, but found no substantial differences between groups.

Skinfold thickness was measured in Flodmark 1993 and found differences in reduction of all three skinfold measurements (triceps, subscapular and suprailiac) in favour of the intervention. Woo 2004 was the only study to measure body fat via DEXA – they found no substantial differences between groups.

Behaviour change

No studies used accelerometry to measure physical activity but NCT02436330 used pedometers to measure weekly steps – no substantial differences between groups were observed. Epstein 2005 used a three-day physical activity recall method to measure MVPA but found no substantial differences between groups. Three studies measured physical work capacity/physical fitness using a bicycle ergometry test and two of these studies found a treatment difference (Epstein 1985b; Flodmark 1993) while the remaining study found no substantial difference between groups (Epstein 1985a). NCT02436330 measured after school and Saturday screen time but found no substantial differences between groups at six months.

NCT02436330 measured dietary intake using "The Block Alive food frequency questionnaire (FFQ)". An increase in carbohydrates was seen in the treatment group compared to the control; however, the number of fruit servings was higher in the control group after six months. No substantial differences were found between groups in the other dietary domains (total calorie intake, percent fat, number of vegetable servings, sugar-sweetened beverage intake). Dietary intake was also measured by two studies (Duffy 1993; Epstein 2015) using a Traffic Light Diet questionnaire but only Epstein 2015 found a treatment effect for the reduction in red foods (unhealthy foods) and also fat intake, but they did not observe a substantial difference between groups in total calorie intake. Epstein 2005 measured dietary intake through a habit book and found a treatment effect

at six and 12 months in alternatives to eating (activities that did not involve eating) but did not see a substantial difference between groups in eating periods. Two studies used the O'Neil 1979 questionnaire (Epstein 1985a; Epstein 1985c) to assess eating behaviours but only differences in favour of the intervention group were observed in Epstein 1985c.

Participant views

No studies measured participants' views of the intervention

Socioeconomic effects

No trials measured socioeconomic effects.

Cluster RCTs

All cluster RCTs had a usual care or no treatment control group except Berry 2007 which added a coping skills training element to a family behavioural therapy intervention.

Primary outcomes

Changes in body mass index (BMI), BMI z score and weight

We meta-analysed two cluster RCTs (Berry 2007; Taveras 2015) (Analysis 3.1) and demonstrated no substantial difference in BMI in the intervention groups compared with controls at the final follow-up: mean difference (MD) -0.49 kg/m^2 (95% CI -1.24 to 0.27); P = 0.20; 2 trials; 629 participants. Taveras 2015 also reported the BMI z score - compared with the usual care group, children in the two intervention arms (clinical decision support and clinical decision support plus individual family coaching) showed a small mean change in BMI z score: -0.06 (95% CI -0.11 to -0.02) and -0.05 (95% CI -0.09 to 0.00), respectively. No substantial differences were found between the two treatment groups.

Wright 2012 presented changes in BMI and BMI z score at 12 months' follow-up; however, there were concerns over the 95% CIs presented which we suspected were ranges rather than CIs. We tried to contact the study author to clarify but did not receive a response. Therefore, we did not include this study in the meta-analysis. The publication reports that there were between-group differences in BMI and BMI z score, in favour of the intervention group. We did not include Berry 2014 in the meta-analyses for BMI/BMI z score because it was not clear from the publication how many children were included in the follow-up analysis. The publication reported that there were no substantial differences between groups for BMI percentile at both 12 and 18 months' follow-up.

There were no cluster trials that reported data on weight.

Adverse events

In the four cluster trials in this review, Berry 2007, Berry 2014 and Taveras 2015 had no adverse events in either group (confirmed through study author correspondence). It was unclear if any adverse events occurred in Wright 2012.

Secondary outcomes

Health-related quality of life and self-esteem

No trials measured health-related quality of life or self-esteem.

All-cause mortality

No deaths were reported in any of the trials.

Morbidity

No trials measured morbidity.

Anthropometric measures other than change in BMI

Berry 2007 measured body fat percentage using bioelectrical impedance analysis (BIA) but found no substantial differences between groups at the study's endpoint. Berry 2014 measured waist circumference and found a treatment effect at 12 months' follow-up but not at 18 months. Triceps and subscapular skinfolds were also measured and a treatment effect was found at 18 months' follow-up.

Behaviour change

Activity was measured using pedometers (number of steps) in Berry 2007 but no substantial differences between groups were observed at follow-up.

Berry 2014 used the Child and Adolescent (CATCH) questionnaire to measure diet and physical activity changes, but only dietary knowledge was improved in the intervention group at 18 months compared to the control. Berry 2014 also used the Child Health behaviour survey by the Department of Health and Human Services 2004 to measure dietary habits and only found a treatment effect for reduced soda consumption at 18 months. Wright 2012 used the Child and Adolescent Trial for Cardiovascular Health After-School Student Questionnaire (ASSQ) to assess dietary intake and eating behaviours and found treatment effects for some outcomes (e.g. fruit and vegetable intake, food intentions); however, others showed no substantial differences (e.g. sweets intake, always reading food labels).

Participants' views

Participants' views were measured in one cluster trial (Taveras 2015) that involved two clinical-led interventions compared against a usual-care group; the most intensive intervention was highly rated by parents (81.3% were satisfied) while only 46.9% of the parents in the less intensive intervention were satisfied.

Socioeconomic effects

No trials measured socioeconomic effects.

Maintenance intervention following weight reduction

Primary outcomes

Changes in body mass index (BMI), BMI z score and weight

Two trials reported BMI z score data (de Niet 2012; Wilfley 2007) that could be meta-analysed (Analysis 4.1) and demonstrated no difference in BMI z score in the intervention groups compared with controls at the final follow-up: mean difference (MD) -0.07 units (95% CI -0.19 to 0.04); P = 0.22; 2 trials; 263 participants). There were no maintenance trials that reported data for BMI or for body weight suitable for meta-analysis.

Adverse events

Both trials had no adverse events (de Niet 2012 confirmed through study author correspondence, and Wilfley 2007 through information in the publication).

Secondary outcomes

Health-related quality of life and self-esteem

de Niet 2012 used The Child Health Questionnaire-PF50 (CHQ-PF50) to measure health-related quality of life. A treatment effect was found at three and six months' follow-up in the physical domain but this was lost at nine months' follow-up. de Niet 2012 also measured self-esteem using the Self-Perception Profile for Children (SPPC)/ Harter global score but found no substantial differences between groups at nine months.

All-cause mortality

No deaths were reported in any of the trials.

Morbidity

No trials measured morbidity.

Anthropometric measures other than change in BMI

Wilfley 2007 measured percentage overweight at two years' follow-up but found no substantial differences between the treatment and control groups. The BMI z score meta-analysis for maintenance trials (Analysis 4.1) showed no substantial differences between groups.

Behaviour change

The Dutch Eating Behaviour Questionnaire (DEBQ) was used to measure behaviour change in de Niet 2012. A treatment effect was seen for external eating at three months from baseline, but not at six or 15 months. No substantial differences were observed in emotional eating or restrained eating.

Wilfley 2007 used a Child Dietary Self-efficacy scale and found a treatment effect at two-year follow-up for the social facilitation maintenance intervention group when compared against the control group; the behavioural-skills maintenance intervention group showed a treatment effect compared with control but only at one-year follow-up. There were no substantial differences between the two treatment groups. Wilfley 2007 also used a Self-efficacy Scale for Children's Physical Activity but only found a difference in favour of the social facilitation maintenance for 'positive alternatives to unhealthy habits' (increasing healthy foods and decreasing sedentary behaviour) at two years; no substantial differences were found for barriers between treatment groups.

Participants' views

No studies measured participants' views of the intervention.

Socioeconomic effects

No trials measured socioeconomic effects.

Subgroup analyses

We performed a number of subgroup analyses to test the effects of different types of comparators, the type of intervention, the setting, risk of attrition bias, duration of post-intervention follow-up, the involvement of parents, and mean baseline BMI z score on outcomes of BMI, BMI-z score and weight.

We did not perform subgroup analyses on the different durations of follow-up from baseline, combining those studies reporting six months' follow-up, those reporting 12 months' follow-up and those reporting 18 months' follow-up or more. Neither did we perform subgroup analyses based on the length of the interventions, combining studies with a duration of intervention of six months or less and studies with duration of intervention of greater than six months. This would have resulted in some studies being included in more than one subgroup for the duration of follow-up because some studies reported follow-up at multiple time points. Also, grouping studies according to whether they were six months or less or greater than six months would not assess all studies immediately post-intervention and would not evaluate the actual length of active intervention for all studies. We were most interested in the longer-term effects of weight-management interventions and the sustainability of weight reduction. Due to the relatively large number of included studies in this review we were able to subgroup according to duration of post-intervention follow-up, that is, we could assess whether follow-up after the active intervention, and the duration of that follow-up period, impacted on BMI, BMI z score and weight outcomes.

Type of control

We did not see any subgroup differences for change in BMI, BMI z score and weight when comparing studies with controls described as 'no intervention' and studies with controls described as 'usual care' (Analysis 1.14; Analysis 1.15; Analysis 1.16).

Type of intervention

The majority of studies were multi-disciplinary interventions, however, some studies were single or dual interventions. We did not see any subgroup differences for change in BMI (Analysis 1.17), change in BMI z score (Analysis 1.18) or change in weight (Analysis 1.19).

Risk of attrition bias

We did not see any subgroup differences when combining studies according to high, low or unclear risk of attrition bias for change in BMI (Analysis 1.20), change in BMI z score (Analysis 1.21) or change in weight (Analysis 1.22).

Setting of intervention

For setting, the studies were divided into eight subgroups, school, community, home, primary care, secondary care, university research clinics, hospital inpatient and mixed settings. We did not see any subgroup differences for change in BMI (Analysis 1.25), change in BMI z score (Analysis 1.24) or change in weight (Analysis 1.23).

Duration of post-intervention follow-up

We put studies into subgroups based on whether they had a period of post-intervention follow-up (defined as the period after the active intervention and up to the final measurement) and the duration of that period: no post-intervention follow-up (N = 15), less than six months (N = 3), six months to less than 12 months (N = 2) and post-intervention follow-up lasting 12 months or longer (N = 4). We calculated the duration of no post-intervention follow-up by subtracting the active intervention period from the total duration of the study (i.e. intervention and all follow-up duration).

For change in BMI (Analysis 1.26), combining studies by post-intervention follow-up indicated a statistically significant subgroup difference (P = 0.03), however this is not reliable because all the

CIs overlap (to a small degree, regarding the CI for studies with post-intervention follow-up 12 months or more versus no post-intervention follow-up). There were no subgroup differences for BMI z score change (Analysis 1.27) or change in weight (Analysis 1.28).

Parental involvement

We put studies into subgroups based on whether the intervention involved the parent and child, whether only the child was treated without any parental involvement and whether the parent was specifically targeted (but the child was included in the intervention). There was no subgroup difference on change in BMI (Analysis 1.29), change in BMI z score (Analysis 1.30) or change in weight (Analysis 1.31).

Mean baseline BMI z score

We put studies into subgroups based on whether the mean baseline BMI z score was less than 2.67 units or 2.67 units or greater (which equates to the 99.6th centile for severe obesity). There was no subgroup difference on change in BMI z score (Analysis 1.32).

Sensitivity analyses

We performed sensitivity analyses restricting the main BMI, BMI z score and weight meta-analyses (Analysis 1.1; Analysis 1.2; Analysis 1.3) to those studies that provided change score data (along with an SD, SE and 95% CI). Hence, we excluded studies where the mean change score SD was not provided but was imputed following the guidelines in the *Cochrane Handbook for Systematic Reviews of Interventions* (Section 16.1.3.2 Imputing standard deviations for changes from baseline; Higgins 2011c) and assumed a correlation of 0.5 between baseline and follow-up measures as suggested by Follmann 1992. All three sensitivity analyses were very similar to the original analyses; which showed that our original analyses were robust (see Table 2).

Assessment of reporting bias

We generated funnel plots for the primary outcomes of BMI, BMI z score and weight, as these analyses included the highest number of studies on which to assess publication bias. Inspection of the funnel plots for BMI and weight (but not BMI z score) showed an uneven distribution of studies and suggested a possibility of small study bias (data not shown).

DISCUSSION

Summary of main results

We included 70 trials in this review, with 55 comparing a behaviour-changing intervention with no treatment or usual-care control and 15 testing an additional component added to a behaviour-changing intervention. The vast majority of trials were multicomponent (N = 64) and individual trial sample sizes ranged from 16 to 686 participants. Total duration of trials ranged from six months to three years; duration of active intervention ranged from 10 days to two years. Just over half (37) of the trials had a period of post-intervention follow-up with a median duration of 10 months.

A total of 8461 participants were randomised to either the intervention or control groups; approximately 69.5% of participants were measured at the study's endpoint. Primary analyses demonstrated that behaviour-changing interventions compared to no treatment or usual-care control reduced BMI, BMI z score and body weight. We could pool data from 24 trials reporting BMI for analysis, which demonstrated a reduction in BMI in favour of the intervention (measured at the last available point of follow-up) of -0.53 (95% CI -0.82 to -0.24); 24 trials; 2785 participants; low-quality evidence). Thirty-seven trials reported BMI z score data suitable for meta-analysis, which resulted in a reduction in favour of intervention (measured at last available point of follow-up) of -0.06 units (95% CI -0.10 to -0.02); 37 trials; 4019 participants; low-quality evidence). Seventeen trials reported change in body weight that could be meta-analysed, and demonstrated a reduction in body weight in the intervention groups compared with controls at the final follow-up: MD -1.45 kg (95% CI -1.88 to -1.02); P < 0.00001; 17 trials; 1774 participants; low-quality evidence).

We excluded from the main analysis the 15 trials that evaluated an additional component to a behaviour-changing intervention, as the additive elements under investigation were extremely diverse and not comparable to the other interventions.

Thirty-five trials had no adverse events, 29 trials were unclear as to whether adverse events occurred and six trials reported a range of adverse events in a small percentage of participants. Thirty one trials documented serious adverse events, although the vast majority (N = 29) reported zero occurrence.

Six trials (718 participants) reported paediatric quality of life inventory, two trials (144 participants) reported a measure of self-esteem, two trials (168 participants) reported change in caloric intake and six (744 participants) reported accelerometry-measured physical activity; however, none of these analyses demonstrated a significant difference between intervention and control. In the two trials reporting on minutes per day of TV viewing, a small reduction of 6.6 minutes per day (95% CI -12.88 to -0.31), P = 0.04; 2 trials; 55 participants) was found in favour of the intervention.

No trials reported on all-cause mortality, morbidity or socioeconomic effects, and few trials reported on participant views; none of which could be meta-analysed.

As the meta-analyses revealed significant heterogeneity, we conducted subgroup analyses to examine the impact of type of comparator, type of intervention, risk of attrition bias, setting of intervention, duration of post-intervention follow-up period, type of parental involvement and mean baseline BMI z score. No substantial subgroup effects were shown for any of the subgroups on any of the outcomes (BMI, BMI z score or weight). There was an indication of an effect for duration of post-intervention follow-up for BMI only, which demonstrated that intervention effects between groups differed only immediately post intervention (heterogeneity increased) and for post-intervention follow-up of less than six months (heterogeneity reduced to zero), however this hypothetical finding has to be further investigated in independent studies. These findings align with data from the two trials (263 participants) identified in this review that specifically examined the impact of a maintenance period following weight loss on BMI z score and found no substantial difference between intervention and control.

Overall completeness and applicability of evidence

This review contains the largest number of trials and participants, compared to the other systematic reviews in this series (surgery; drugs; parent-only interventions; diet, physical activity and

behavioural interventions for young children aged 0 to 6 years, and adolescents aged 12 to 17 years).

The bulk of the evidence was derived from multicomponent interventions that involved the parent and child. The interventions varied in duration including longer-term interventions (up to three years) and follow-up after a period of no active intervention in half of the trials. The majority of evidence relates to trials published from 2000 onwards; however, there was no evidence included from trials conducted in lower middle-income countries. The review included evidence from a wide variety of settings. There was less evidence relating to younger children (median age was 10 across the trials) and for non-white children; however, both girls and boys were equally represented. These limitations call into question the transferability of the findings to cultural and geographic settings other than upper- and upper middle-income countries . Therefore, the results should be interpreted carefully within the context of local population needs (i.e. age, sex, socioeconomic status, ethnicity, religion, culture, disabilities/complex needs, severity of obesity) and local political and health systems.

All participants included in this review were overweight, obese or severely obese at baseline. Whilst any reduction in body mass in overweight or obese children may be of benefit, the small reduction observed in the studies included in this review may not be sufficient to improve or prevent obesity-related comorbidities. Indeed there was a lack of data reported on obesity-related comorbidities. The authors of a recent study in England (in older school aged children – median age 12.4 years) reported that a reduction of 0.25 BMI z score units was required to improve adiposity and metabolic health (Ford 2010). This is a reduction much higher than that observed in this review.

Very few studies measured any of the review's secondary outcomes other than anthropometric outcomes, the results of those that did were inconsistent and used a variety of measurement tools. Outcome results were also inconsistent depending on the timing of measurements within the studies. In summary, the data were too limited and heterogeneous to enable any meaningful synthesis of secondary outcomes for those studies that investigated adding a component to a behaviour-changing intervention, maintenance trials and cluster RCTs. Meta-analyses of secondary outcomes for usual care/no treatment comparators showed no substantial differences between groups or wide 95% CIs, or both.

Quality of the evidence

We rated over half (N = 48) of the 70 included studies as having a low risk of selection bias based on the randomisation method they used. We rated 49 studies as low risk of bias for allocation concealment. However, we rated a majority of trials as high risk of bias for blinding (for both performance and detection bias). Forty-five studies did not blind their participants or study personnel to study group allocation with regards to objective measures. Only eight trials did not have a high risk of bias on at least one criterion.

GRADE assessments of the outcomes in this review led to trials being downgraded for risk of bias, inconsistency and also imprecision. This made overall interpretation of the data difficult. Overall the quality of included trials was low for BMI, BMI z score, weight, adverse events and parent-reported health-related quality of life, and very low for child-reported health-related quality of life.

Potential biases in the review process

The review identified all relevant trials with searches from inception of databases to July 2016 and all efforts were made to include studies published up until the start of November 2016 and to obtain any additional data.

There is a potential bias in terms of the wider applicability of the findings, with the vast majority of included studies conducted in high-income countries, with a heavy reliance on data from the USA. It is also unclear as to applicability of the findings in populations of different socioeconomic status and ethnicity, due to lack of reporting of ethnicity data in the majority of trials.

The impact of the comparator group should also be considered, given that a significant proportion of studies used a ‘usual care’ condition which varied greatly in terms of content and intensity; there was an element of subjectivity introduced in that review authors had to sometimes assess whether the comparator was 'usual care' if not reported by the study authors as such.

We attempted to contact all study authors whenever there were missing data or clarification was needed. The majority of studies did not report if adverse events occurred; hence, we contacted study authors for this information. Some study authors did not reply and this may have introduced bias. However, we felt it was important to contact study authors about adverse events because reporting was so poor. Furthermore, we had concerns that some studies never measured or documented adverse events, so if any did occur, they would not have been captured.

Agreements and disagreements with other studies or reviews

This review is a partial update to a previous Cochrane Review: the original review 'Interventions for treating obesity in children and adolescents' (Oude Luttikhuis 2009) was split into six separate reviews, with a specific intervention and age focus.

- Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in adolescents aged 12 to 17 years
- Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in children from the age of 6 to 11 years
- Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in preschool children up to the age of 6 years (Colquitt 2016)
- Drug interventions for the treatment of obesity in children and adolescents (Mead 2016a)
- Parent-only interventions for childhood overweight or obesity (Loveman 2015)
- Surgery for the treatment of obesity in children and adolescents (Ells 2015b)

This review is now a stand-alone review of all the RCT evidence relating to the treatment of overweight or obesity in children aged 6 to 11 years. The evidence base contained in this review has increased substantially; the majority of these new trials have focused on multi-component interventions with a mix of diet, physical activity and behaviour-change elements. However, despite the substantial increase in available evidence, the overall effects in terms of BMI/BMI z score and weight reductions in

favour of interventions remain similar to the previous Cochrane Review of interventions to treat childhood obesity (Oude Luttikhuis 2009), with continued heterogeneity in terms of comparators, intervention content and delivery. The previous Cochrane Review (Oude Luttikhuis 2009) found very similar reductions in BMI z scores, in favour of the intervention for children under 12 years old, at 6 and 12 months' follow-up: -0.06 (95% CI -0.12 to -0.01) and -0.04 (95% CI -0.12 to 0.04), respectively.

When comparing the findings of this review to the other behaviour-changing intervention reviews in this series (preschool, adolescent and parent-only), our findings are very similar. The preschool review (Colquitt 2016) found slightly larger reduction in BMI z score in favour of the intervention group than in this review: -0.3 units (95% CI -0.4 to -0.2) for 6 to 12 months' follow-up, and -0.4 units (95% CI -0.6 to -0.2) for 12 to 18 months' follow-up. However, very similar reductions in BMI z score were found when comparing parent-only interventions to parent-child interventions (-0.04 units, 95% CI -0.15 to 0.08) and parent-only interventions with a waiting list control (-0.10, 95% CI -0.19 to -0.01) (Loveman 2015). Therefore, the other two reviews support the findings found in this review – small reductions in BMI and BMI z score occur when comparing behaviour-changing interventions to control groups.

The effects of behaviour-changing interventions for overweight/obese children were assessed in another recent systematic review and meta-analysis (Ho 2012). When comparing behaviour-changing treatments to no care or waiting list controls they saw a reduction of -1.00 kg/m^2 (95% CI -1.91 to -0.08) in favour of the intervention group for children 12 years old or less. A similar reduction was found when they compared the treatment group to a usual-care/minimal-intervention control group. A recent review assessing the effects of educational interventions to treat obesity in 6- to 12-year-old children (Sbruzzi 2013) found very similar reductions in BMI and BMI z scores to this review: -0.86 kg/m^2 (95% CI -1.59 to -0.14) and -0.06 units (95% CI -0.16 to 0.03), respectively.

An overview of reviews for childhood obesity is underway that examines interventions for the treatment of obesity in children using Cochrane methodology (Ells 2016 [pers comm]). This overview will bring together all the evidence for any type of intervention to treat childhood obesity and highlight any evidence gaps that remain.

All types of treatment interventions should also be viewed within the context of prevention interventions. It is interesting that the effect size for BMI z score reduction (measured at longest follow-up) observed in this treatment review of behaviour-changing interventions (MD -0.06 units (95% CI -0.10 to -0.02); P = 0.001; 37 trials; 4019 participants; low-quality evidence) is very similar to the BMI z score reduction (measured at first available point of follow-up after 12-weeks) observed in the recently updated (Brown 2016 [pers comm]) obesity prevention review (Waters 2011) of children aged up to 18 years (-0.05 units (95% CI -0.07 to -0.03); P < 0.00001; 58 studies; 53,777 participants; low-quality evidence).

AUTHORS' CONCLUSIONS

Implications for practice

Multi-component behaviour-changing interventions that incorporate diet, physical activity and behaviour-change components may be beneficial in achieving small, short-term reductions in body mass index (BMI), BMI z score and weight in children aged 6 to 11 years. The evidence was low quality for BMI, BMI z score and weight; and there was a limited number of trials reporting low- to very low-quality evidence for health-related quality of life including self-esteem. Although data on adverse events were not well reported and of low quality, where provided, the evidence suggests a very low occurrence of adverse events. The heterogeneity observed across all outcomes was not explained by subgrouping based on the type of intervention, type of comparator, setting, risk of bias, parental involvement or severity of obesity at baseline. The sustainability of any observed reduction in BMI/BMI z score and body weight is a key consideration and there is a need for longer-term follow-up of these children. The evidence highlights a focus in paediatric obesity on initial weight reduction interventions rather than longer term maintenance interventions. This review demonstrates that interventions show effects at the end of the intervention and up to six months post-intervention; the fact that these intervention effects might not persist is not a failure of the initial intervention, but due to a lack of maintenance interventions. Obesity is a severe chronic relapsing disease becoming manifest in an obesity-conducive environment, therefore it is unsurprising that short-term effects do not persist. Continued support through obesity maintenance interventions are required to build upon behaviour changes which increase resilience to obesity-conducive environments.

Implications for research

The systematic review identified 20 ongoing trials of behaviour-changing interventions, which will contribute data to the results of an updated review. Further research is required of interventions in lower income countries and in children from ethnic minority groups. We still do not understand what the key components of multicomponent interventions are that contribute to success, and for which children. Study designs other than randomised controlled trials may be helpful in improving our understanding.

Children aged 6 to 11 years are likely to require the support of families (hence only five of the 70 included interventions targeted the child and did not involve parents) which adds another layer of complexity, particularly given that we know parents are also likely to be suffering from excess weight; further research into the optimal ways of involving parents in paediatric obesity interventions is required. Despite this review including many more studies compared with the original review (Oude Luttikhuis 2009), the effect size on BMI z score is almost identical. Although the evidence is of low or very low quality according to GRADE, the review authors believe that it is unlikely that any subsequent update would dramatically alter the effects on BMI, BMI z score or weight. Perhaps a change of focus is required, for example, qualitative research to further our understanding of what works for who, when and why, in the context of the family, in order to tailor and target future obesity interventions. Future research could examine family-based approaches that treat both obese parents and children simultaneously, similar to two studies included within this review (Berry 2007; Berry 2014).

Further research is required on the impacts of these interventions for health-related quality of life, long term diet and activity behaviour change and obesity-related comorbidities. There is a need for standardised reporting of key outcomes and moderators (e.g. ethnicity, health-related quality of life, diet and physical activity changes and socioeconomic status). Cost data were not

considered within the remit of this review; nine of the 70 (13%) included studies measured costs associated with resource use or cost effectiveness of the intervention (Bryant 2011; Coppins 2011; Hughes 2008; Kalavainen 2007; Lison 2012; McCallum 2007; Reinehr 2010; Wake 2009; Wake 2013). Nine studies reported on cost data using a variety of different reporting methods. Whilst Wake 2013 planned a full economic evaluation, this was not conducted, as the programme did not prove to be effective, and Lison 2012 simply reported that the hospital-based intervention was more expensive when compared to the home-based approach. Kalavainen 2007 reported a cost per 0.1 decrease in BMI SDS of EUR 168 for the intervention group, whilst Reinehr 2010 reported a cost per family of EUR 652. The remaining five studies provided an estimated cost of the intervention per person ranging from GBP 108 (Hughes 2008), GBP 403 (Coppins 2011), GBP 858 (Bryant 2011), AUD 873 (McCallum 2007) and AUD 1317 (Wake 2009). However, not all of these studies conducted formal cost-effectiveness analyses. As these outcomes are vitally important for practice implications and decision-makers, it is import that these outcomes are systematically reviewed.

A UK tracking study (Mead 2016b) using data from the Millenium cohort showed that overweight and obese children at 4/5 years old are very likely to remain overweight and obese at 11/12 years old. In addition, obese deprived boys at age 4/5 were more likely to remain obese at age 11/12 compared with non-deprived obese boys (trend not seen in girls). Therefore, interventions targeted at children aged 6 to 11 years are capturing an important timeframe, however there is a complete lack of data reporting on the potential moderating effect of socioeconomic status on obesity.

Further work is required to determine the most appropriate and effective forms of post intervention maintenance, including the level of intensity and different modes of maintenance intervention, in order to ensure intervention benefits are sustained over the longer term.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Alves 2008

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: BMI ≥ 85th percentile (CDC growth charts), absence of clinical evidence of heart disease (congenital or acquired), respiratory failure or type 1 diabetes, do not use drugs which interfere with cardiac response during exercise (e.g. beta blockers) **Exclusion criteria**: - **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: none **Intervention:** exercise group **Comparator:** no-care control
Outcomes	**Outcome measures reported in abstract**: weight, BMI
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: Portuguese **Funding:** non-commercial funding (Cnpq, Brazilian Government) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To verify the effectiveness of an exercise intervention to control excess of body weight without the incorporation of diet guidelines in children who lives in a deprived area in a developing country"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Patients were listed consecutively and after randomly selected, without spare, to compose the group intervention" **Comment:** adequate randomisation method
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed allocation was concealed

Alves 2008 *(Continued)*

Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed study was not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed study was not blinded
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Comment:** dropout rates fairly low
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol available
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Arauz Boudreau 2013

Methods	**Parallel RCT** **Randomisation ratio**: 3:2 during the first half of the study, and then 2:2 during the second half of the study to adequately fill the group classes **Superiority design**
Participants	**Inclusion criteria:** Latino children aged 9-12 years, overweight or obese (≥ 85th percentile or ≥ 95th percentile, CDC growth charts. Had received primary care at a single community health centre **Exclusion criteria**: children who had chronic diseases (other than asthma) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** lifestyle intervention and coaching on lifestyle behaviours **Comparator:** waiting-list control
Outcomes	**Outcome measures reported in abstract**: attendance, barriers to changing lifestyles to control obesity, HRQoL, obesity markers, BMI, physical activity
Study details	**Trial terminated early: no** **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** Robert Wood Johnson Foundation; Massachusetts General Hospital Multicultural Affairs Career Development Award; Massachusetts General Hospital Disparities Solution Center; Harvard Catalyst Clinical Research Center (Grant no. UL1 RR025758-01); NIH; National Center for Research Resources; and General Clinical Research Centers Program (non-commercial) **Publication status:** peer-reviewed journal

Arauz Boudreau 2013 *(Continued)*

Stated aim for study	Quote from publication: "To assess the feasibility and effectiveness of a family-centred, primary care-based approach to control childhood obesity through lifestyle choices"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** no description of the randomisation method
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** no subjective outcomes measured
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Although participants were randomized, because of the waitlist study design, neither participants nor study team members were blinded to group allocation" **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "Although participants were randomized, because of the waitlist study design, neither participants nor study team members were blinded to group allocation" **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "Although participants were randomized, because of the waitlist study design, neither participants nor study team members were blinded to group allocation" **Comment:** outcome assessors were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "A total of 67% (12/18) control and 61% (14/23) intervention participants took part in first and second visits" **Comment:** attrition rates were high
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "A total of 67% (12/18) control and 61% (14/23) intervention participants took part in first and second visits" **Comment:** attrition rates were high
Selective reporting (reporting bias)	Unclear risk	**Comment:** unable to find clinical trial record/protocol
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Barkin 2011

Methods	**Parallel RCT**

Barkin 2011 *(Continued)*

	Randomisation ratio: 1:1 **Superiority design**
Participants	**Inclusion criteria**: Latino children who were 8-11 years, BMI ≥ 85% adjusted for age and gender (CDC growth charts), parent > 18 years and committed to participating in the intervention **Exclusion criteria**: - **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 2 **Run-in period**: no **Extension period**: no **Intervention:** group physical activity and goal setting **Comparator:** standard care counselling and health education session
Outcomes	**Outcome measures reported in abstract**: BMI (parents and children)
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** National Institutes of Health (NICHD Grant No. R21 HD050990-02) and 'The Collaborative to Strengthen Families and Neighborhoods' – part funded by The Duke Endowment (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To assess whether body mass index (BMI) change in preadolescents reflected that of their participating parent."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** no description of randomisation method
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed. No mention in text
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear if participant and study personnel were blinded. No mention in text
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear if outcome assessors were blinded. No mention in text
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "For this community-based randomized controlled trial, we had a 68% retention rate, consistent with other studies of this kind."

Barkin 2011 *(Continued)*

		"The completers (those who completed both baseline and 6-month data) did not differ significantly on the variables of interest compared with those who did not complete the study (refer to Table 3)." **Comment:** attrition rates were high and bias assessed as high even with multiple imputation method used. Only 45% of participants were followed up
Selective reporting (reporting bias)	High risk	**Comment:** they only report baseline and change from baseline BMI measurements for both groups combined, don't report them individually for intervention and control groups. No clinical trial register or protocol to assess reporting of outcomes
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Bathrellou 2010

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: overweight or obese children (IOTF growth references), aged 7-12 years **Exclusion criteria**: chronic physical or mental illness **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** behavioural intervention with parental involvement **Comparator:** behavioural intervention without parental involvement
Outcomes	**Outcome measures reported in abstract**: percent overweight
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** part funded by the Department of Nutrition and Dietetics Graduate programme (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "In this context, the aim of the present study was to evaluate the effectiveness of involving parents in an intense childhood obesity programme involving lifestyle intervention based on cognitive behavioral therapy (CBT) principles and assigning high self-management to the children"
Notes	-
Risk of bias	

Bathrellou 2010 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** no description of randomisation method
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear if participant and study personnel were blinded
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear if outcome assessors were blinded
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Although most children attended the intensive phase of the intervention (88%), only three quarters of the children completed all stages of the 18-month follow-up assessment." **Comment:** relatively high dropout rates at the end of the follow-up
Selective reporting (reporting bias)	Unclear risk	**Comment:** methods paper lists a number of outcomes they plan to measure including diet, physical activity, biochemical & metabolic and psychological measures. However, in the results of the publication only BMI and percent overweight are mentioned - and only percent overweight results are given (in graph), not BMI - potential reporting bias
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Berry 2007

Methods	**Cluster RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 7-17 years who assented, children whose BMI > 85th percentile (CDC growth charts), parents who consented and had a BMI > 25, English or Spanish speaking parents and children, any ethnic group (white, black or Hispanic), no major diagnosis that would affect participation **Exclusion criteria**: - **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** nutrition and exercise education programme (NEEP) plus coping skills training (CPT) **Comparator:** nutrition and exercise education programme (NEEP) only

Berry 2007 *(Continued)*

Outcomes	**Outcome measures reported in abstract**: BMI, body fat percentage, pedometer steps, parental behaviour outcomes
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** research grants (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The purpose of this pilot study was to determine the effects of the addition of coping skills training for obese multiethnic parents whose overweight children were attending a weight management program."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication: :** "After participants consented and children assented to join the study, they were randomized by class, using the "sealed envelope technique" in blocks of 8-10 parent-child dyads to either the experimental group or the control group" **Comment:** adequate randomisation method
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "sealed envelope technique" **Comments:** it's likely allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Low risk	**Comment:** study author confirmed via email that participants and personnel were blinded
Blinding of participants and personnel (performance bias) Objective outcomes	Low risk	**Comment:** study author confirmed via email that participants and personnel were blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "Trained research assistants blinded to the study group collected clinical and psychosocial data" **Comment:** outcome assessors were blinded
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Trained research assistants blinded to the study group collected clinical and psychosocial data" **Comments:** outcome assessors were blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "dropout rates and loss to follow up were moderate" **Comments:** potential attrition bias
Incomplete outcome data (attrition bias)	Unclear risk	**Quote from publication:** "dropout rates and loss to follow up were moderate"

Berry 2007 *(Continued)*

Objective outcomes		**Comments:** potential attrition bias
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trial register entry available
Other bias	High risk	**Comment:** was a cluster-RCT and did not adjust for clustering in their analyses

Berry 2014

Methods	**Cluster-RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children and parents able to speak, read and write in English, children in the 2nd-4th grade (age 7-11 years), children with a BMI ≥ 85th percentile (CDC growth charts), at least 1 biological parent with a BMI ≥ 25 kg/m2 and parent must live with the child, child self-consent and parental consent to participate **Exclusion criteria**: if parent or child had congenital heart disease, a heart murmur, family history of sudden death or claustrophobia, if parent or child were participating in other weight management programme, Asian descent (due to lower BMI cut-offs for overweight and obesity) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 8 **Run-in period**: no **Extension period**: no **Intervention:** nutrition and exercise education and coping skills intervention **Comparator:** waiting list control, usual care
Outcomes	**Outcome measures reported in abstract**: BMI percentile children, triceps growth rate, subscapular skinfolds growth rate, dietary knowledge, glasses of soda/d, eating, exercise self-efficacy parental BMI, parental triceps growth, parental subscapular skinfolds growth, parental nutrition knowledge, parental exercise knowledge, parental water and unsweetened drinks consumption, parental eating self-efficacy, parental emotional eating self-efficacy, parental exercise self-efficacy
Study details	**Trial terminated early:** no **Trial ID:** NCT01378806
Publication details	**Language of publication**: English **Funding:** National Institute of Health and the National Institute of Nursing Research (1R01NR010254-05) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The purpose of this study was to test a 2-phased nutrition and exercise education, coping skills training, and exercise intervention programme for overweight or obese low-income ethnic minority 2nd to 4th grade children and their parents in rural North Carolina, USA"
Notes	-

Berry 2014 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Quote from publication:** "Schools were randomized to either the experimental or the control group for the first enrollment and exchanged conditions for the second enrolment. The sequence of each school was randomized before the start of the study and was stratified by county. A total of 18 months had passed and the first group had completed their time in the study prior to the second enrollment in each school. This design preserved a balance of treatment groups within each site to avoid confounding site effects with intervention effects" **Comment:** randomisation process described but there were baseline differences likely due to the cluster randomisation – potential bias
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "Participants and staff were blinded to group assignment from enrolment until implementation." **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Low risk	**Comment:** study author confirmed via email that participants and personnel were blinded
Blinding of participants and personnel (performance bias) Objective outcomes	Low risk	**Comment:** study author confirmed via email that participants and personnel were blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Comment:** study author confirmed via email that outcome assessment was blinded
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Comment:** study author confirmed via email that outcome assessment was blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "To assess the extent of selection bias owing to attrition, the mean values for parent BMI and for child BMI percentiles were compared between those participants who did not contribute data beyond the Phase I intervention and those who did. There were no significant differences between these groups, either overall or by experimental group (P=0.35)." **Comment:** sensitivity analysis performed between completers and dropouts – low dropout overall
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "To assess the extent of selection bias owing to attrition, the mean values for parent BMI and for child BMI percentiles were compared between those participants who did not contribute data beyond the Phase I intervention and those who did. There were no significant differences between these groups, either overall or by experimental group (P=0.35)." **Comment:** sensitivity analysis performed between completers and dropouts – low dropout overall
Selective reporting (reporting bias)	Low risk	**Comment:** no differences found between publication and protocol/clinical trial register entry

Berry 2014 *(Continued)*

Other bias	Unclear risk	**Comment:** was a cluster-RCT and adjusted for clustering in their analyses

Boutelle 2014

Methods	**Parallel RCT** **Randomisation ratio**:1:1 **Superiority design**
Participants	**Inclusion criteria**: overweight children (≥ 85th percentile, CDC growth charts), age 8-12 years, the children ate > 10% of their daily caloric intake in the free access paradigm, children must also like cheese pizza (the dinner provided) **Exclusion criteria**: non-English speakers/readers, already participating in a formal weight loss programme, have a medical condition or taking medication which could influence growth or weight, and eating, food allergies or dietary restrictions, having a disability which would prevent them from participating **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** regulation of cues (ROC) programme **Comparator:** usual care control group
Outcomes	**Outcome measures reported in abstract**: acceptability ratings, child food responsiveness, eating in the absence of hunger, body weight measures
Study details	**Trial terminated early:** no **Trial ID:** NCT01442142
Publication details	**Language of publication**: English **Funding:** University of Minnesota, Faculty Development Grant (R01DK094475 and K02HL112042) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "This study evaluated the feasibility, acceptability, and initial efficacy of an intervention based on Schachter's externality theory; the Regulation of Cues (ROC) program."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "the project coordinator used a computer-generated randomization table to assign participants to 1 of 2 possible treatment condition (ROC or control) by sex"

Boutelle 2014 *(Continued)*

		Comment: randomisation method well described
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants were not blinded
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants were not blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Comment:** study author confirmed via email that outcome assessment was blinded
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Comment:** study author confirmed via email that outcome assessment was blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "As can be seen in Figure 1, treatment completion rate was high for the ROC intervention" **Comment:** 95% and 82% of intervention and control group completed the follow-up – relatively low dropout rates
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "As can be seen in Figure 1, treatment completion rate was high for the ROC intervention" **Comment:** 95% and 82% of intervention and control group completed the follow-up – relatively low dropout rates
Selective reporting (reporting bias)	Unclear risk	**Comment:** clinical trial entry reports that there were three intervention groups and 1 control group; however, there is only 1 intervention group in the publication
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Bryant 2011

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 8-16 years, BMI > 98th percentile (UK 1990 growth references), parent or carer who spoke fluent English **Exclusion criteria**: a medical cause for obesity, severe learning difficulties, significant medical or psychiatric problems, siblings already enrolled in the study **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1

Bryant 2011 *(Continued)*

	Run-in period: no **Extension period**: no **Intervention:** WATCH IT intervention **Comparator:** waiting-list control
Outcomes	**Outcome measures reported in abstract**: recruitment, blinding success, sample size, costs
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN95431788
Publication details	**Language of publication**: English **Funding:** the Wellcome Trust Ltd. (078174/Z05/Z) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "Our aim was to conduct a feasibility trial of the evaluation of WATCH IT, a community obesity intervention for children and adolescents"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "After informed consent (parental consent and child assent) and baseline assessment, participants were randomised to either WATCH IT or a waiting list control for 12 months using a remote automated telephone randomisation system. Randomisation was stratified by BMI standard deviation score (SDS;≤3.0 vs. >3.0), age (≤12 years vs. >12 years), gender, and maternal level of education (less than General Certificate of Secondary Education (GCSE) or equivalent (attainment reached at the age of 16 years) vs. higher)." **Comment:** randomisation method well described
Allocation concealment (selection bias)	Low risk	**Comment:** allocation was concealed (as confirmed by study author)
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "An assessor-blinded randomised controlled feasibility trial" **Comment:** participants and study personnel were not blinded
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "An assessor-blinded randomised controlled feasibility trial" **Comment:** participants and study personnel were not blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "Follow-up assessments performed after randomisation were conducted by assessors who were blinded to the treatment allocation for each family." **Comment:** outcome assessment was blinded

Bryant 2011 *(Continued)*

Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Follow-up assessments performed after randomisation were conducted by assessors who were blinded to the treatment allocation for each family." **Comment:** outcome assessment was blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Retention strategies were not formalised within the protocol, but we had an acceptable level of dropout (24% withdrawal overall)." **Comment:** 75.7% follow-up – some losses to follow-up
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Retention strategies were not formalised within the protocol, but we had an acceptable level of dropout (24% withdrawal overall)." **Comment:** 75.7% follow-up – some losses to follow-up
Selective reporting (reporting bias)	Unclear risk	**Comment:** clinical trial entry retrospectively entered. Also, publication specifies this study was a feasibility study – hence, it doesn't report results of some of the outcome measures, e.g. HRQoL
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Coppins 2011

Methods	**Cross-over RCT** (however, analysed as a parallel RCT) **Randomisation ratio**: 1:1 **Superiority design** **Non-inferiority design**: (specify 1- or 2-sided confidence interval) **Equivalence design**: (specify 1- or 2-sided confidence interval) **Controlled clinical trial (CCT)**
Participants	**Inclusion criteria:** BMI > 91st centile (SIGN 2010 guidelines), children with intellectual disability were included if they were judged to be able to participate in the intervention, age 6-14 years **Exclusion criteria**: medical conditions which might impede physical activity – GPs were asked to notify the dietitian of such conditions (none were disclosed) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** multi-component family-focused education package **Comparator:** waiting-list control
Outcomes	**Composite outcome measures reported**: BMI z scores, weight, attendance
Study details	**Trial terminated early:** no

Coppins 2011 *(Continued)*

	Trial ID: ISRCTN55734850
Publication details	**Language of publication**: English **Funding:** Wessex Medical Research and The Public Health Department in States of Jersey funded the project. Department of Education, Sports and Culture, States of Jersey funded all the activities. The Channel Islands Co-op funded the food for all the healthy eating workshops; and Jersey Bowl sponsored the Family Project Xmas party (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To determine if a multi-component family focused education package is more effective than a waiting list control group in treating overweight and obese children"
Notes	Participants in the intervention and control groups crossed over into the other condition after 12 months – however, in the publication results are presented as if the trial was a parallel RCT. Hence, results are presented up to 12 months before the crossover

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Quote from publication:** from author (via email): "Simple random test/control each time a patient came forward." **Comment:** unclear if this method would have introduced bias
Allocation concealment (selection bias)	Low risk	**Comment:** allocation was concealed (as confirmed by study author)
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "A waiting list control group may also not have been the best comparison, as enrolment into the study may have had a placebo effect." "The lead investigator was also not blind to treatment allocation" **Comment:** participants and study personnel were not blinded
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "A waiting list control group may also not have been the best comparison, as enrolment into the study may have had a placebo effect." "The lead investigator was also not blind to treatment allocation" **Comment:** participants and study personnel were not blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** A waiting list control group may also not have been the best comparison, as enrolment into the study may have had a placebo effect." "The lead investigator was also not blind to treatment allocation" **Comment:** assume assessors were not blinded either
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "A waiting list control group may also not have been the best comparison, as enrolment into the study may have had a placebo effect." "The lead investigator was also not blind to treatment allocation" **Comment:** assume assessors were not blinded either
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "After the study was completed, we calculated the actual power of the study for an effect size of 0.3 for BMI SDS and it was about 60%." **Comment:** dropout rates were low

Coppins 2011 *(Continued)*

Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "After the study was completed, we calculated the actual power of the study for an effect size of 0.3 for BMI SDS and it was about 60%." **Comment:** dropout rates were low
Selective reporting (reporting bias)	Unclear risk	**Comment:** potential selective reporting as lifestyle outcomes only briefly reported with significant or not significant P values
Other bias	Unclear risk	**Comment:** study was presented as if it was a crossover trial where each participant was given the intervention and control condition. However, the results are only analysed comparing the 2 groups (I/C and C/I) - no individual analyses performed

Croker 2012

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: 8-12 years, overweight or obese (IOTF definition), at least 1 parent/guardian willing to participate in the intervention, parent and child could speak English well enough to take part in the groups and understand the materials **Exclusion criteria**: had an identified medical cause for obesity (e.g. hypothyroidism, Prada Willi syndrome), had type 2 diabetes, taking obesity medication, undergoing obesity treatment, had significant learning difficulties, the parent or child had significant mental health problems, were currently receiving psychological or psychiatric treatment including psychotropic medication **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** family-based behavioural treatment (FBBT) **Comparator:** waiting-list control
Outcomes	**Outcome measures reported in abstract**: BMI SDS, BMI, systolic blood pressure, QoL, eating attitudes, body composition, psychosocial outcomes, adverse events
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN51382628
Publication details	**Language of publication**: English **Funding:** Cancer Research UK, Great Ormond Street Hospital and Weight Concern (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To examine the acceptability and effectiveness of 'family-based behavioural treatment' (FBBT) for childhood obesity in an ethnically and socially diverse sample of families in a UK National Health Service (NHS) setting"

Croker 2012 *(Continued)*

Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Randomisation was carried out by a statistician; each child was given an ID code, and computer-generated random numbers were used to allocate them to a treatment condition." **Comment:** low risk of selection bias from randomisation method described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** (from author via email): "allocation was not known until they were randomised. This was a group programme and we randomised in waves, so waited until we had recruited enough families to run a treatment group. Families were informed of their group allocation as soon as they had been randomised." **Comment:** allocation was concealed (as confirmed by author)
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "It was not possible to blind families or clinicians to treatment allocation because of the nature of the intervention" **Comment:** participants and study personnel were not blinded
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "It was not possible to blind families or clinicians to treatment allocation because of the nature of the intervention" **Comment:** participants and study personnel were not blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Quote from publication:** "the researcher collecting anthropometric data was blinded to group allocation unless families disclosed this information" **Comment:** unclear if subjective outcomes were measured by a researcher who was blinded to the study group (only mentions anthropometric data which was an objective outcome)
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "the researcher collecting anthropometric data was blinded to group allocation unless families disclosed this information" **Comment:** outcome assessors measuring objective measures (anthropometric data) were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "22 of the children randomised to the treatment group completed the 6 month intervention (59% of those randomised and 73% of those starting treatment)" **Comment:** high dropout in the intervention group. Missing data replaced by baseline carried forward which is a highly criticised method
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "22 of the children randomised to the treatment group completed the 6 month intervention (59% of those randomised and 73% of those starting treatment)" **Comment:** high dropout in the intervention group. Missing data replaced by baseline carried forward which is a highly criticised method
Selective reporting (reporting bias)	High risk	**Comment:** potential reporting bias as study trial register states they aimed to measure additional outcomes not reported in this publication

Croker 2012 *(Continued)*

Other bias	Unclear risk	**Comment:** unable to assess if any other biases present

Davis 2013

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: criteria for school participation included having rural designation (in a town or county with a population < 20,000) and telemedicine capabilities (common in rural districts for distance learning), child living in rural Kansas and attending elementary school, child being overweight/obese for age/gender (≥ 85th percentile, CDC growth charts), parent able to speak English **Exclusion criteria**: developmental disability preventing child from participating, being immobile and preventing the child from increasing exercise **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 for each study **Run-in period**: no **Extension period**: no **Intervention:** telemedicine intervention **Comparator:** physician-visit intervention
Outcomes	**Composite outcome measures reported**: BMI z, dietary behaviours, physical activity behaviours
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** National Institutes of Health (DK068221) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The objective of the current study was to examine the effectiveness of a multidisciplinary weekly family-based behavioral group delivered via telemedicine to rural areas, compared with a standard physician visit intervention"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Children within each school were ranked based on an obesity factor (child BMI percentile plus primary parent BMI and stratified based on a household factor (single or dual parent household), and gender, according to previous research, which indicates these factors are closely linked to obesity and to treatment outcome. One child from each stratification was then randomly assigned (via a random numbers table) to the telemedicine

Davis 2013 *(Continued)*

		intervention (TM) with the other half of the pair being assigned to the physician visits (PV) intervention." **Comment:** low risk of selection bias from randomisation method described
Allocation concealment (selection bias)	Low risk	**Comment:** author confirmed allocation was concealed via email contact
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Quote from publication:** (from study author via email) "participants were blinded, and assessment personnel were blinded. Intervention personnel were not blinded." **Comment:** participants were blinded but study personnel were not
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Quote from publication:** (from study author via email) "participants were blinded, and assessment personnel were blinded. Intervention personnel were not blinded." **Comment:** participants were blinded but study personnel were not
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** (from author via email): "Yes, the assessment staff were blinded." **Comment:** assessment staff were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** (from study author via email): "Yes, the assessment staff were blinded." **Comment:** participants were blinded but study personnel were not
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** · "In terms of other outcome measures, attrition was not significantly different by group, but there was a trend for slightly higher attrition in the TM group compared with the PV group." **Comment:** potential attrition bias due to moderate dropout rates in intervention group
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "In terms of other outcome measures, attrition was not significantly different by group, but there was a trend for slightly higher attrition in the TM group compared with the PV group." **Comment:** potential attrition bias due to moderate dropout rates in intervention group
Selective reporting (reporting bias)	Low risk	**Comment:** no differences between protocol and publication found
Other bias	Unclear risk	**Comment:** unable to assess if any other biases present

Davoli 2013

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: overweight children (≥ 85th BMI percentile but ≤ 95th – CDC growth charts), age 4-7 years, live in the Reggio Emilia Province and assisted by that paediatrician for at least 12 months

Davoli 2013 *(Continued)*

	Exclusion criteria: metabolic pathologic conditions and all pathologic conditions related to overweight and obesity, families who did not consider childhood overweight/obesity being a problem and were not interested in advice to lose weight **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 69 (paediatricians working from their own centres in Reggio Emilia) **Run-in period**: no **Extension period**: no **Intervention:** family paediatrician-led motivational interviewing **Comparator:** usual care plus a booklet on obesity prevention
Outcomes	**Outcome measures reported in abstract**: attendance, BMI, parent-reported lifestyle behaviours
Study details	**Trial terminated early:** no **Trial ID:** NCT01822626
Publication details	**Language of publication**: English **Funding:** no external funding (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The aim of this study was to evaluate the effect of family pediatrician–led motivational interviews (MIs) on BMI of overweight (85th ≥BMI percentile ≤95th) children aged 4 to 7 years" "The objective of the current study was to examine the effectiveness of a multidisciplinary weekly family-based behavioral group delivered via telemedicine to rural areas, compared with a standard physician visit intervention"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Eligible children whose parents signed the informed consent form were centrally allocated to intervention or control groups according to a randomization list created by the Epidemiology Unit by using the package RALLOC (Stata version 11.0; Stata Corp, College Station, TX)" "Due to the practical constraints of a maximum of 3 treated children per pediatrician, different allocation rules were used according to the number of eligible children. To balance allocation within strata, observations were opportunely weighted" **Comment:** low risk of selection bias from randomisation method described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "Each paediatrician was informed of the group allocation by means of a corporate Intranet Web form customized for the trial (Supplemental Tutorial)." **Comment:** allocation likely concealed
Blinding of participants and personnel (performance bias)	High risk	**Quote from publication:** "The primary outcome was the individual variation of BMI, assessed by paediatricians unblinded to treatment groups." **Comment:** unlikely that participants and study personnel were blinded

Davoli 2013 *(Continued)*

Subjective outcomes		
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "The primary outcome was the individual variation of BMI, assessed by paediatricians unblinded to treatment groups." **Comment:** unlikely that participants and study personnel were blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "Both primary and secondary outcomes were assessed by the pediatricians without any blinding." **Comment:** assessment staff were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "Both primary and secondary outcomes were assessed by the pediatricians without any blinding." **Comment:** assessment staff were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "Compliance to the 1- year intervention was high, even for a population-based study involving almost all the pediatricians in the RE Province and a relevant sample of their overweight patients" **Comment:** 95% of participants completed the 1-year intervention – dropout low
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "Compliance to the 1- year intervention was high, even for a population-based study involving almost all the pediatricians in the RE Province and a relevant sample of their overweight patients" **Comment:** 95% of participants completed the 1 year intervention – dropout low
Selective reporting (reporting bias)	Low risk	**Comment:** no differences between protocol and publication found
Other bias	Unclear risk	**Comment:** unable to assess if any other biases present

de Niet 2012

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: overweight or obese (defined by Cole 2000 international survey), parent participation in the BFC (behavioural lifestyle treatment), sufficient knowledge of the Dutch language, parent and child fluent in Dutch language and show motivation to the programme (assessed by motivational interviewing) **Exclusion criteria**: behavioural programmes (score > 70 on Child Behaviour Checklist (CBCL), any disease causing overweight that can be treated with drugs, mental retardation **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 8 **Run-in period**: no **Extension period**: no

de Niet 2012 *(Continued)*

	Treatment before study *:* all participants took part in 3 months of behavioural lifestyle treatment **Intervention:** short message service maintenance treatment and behavioural lifestyle treatment **Comparator:** behavioural lifestyle treatment only
Outcomes	**Composite outcome measures reported**: physical health scores, number of SMS sent, weight loss, BMI, dropout rates
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN33476574
Publication details	**Language of publication**: English **Funding:** Vodafone (the Netherlands), and grants were received from the Erasmus University Medical Centre Rotterdam – MRACE (Medical Research Advice Committee) grant no. 2006-26 and Innovation Fund Insurances (Innovatiefonds Verzekeringen) grant no. 06–334 (commercial and non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The effect of a short message service maintenance treatment on body mass index and psychological well-being in overweight and obese children: a randomized controlled trial"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Randomization allocation in a 1:1 ratio was applied in a randomized block design. The blocks were formed by the treatment groups" **Comment:** randomisation method described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "The randomization allocation was printed on paper in a sealed envelope. An equal number of SMSMT and control notes were put in the envelopes. The researcher randomized the children to the SMSMT or control group by picking an envelope from a basket" **Comment:** allocation likely concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed nobody was blinded to the study group in the trial
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed nobody was blinded to the study group in the trial
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed nobody was blinded to the study group in the trial
Blinding of outcome assessment (detection bias)	High risk	**Comment:** study author confirmed nobody was blinded to the study group in the trial

de Niet 2012 *(Continued)*

Objective outcomes		
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Only 10 children in the intervention group dropped out of the BFC treatment (14%) in the period between 3 and 12 months compared to 21 children in the control group (31%)." **Comment:** potential attrition bias as more dropped out in control group
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Only 10 children in the intervention group dropped out of the BFC treatment (14%) in the period between 3 and 12 months compared to 21 children in the control group (31%)." **Comment:** potential attrition bias as more dropped out in control group
Selective reporting (reporting bias)	Unclear risk	**Comment:** raw data for many outcomes not reported in tables or text but given in graphs or reported as either significant or non-significant
Other bias	Unclear risk	**Comment:** unable to assess if any other biases were present

Diaz 2010

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: age 9-17 years, BMI > 95th percentile (CDC growth charts) or BMI > 90th percentile + WC > 90th percentile, willingness to attend the group sessions, caregivers showing an interest in weight control **Exclusion criteria**: glucose intolerance of type 2 diabetes, psychiatric disorders, medical condition that would preclude participating in the study, medication that affects weight or involvement in another weight loss programme, participants who had lost weight during the 4 months before the study **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Treatment before study** *:* 5% of volunteers took part in a previous cross-sectional study **Intervention:** behavioural curriculum plus registered dieticians and physician consultations **Comparator:** physician consultations only
Outcomes	**Outcome measures reported in abstract**: completion rates, body weight, BMI, insulin sensitivity
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** grant from the International Atomic Energy Agency (ARCAL 6/059) and CONACyT (R/182996) (non-commercial)

Diaz 2010 *(Continued)*

	Publication status: peer-reviewed journal
Stated aim for study	Quote from publication: "The main objective of this study was to compare a lifestyle intervention—primary care physician supported by a registered dietitian (RD) and a behavioral curriculum— to a brief primary care physician intervention for treating pediatric obesity in the primary care setting"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Once measurements were completed, the study statistician randomly assigned participants 1:1 to the lifestyle intervention or the control group by simple randomization, stratified according to sex. The randomization sequence was generated by a computer" **Comment:** randomisation method described
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** (from author via email) "Only study personnel who measured the primary outcomes were blinded to group assignments, as were personnel who measured body composition by dual-energy x-ray absorptiometry and performed blood work." **Comment:** study author confirmed participants were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** (from author via email): "Study personnel who measured the primary outcomes were blinded to group assignments, as were personnel who measured body composition by dual-energy x-ray absorptiometry and performed blood work." **Comment:** those who measured objective outcome were blinded to study group
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "A limitation of this study was the high attrition rates" "We also applied an intention-to-treat analysis at 12 months in the primary outcomes of the study. Considering the risk of bias of procedures for analyzing incomplete data, we made an effort to obtain the primary outcomes (weight and BMI) of all participants who dropped out of the study (n=33) measuring children at their homes. However, we were able to measure the primary outcomes only in 23 drop outs. Thus, intention-to-treat analysis included 66 (87%) of the original 76 randomized participants (lifestyle group, n=33; control group, n=33)." **Comment:** high risk of bias due to high attrition rates; however, the study authors measured 23/33 dropouts in their own homes and presented this presented this for weight and raw BMI; therefore, rated as unclear due to disparity
Selective reporting (reporting bias)	Unclear risk	**Comment:** no clinical trial register entry or protocol available
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Duffy 1993

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: age 7-13 years, exceeding 15% of ideal weight for age, height and sex (reference used unclear), 1 parent willing to attend sessions **Exclusion criteria**: none **Diagnostic criteria**: unclear
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** cognitive self-management training plus behaviour therapy **Comparator:** behaviour therapy plus attention placebo control methods
Outcomes	**Outcome measures reported in abstract**: percentage overweight, number of red foods/d
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** unclear **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The present study was therefore designed to evaluate the benefits of cognitive self-management techniques in enhancing the effectiveness of a traditional behavioural approach."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** no description of the randomisation process
Allocation concealment (selection bias)	Unclear risk	**Comment:** not clear whether allocation was concealed
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear if participants/study personnel were blinded
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear if outcome assessors were blinded to study group

Duffy 1993 *(Continued)*

Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Of the 27 children who commenced treatment, 21 completed therapy and were available for post-treatment and 3-month follow-up". "At the 6-month follow-up, four children who had completed the programme were not available, leaving eight in the BT + APC condition and nine in the CBT group" **Comment:** dropout rate high at 6 months' follow up (37%) and no ITT analysis
Selective reporting (reporting bias)	Unclear risk	**Comment:** no clinical trial register entry or protocol available
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Duggins 2010

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: age 5-17 years, BMI above the 85th percentile for age and sex (CDC growth charts) **Exclusion criteria**: no criteria for exclusion **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 2 family medicine clinics and a specialty Pediatrics Clinic and 6 YMCAs **Run-in period**: no **Extension period**: no **Intervention:** nutrition classes and family YMCA membership **Comparator:** nutrition classes only
Outcomes	**Composite outcome measures reported**: adherence, BMI percentile
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** KT Wiedemann Foundation, Children's Miracle Network, Medical Society of Sedgwick County, and the Greater Wichita YMCA (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "We sought to test the effectiveness of an evidence- based intervention that feasibly could be incorporated into the routine primary care of a diverse population."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement

Duggins 2010 *(Continued)*

Random sequence generation (selection bias)	Low risk	**Quote from publication:** "The study physician enrolled participants using a computer-generated randomization list" **Comment:** randomisation process adequately described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "The allocation sequence was concealed before randomization by using sequentially numbered envelopes containing the group-appropriate materials" **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Given the nature of the intervention neither clinicians nor participants were blind to the treatment allocation once randomization occurred." **Comment:** participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Given the nature of the intervention neither clinicians nor participants were blind to the treatment allocation once randomization occurred." **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "Participants' height and weight were collected and entered into the medical record at baseline and at 2 months, 4 months, 6 months, 9 months, and 12 months after enrollment by the nonblinded nursing staff." **Comment:** assessment staff were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "Participants' height and weight were collected and entered into the medical record at baseline and at 2 months, 4 months, 6 months, 9 months, and 12 months after enrollment by the nonblinded nursing staff." **Comment:** assessment staff were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "17 children were excluded from analysis, leaving evaluable data from 30 children in the control group and 36 in the treatment group." "Overall attendance at scheduled study-related visits was poor" **Comment:** 80% of participants were included in the ITT analysis however the publication does not specify how many completed the study. Furthermore attendance at sessions very low
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "17 children were excluded from analysis, leaving evaluable data from 30 children in the control group and 36 in the treatment group." "Overall attendance at scheduled study-related visits was poor" **Comment:** 80% of participants were included in the ITT analysis however the publication does not specify how many completed the study. Furthermore attendance at sessions very low
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register available. However, publication only reports dietary outcomes for whole group, does not split them by group or comment on statistical significance. Also do not report standard deviations for change in BMI or BMI percentile. Risk of selective reporting bias therefore unclear
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Eddy Ives 2012

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: age 10-14 years of both sexes, overweight or obese (BMI 85th-95th or > 95th percentiles, depending on age and sex, WHO classification) **Exclusion criteria**: morbid obesity, secondary obesity, bulimia nervosa, mental retardation, difficulties understanding the recommendations, current or recent participation in another clinical trial **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 48 **Run-in period**: no **Extension period**: no **Intervention:** dietary and physical exercise recommendations during 6 sessions **Comparator:** dietary and physical exercise recommendations in 2 sessions only (waiting list control)
Outcomes	**Outcome measures reported in abstract**: completion rates, BMI z scores, WC z score, food habits, physical activities
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN35399598 (retrospectively entered)
Publication details	**Language of publication**: English **Funding:** IX Research Award Nutribén 2007 (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "to assess the efficiency of an educational intervention on lifestyle habits to reduce the body mass index in adolescents."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "We obtained the informed consent of those who chose to participate, and randomly allocated each adolescent to one of the study groups based on a sequence of random numbers generated in a centralised manner from the Research Unit that participated in the study." **Comment:** randomisation process adequately described
Allocation concealment (selection bias)	Low risk	**Comment:** allocation likely concealed due to randomisation method (as described above)
Blinding of participants and personnel (performance bias)	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group

Eddy Ives 2012 *(Continued)*

Subjective outcomes		
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Thus, 174 participants were randomised, and 125 (71.8%) completed the follow up" **Comment:** relatively moderate dropout rates – may have introduced bias
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Thus, 174 participants were randomised, and 125 (71.8%) completed the follow up" **Comment:** relatively moderate dropout rates – may have introduced bias
Selective reporting (reporting bias)	Unclear risk	**Comment:** clinical trial entry registered retrospectively
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Epstein 1984a

Methods	**Parallel RCT** **Randomisation ratio**: 1:1:1 **Superiority design**
Participants	**Inclusion criteria**: children age 8-12 years, child and parent between 20%-80% of their ideal weight for height, age and sex (Jelliffe 1966), parent and child had triceps skinfold thickness > 85th percentile, parent willing to participate in all treatment meetings **Exclusion criteria**: child had a current psychiatric contact or a learning disability, medical problem that contraindicated exercise (parent or child) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: unclear **Run-in period**: no **Extension period**: no **Intervention 1:** diet-plus-exercise group **Intervention 2:** diet only **Comparator:** waiting list control

Epstein 1984a *(Continued)*

Outcomes	**Outcome measures reported in abstract**: weight, parental weight, lipids, triglycerides, cholesterol, HDL, fitness
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** part by Grant HD12520 from the National Institute of Child Health and Human Behavior (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The present study reports the comparison of diet with diet-plus-life-style exercise in a sample of overweight children and parents enrolled in the family-based obesity treatment program previously developed in this laboratory"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** no description of randomisation process
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "At 6 months, results were available for 47 (89%) of the original 53 families, with 15, 18, and 14 families measured per group." **Comment:** attrition rates were low
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "At 6 months, results were available for 47 (89%) of the original 53 families, with 15, 18, and 14 families measured per group." **Comment:** attrition rates were low

Epstein 1984a *(Continued)*

Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Epstein 1985a

Methods	**Parallel RCT** **Randomisation ratio**: 1:1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 8-12 years, child and parent > 20% over their ideal weight for height (Metropolitian Life Insurance Company 1959; Robinson 1968) **Exclusion criteria**: parent and child with a problem that would interfere with exercise **Diagnostic criteria**: see above
Interventions	**Number of study centres**: unclear **Run-in period**: no **Extension period**: no **Intervention 1:** diet plus programmed aerobic exercise programme **Intervention 2:** diet plus lifestyle exercise programme **Comparator:** diet plus low intensity callisthenic exercise programme
Outcomes	**Outcome measures reported in abstract**: weight, parental weight
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** GRANT HD12520 from National Institute of Child Health and Human Development (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The present study is designed to assess the reliability of the effects of diet plus lifestyle versus diet plus programmed aerobic exercise over an extended two year observation interval."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** no description of randomisation process

Epstein 1985a *(Continued)*

Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "Complete data were available for 35 families, which represent 85% of the families beginning the study" **Comment:** attrition rates fairly were low
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "Complete data were available for 35 families, which represent 85% of the families beginning the study" **Comment:** attrition rates fairly were low
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Epstein 1985b

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: girls between 8-12 years, at least 20% over her ideal weight for height and age (Jeliffe 1966), at least 1 parent willing to participate **Exclusion criteria**: medical problems that would contraindicate weight loss, exercise or fitness testing **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** diet and exercise education

Epstein 1985b *(Continued)*

	Comparator: diet education only
Outcomes	**Outcome measures reported in abstract**: weight, percent overweight, fitness
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** Grant HD 16411 from National Institute of child health and human development (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The present study was designed to re-evaluate the role of exercise plus diet in weight control by having children participate in a structured exercise program during the first 6 weeks of exercise, which may facilitate the development of appropriate exercise behavior."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "After acceptance into the program, families were assigned to one of two treatment groups by a stratified random assignment procedure. Children were stratified on the basis of age, percent overweight, and physical work capacity, and were then randomly assigned to either the diet plus exercise group (group 1) or the diet without exercise group (group 2)." **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Twenty of the 23 children completing treatment (86.96%) attended the 6-month assessment, and 19 children (82.61%) attended the 1-year assessment. There was no difference in the dropout rate between groups"

Epstein 1985b *(Continued)*

		Comment: even though dropout rates were relatively low, there was no sensitivity analysis or missing data imputation, and furthermore original sample size was small. Hence attrition rate may have led to bias
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:**"Twenty of the 23 children completing treatment (86.96%) attended the 6-month assessment, and 19 children (82.61%) attended the 1-year assessment. There was no difference in the dropout rate between groups" **Comment:** even though dropout rates were relatively low, there was no sensitivity analysis or missing data imputation, and furthermore original sample size was small. Hence attrition rate may have led to bias
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Epstein 1985c

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: obese female children (obesity defined by Robinson 1968), 5-8 years of age **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** behaviourally-oriented programme that emphasised parent management **Comparator:** provided equal education and attention but not behavioural principles
Outcomes	**Composite outcome measures reported**: weight
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** part by Grant HD16411 from the national Institute of child health and human development (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The purpose of this study was to evaluate the effectiveness of family-based treatment for childhood obesity for 5-to-8 year old children"
Notes	-

Epstein 1985c *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** no description of randomisation method
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Five families dropped out after the preliminary meeting because of conflicting obligations" **Comment:** moderate dropout rates, unclear if attrition bias occurred
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Five families dropped out after the preliminary meeting because of conflicting obligations" **Comment:** moderate dropout rates, unclear if attrition bias occurred
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Epstein 2000a

Methods	**Parallel RCT** **Randomisation ratio**: 1:1:1 **Superiority design**
Participants	**Inclusion criteria**: child > 20% overweight (Must 1991), 1 parent willing to attend meetings, child reading third-grade level or higher **Exclusion criteria**: if a either parent was > 100% overweight, a family member on an alternative weight management programme, parent or child having psychiatric problems, parent or child having activity restrictions

Epstein 2000a *(Continued)*

	Diagnostic criteria: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention 1:** behavioural weight-control programme plus parent and child problem solving **Intervention 2:** behavioural weight-control programme plus child problem solving only **Comparator:** standard treatment with no additional problem solving
Outcomes	**Composite outcome measures reported**: BMI, child behaviour problems, parental distress, parent problem solving, child problem solving, parental weight, eating disorder symptoms
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** in part by Grant HD20829 (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "This study was designed to determine the effects of adding problem-solving training for parents and children or children alone to a comprehensive family-based behavioral childhood obesity treatment"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** (from study author via email) "After participants are screened to ensure they met eligibility criteria for the specific study, families are randomized to treatment groups using a random number algorithm which assigned a random number that was limited to the number of groups, for example in a two group study group 1 or 2. Groups are then checked to make sure they are not different in child and parent relative body weight (BMI, percent overweight, z-BMI), usually SES, and sometimes other study specific baseline values of other measures. If groups are not equal randomization is repeated" **Comment:** unlikely this randomisation method introduced selection bias
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias)	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group

Epstein 2000a *(Continued)*

Objective outcomes		
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "Attrition was 3%, 11%, and 15% at 6, 12, and 24 months, respectively" **Comment:** low attrition rates
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "Attrition was 3%, 11%, and 15% at 6, 12, and 24 months, respectively" **Comment:** low attrition rates
Selective reporting (reporting bias)	High risk	**Comment:** no protocol or clinical trials register entry available. Also, in the additional publication all three groups were grouped together for analysis - potential reporting bias due to non-significant results
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Epstein 2001

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 8-12-years, child ≥ 85th BMI percentile but < 100% over average BMI for age and sex (using standards derived from the National Health and Nutrition Examination Survey III) child at or > 85th, 1 parent willing to attend the weekly treatment meetings **Exclusion criteria**: either parent over 100% overweight, a parent or child on another weight-control programme, medical restrictions to the parent or child that would prevent exercise, current psychiatric disorders in parents or child, a history of eating disorders in the parents **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** a combination of reducing sedentary behaviour and increasing physical activity **Comparator:** targeting increasing physical activity only
Outcomes	**Outcome measures reported in abstract**: percent overweight, adherence
Study details	**Trial terminated early:** no **Trial ID:** -

Epstein 2001 *(Continued)*

Publication details	**Language of publication**: English **Funding:** in part by Grant HD34284 (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The primary goal was to evaluate sex differences in child weight control programs that targeted increasing physical activity (increase) or the combination of reducing sedentary behavior and increasing physical activity (combined). A second goal was to evaluate the benefits of family-based interventions on non-targeted siblings."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** (from author via email) "After participants are screened to ensure they met eligibility criteria for the specific study, families are randomized to treatment groups using a random number algorithm which assigned a random number that was limited to the number of groups, for example in a two group study group 1 or 2. Groups are then checked to make sure they are not different in child and parent relative body weight (BMI, percent overweight, z-BMI), usually SES, and sometimes other study specific baseline values of other measures. If groups are not equal randomization is repeated" **Comment:** unlikely this randomisation method introduced selection bias
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that assessment staff were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "The final sample with complete data for targeted children at baseline, 6-month, and 12-month measurements was based on 56 of the 67 families that were randomized (84%), which included 245 family members." **Comment:** low attrition rates
Incomplete outcome data (attrition bias)	Low risk	**Quote from publication:** "The final sample with complete data for targeted children at baseline, 6-month, and 12-month measurements was based on

Epstein 2001 *(Continued)*

Objective outcomes		56 of the 67 families that were randomized (84%), which included 245 family members." **Comment:** low attrition rates
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Epstein 2005

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 8-12-years, overweight or obese (≥ 85th BMI percentile, CDC growth charts), a parent willing to attend treatment meetings, child reading level at a minimum of third-grade level **Exclusion criteria**: if any family members are participating in another weight-control programme, parent or child with medical restrictions on diet or physical activity, which could interfere with participation in the study, current psychiatric, addictive or eating disorders in parents or child **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** standardised family-based behavioural weight control programme plus reinforcement for increasing alternatives to eating **Comparator:** standardised family-based behavioural weight control programme only
Outcomes	**Outcome measures reported in abstract**: BMI z score, alternatives to eating, physical activity, energy intake
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** supported in part by grant HD 39792 awarded to the lead study author (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "Two experiments that attempt to increase alternatives to eating in obese youth are presented"
Notes	-
Risk of bias	

Epstein 2005 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "After participants are screened to ensure they met eligibility criteria for the specific study, families are randomized to treatment groups using a random number algorithm which assigned a random number that was limited to the number of groups, for example in a two group study group 1 or 2. Groups are then checked to make sure they are not different in child and parent relative body weight (BMI, percent overweight, z-BMI), usually SES, and sometimes other study specific baseline values of other measures. If groups are not equal randomization is repeated" **Comment:** unlikely this randomisation method introduced selection bias
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Comment:** unclear if assessment staff were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear if assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Complete height and weight data at 24 months was available for 35 of the 41 families "The intention to treat analysis replaced missing data with return to baseline values." **Comment:** dropout rates were moderate and ITT analysis was used - however they replaced missing data with baseline values which is not a robust imputation method. Bias may still have occurred
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Complete height and weight data at 24 months was available for 35 of the 41 families "The intention to treat analysis replaced missing data with return to baseline values." **Comment:** dropout rates were moderate and ITT analysis was used - however they replaced missing data with baseline values which is not a robust imputation method. Bias may still have occurred
Selective reporting (reporting bias)	Unclear risk	**Comment:** unclear as no protocol or clinical trials register. Study found no significant differences between groups - raw data reported either in the text or in graphical format (not presented in a table) hence will be difficult to extract. Potential selective reporting due to non-significant results
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Epstein 2015

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 8-12-years, > 85th BMI percentile (CDC growth charts), 1 overweight/obese (BMI ≥ 25) parent willing to attend treatment meetings, child reading level at a minimum of third-grade level **Exclusion criteria**: taking weight-altering drugs, if any family members are participating in another weight-control programme, parent or child with diet or physical activity restrictions, which could interfere with participation in the study, psychiatric problems in child or parent **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: prior to initiating the pilot, 21 families were seen to develop treatment methods, and provide therapists experience with the intervention **Extension period**: no **Intervention:** family-based treatment + variety of high energy-dense foods **Comparator:** family-based treatment only
Outcomes	**Composite outcome measures reported**: percent overweight, BMI z score, RED foods, parent BMI
Study details	**Trial terminated early:** no **Trial ID:** NCT01208870
Publication details	**Language of publication**: English **Funding:** funded in part by a grant from the National Institute of Diabetes and Digestive and Kidney Diseases UO1 DK088380 awarded to lead author (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The aims of the pilot study were to assess effects of variety of both child and parent weight loss, and to assess whether reduced variety of high energy dense foods was associated with weight loss."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** (from author via email) "After participants are screened to ensure they met eligibility criteria for the specific study, families are randomized to treatment groups using a random number algorithm which assigned a random number that was limited to the number of groups, for example in a two group study group 1 or 2. Groups are then checked to make sure they are not different in child and parent relative body weight (BMI, percent overweight, z-BMI), usually SES, and sometimes other study specific baseline values of other measures. If groups are not equal randomization is repeated" **Comment:** randomisation method described

Epstein 2015 *(Continued)*

Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Comment:** unclear if subjective outcomes were measured by blinded staff
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Height and weight measurements were taken at 0 and 6 months by staff blind to treatment assignment using a digital weight scale and stadiometer calibrated daily." **Comment:** objective anthropometric outcomes were measured by blinded staff
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Comment:** attrition rates unknown
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Comment:** attrition rates unknown
Selective reporting (reporting bias)	Low risk	**Comment:** no differences found between clinical trial register entry and the publication
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Faude 2010

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 8-12 years, overweight (large German reference sample - Kromeyer-Hauschild 2001) **Exclusion criteria**: children not actively involved in regular sports activities, children not exposed to any nutritional or pharmacological intervention, adverse cardiovascular conditions, and chronic metabolic or orthopaedic disorders **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no

Faude 2010 *(Continued)*

	Extension period: no **Intervention:** football training programme (FB) **Comparator:** established standard sports programme (STD)
Outcomes	**Composite outcome measures reported**: maximal performance capacity, submaximal heart rate, motor skills, self-esteem, body composition, psychometric variables
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** FIFA/FMARC (Fédération International de Football Associations, FIFA – Medical Assessment and Research Center) (commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The present study aimed at analyzing the efficacy of a 6-month football training program compared with a standard exercise program on health and fitness parameters in overweight children"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Quote from publication:** "Children underwent a stratified randomization into two groups (according to age, gender, body mass index (BMI) percentile and maximal performance in cycling ergometry)." **Comment:** randomisation method not described in enough detail
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Quote from publication:** "The training programs were carried out in two different locations at the same time of the day on the same days of the week (Monday, Tuesday, Thursday, 16:00–17:00 hour). This was decided to blind the groups to the training program of the other group" **Comment:** participants were likely blinded to study group - unclear if personnel were blinded however
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Quote from publication:** "The training programs were carried out in two different locations at the same time of the day on the same days of the week (Monday, Tuesday, Thursday, 16:00–17:00 hour). This was decided to blind the groups to the training program of the other group" **Comment:** participants were likely blinded to study group - unclear if personnel were blinded however
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Cycling ergometry was conducted by a trained institutional investigator who was blinded for group randomization to avoid investigator bias" **Comment:** unclear if subjective outcomes were measured by blinded staff

Faude 2010 *(Continued)*

Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Quote from publication:** "Cycling ergometry was conducted by a trained institutional investigator who was blinded for group randomization to avoid investigator bias" **Comment:** unclear whether other objective outcomes were measured by blinded staff
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "17 children (44%) dropped out during the study period due to insufficient compliance (N=12), private or school problems (N=4) or change of residence (N=1). No significant differences were observed between drop-outs and children who completed the training (P>0.10)." **Comment:** even though no differences were observed between dropouts and completers, attrition rate was high and would likely have introduced bias. Plus ITT analysis was not used
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "17 children (44%) dropped out during the study period due to insufficient compliance (N=12), private or school problems (N=4) or change of residence (N=1). No significant differences were observed between drop-outs and children who completed the training (P>0.10)." **Comment:** even though no differences were observed between dropouts and completers, attrition rate was high and would likely have introduced bias. Plus ITT analysis was not used
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trial register entry available
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Flodmark 1993

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 10-11 years, obese (BMI > 23 kg/m2) **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: unclear **Run-in period**: no **Extension period**: no **Intervention:** family therapy **Comparator:** conventional treatment
Outcomes	**Outcome measures reported in abstract**: BMI, triceps thickness, subscapular thickness, suprailiac skinfold thickness, physical fitness
Study details	**Trial terminated early:** no

Flodmark 1993 *(Continued)*

	Trial ID: -
Publication details	**Language of publication**: English **Funding:** the Golje Foundation, the Swedish Medical Associations, the Albert Pahlsson Foundation, the Swedish Society of Medicine, the Johanna Andersson Foundation, "Forenade Liv" mutual group life insurance company Stockholm, the medical faculty of the University of Lund (commercial and non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To evaluate the effect of family therapy on childhood obesity"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Quote from publication:** "44 obese children were divided into two treatment groups" **Comment:** in the abstract the study authors do not say that the children were randomised. They do in the main text of the publication but do not describe the process and there are also concerns over imbalance of sexes in the two groups. The study also includes a non-randomised control group – unclear why they were not randomised as well
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear if participants and study personnel were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear if assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "intention to treat analysis were made of the weight and height data for 39 of 44 children in the two treatment groups" **Comment:** dropout rates relatively low
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry available
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Gillis 2007

Methods	**Parallel** RCT **Randomisation ratio**: 1:1 **Superiority design**

Gillis 2007 *(Continued)*

Participants	**Inclusion criteria**: aged 7-16 years, BMI > 90th percentile (CDC growth charts) **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 2 **Run-in period**: no **Extension period**: no **Intervention:** exercise and diet education with weekly diaries and telephone calls **Comparator:** exercise and diet education only
Outcomes	**Outcome measures reported in abstract**: attitude, BMI SDS, LDL
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** personal funds (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "We aimed to determine whether in a small pilot group, treated over a 6-month period, this intervention strategy could show at least a trend toward improving obesity-related attitudes, reducing weight and decreasing adverse metabolic consequences of obesity"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	**Quote from publication:** "Patients were allocated alternately to one of the groups as they enrolled." **Comment:** potential selection bias introduced through this method
Allocation concealment (selection bias)	High risk	**Comment:** study author confirmed via email that allocation was not concealed before randomisation
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that the study was not blinded
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that the study was not blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that the study was not blinded

Gillis 2007 *(Continued)*

Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that the study was not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "After 6 months 11/14 (78.6%) intervention and 7/13 (53.8%) control participants remained in the trial" **Comment:** high dropout rates in the control group
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "After 6 months 11/14 (78.6%) intervention and 7/13 (53.8%) control participants remained in the trial" **Comment:** high dropout rates in the control group
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry available to assess reporting bias
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Gunnarsdottir 2011a

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children 8-12 years, BMI SDS > 2.4 (BMI reference values for Swedish children - Karlberg, Luo & Albertsson-Wikland, 2001), simple obesity (obesity not due to an identifiable medical cause), 1 parent willing to participate fully in the treatment with the child, neither parent nor child receiving other obesity treatment, children with comorbid emotional, behavioural and/or learning-related disorders were not excluded as long as they could comprehend intervention material and self-monitor **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** Epstein's family-based behavioural treatment (FBBT) **Comparator:** standard care (waiting-list control)
Outcomes	**Composite outcome measures reported**: BMI-SDS
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** Landspitali University Hospital Research Fund, The Icelandic Research Fund for Graduate Students, University of Iceland Research Fund, and a grant from Thorvaldssen Society (non-commercial)

Gunnarsdottir 2011a *(Continued)*

	Publication status: peer-reviewed journal
Stated aim for study	Quote from publication: "To assess the acceptability and effectiveness of Epstein's family-based behavioural treatment (FBBT) for childhood obesity in a medical setting in Iceland"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** randomisation method not described
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** unclear whether participants or study personnel were blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear whether participants or study personnel were blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Comment:** unclear whether outcome assessors were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear whether outcome assessors were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Three families dropped out prematurely (Figure 1 shows flow of participants during study process). The children dropping out all had emotional, behavioural, and/or learning-related comorbidities." "Of the three families who dropped out before the study ended, two families dropped out for reasons unrelated to the intervention but one family was unable to cope with the high at-home demands of the program" **Comment:** 3/16 (19%) families dropped out of the study at 4 months. It is unclear whether these 13 participants were followed up until the end of the study. Furthermore all dropouts had comorbidities even though the study stated 2 of the families dropped out for reasons unrelated to the intervention - risk of bias is unclear
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Three families dropped out prematurely (Figure 1 shows flow of participants during study process). The children dropping out all had emotional, behavioural, and/or learning-related comorbidities." "Of the three families who dropped out before the study ended, two families dropped out for reasons unrelated to the intervention but one family was unable to cope with the high at-home demands of the program" **Comment:** 3/16 (19%) families dropped out of the study at 4 months. It is unclear whether these 13 participants were followed up until the end of the study. Furthermore all dropouts had comorbidities even though the study stat-

Gunnarsdottir 2011a *(Continued)*

		ed 2 of the families dropped out for reasons unrelated to the intervention - risk of bias is unclear
Selective reporting (reporting bias)	High risk	**Comment:** no clinical trials register entry or protocol. They did not do a comparison of the intervention and control outcomes - did not present raw data for physical activity or fruit and vegetable consumption for each group separately
Other bias	Unclear risk	**Comment:** unable to assess if any other biases are present

Hamilton-Shield 2014

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: obese (≥ 95th percentile, UK 1990 references) children aged 5-11 years old **Exclusion criteria**: parents unable to read English; secondary care evaluation was required if: possible genetic cause of obesity, possible endocrine disorder, possible comorbidity, features of an overt eating disorder, iatrogenic causes of obesity **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 9 **Run-in period**: no **Extension period**: no **Intervention:** standard care plus Mandolean training **Comparator:** standard care only
Outcomes	**Outcome measures reported in abstract**: progression to the main trial, recruitment numbers, attendance
Study details	**Trial terminated before regular end (for benefit/because of adverse events):** yes **Trial ID:** ISRCTN90561114
Publication details	**Language of publication**: English **Funding:** NIHR Health Technology Assessment programme (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "This pilot study aimed to test recruitment strategies, treatment adherence, clinic attendance and participants' experiences of using a device [Mandolean® (previously Mandometer®, Mikrodidakt AB, Lund, Sweden)] to slow down speed of eating as an adjunct to dietary and activity advice in treating obesity in primary school-aged children"
Notes	This trial was terminated due to recruitment issues and technical issues relating to the Mandolean equipment

Risk of bias

Hamilton-Shield 2014 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Participants were randomised into one of two groups: (1) standard care plus Mandolean therapy or (2) standard care alone. Participants were randomised using the Bristol Randomised Trials Collaboration randomisation service" **Comment:** randomisation method was well described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "Concealment of allocation was ensured by use of an automated web-based randomisation service hosted by the Bristol Randomised Trials Collaboration, a UKCRC (UK Clinical Research Collaboration)-registered clinical trials unit." **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** unclear whether participants or study personnel were blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear whether participants or study personnel were blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Comment:** unclear whether outcome assessors were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear whether outcome assessors were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "None of the criteria for progression to the main trial were reached. Despite numerous pathways being available for referral, only 21 (13 to standard care, eight to intervention arm; 58%) of the target 36 families were recruited in the pilot phase. Less than 20% of those randomised to Mandolean used the device at least five times a week. The > 60% target for slowing down of eating speed by 3 months was unmet. Attendance at the weight management clinic in general practice hubs for both arms of the study at 3 months was 44% against a target of 80%." **Comment:** attendance at the sessions was very low and the trial was not completed – high attrition bias
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "None of the criteria for progression to the main trial were reached. Despite numerous pathways being available for referral, only 21 (13 to standard care, eight to intervention arm; 58%) of the target 36 families were recruited in the pilot phase. Less than 20% of those randomised to Mandolean used the device at least five times a week. The > 60% target for slowing down of eating speed by 3 months was unmet. Attendance at the weight management clinic in general practice hubs for both arms of the study at 3 months was 44% against a target of 80%." **Comment:** attendance at the sessions was very low and the trial was not completed – high attrition bias

Hamilton-Shield 2014 *(Continued)*

Selective reporting (reporting bias)	High risk	**Comment:** even though the study was terminated, the report does not provide any outcome data of those who participated
Other bias	High risk	**Comment:** this study was terminated before its endpoint

Ho 2016

Methods	**Parallel RCT** **Randomisation ratio**:1:1 **Superiority design**
Participants	**Inclusion criteria**: 8-16 years, BMI ≥ 85th centile for age and gender **Exclusion criteria**: currently taking a weight loss medication, enrolled in any organised weight loss programmes or exercise programmes, consumed more than 30% of all meals at restaurants, had a history of gastrointestinal disorder, psychiatric illness under the care of a physician, Cushing's syndrome, hypothalamic or genetic aetiology of obesity, uncontrolled or untreated thyroid disease, a current diagnosis of cancer, history of an eating disorder such as bulimia or anorexia nervosa, any surgery in the past 3 months, any surgery planned in the ensuing 6 months or any other chronic illness that could affect weight change **Diagnostic criteria**: BMI percentile (population reference not stated)
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** standard nutrition counselling plus portion control equipment **Control:** standard nutrition counselling only
Outcomes	**Outcome measures reported in abstract**: BMI z score
Study details	**Trial terminated early:** no **Trial ID:** NCT00881478
Publication details	**Language of publication**: English **Funding:** non-commercial funding and commercial donation, research grant from the Alberta Children's Hospital Foundation (Calgary, Alberta, Canada). Some of the portion control tools were donated for use in the study by The Diet Plate **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "to assess the effect of a family intervention using a portion control tool on BMI z score in children."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement

Ho 2016 *(Continued)*

Random sequence generation (selection bias)	Low risk	**Quote from publication:** "A computer-based random number sequence generator was used to create the random allocation..." **Comment:** low risk of selection bias from the randomisation method used
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "Sequentially numbered sealed envelopes were used to conceal the sequence until participants were assigned. The random allocation sequence was generated by a research assistant, while enrolment and assignment of participants to groups was done by the research coordinator.." **Comment:** allocation was likely concealed, hence low risk of selection bias
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Participants and care givers were not blinded to the intervention since they were instructed on use of the portion control tools." **Comment:** investigator-assessed. Participants weren't blinded due to the nature of the intervention in addition it is currently not stated whether trial personnel were blinded – this presents potentially high risk of bias
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Participants and care givers were not blinded to the intervention since they were instructed on use of the portion control tools." **Comment:** investigator-assessed. Participants weren't blinded due to the nature of the intervention in addition it is currently not stated whether trial personnel were blinded – this presents potentially high risk of bias
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Participants and care givers were not blinded to the intervention since they were instructed on use of the portion control tools.." **Comment:** unclear if outcome assessment was blinded
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Quote from publication:** "Participants and care givers were not blinded to the intervention since they were instructed on use of the portion control tools." **Comment:** unclear if outcome assessment was blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Comment:** reported and ITT analysis conducted
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Comment:** reported and ITT analysis conducted
Selective reporting (reporting bias)	Low risk	**Comment:** study was conducted as described in the trials register
Other bias	Low risk	**Comment:** no other bias identified – this was a generally well conducted and reported study

Hughes 2008

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**

Hughes 2008 *(Continued)*

Participants	**Inclusion criteria**: obese children (BMI ≥ 98th centile, UK 1990 references) aged 5-11 years, attending a standard elementary school, at least 1 parent who perceived their child's weight as a problem and willing to make changes to their lifestyle **Exclusion criteria**: child with an underlying medical cause for their obesity, serious co-morbidity requiring urgent treatment, had received treatment for obesity in the past year **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** behavioural programme **Comparator:** standard care
Outcomes	**Outcome measures reported in abstract**: BMI z scores, weight, total physical activity, percentage time spent in sedentary behaviour and light intensity physical activity, parental views of the treatment
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN41383109
Publication details	**Language of publication**: English **Funding:** grant from the Scottish Executive Health Department. The funder's role was limited to peer review of the original grant application (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The objective of this study was to determine whether a generalizable best practice individualized behavioral intervention reduced BMI z score relative to standard dietetic care among overweight children"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "For ensuring concealment, the study code was sent to a statistician, who produced a computer-generated randomization list and allocated participants to the intervention or control group. Randomization was in blocks of 10 (ratio 1:1) and was stratified by gender and study center (Edinburgh or Glasgow). The statistician informed the research dietitians, who were delivering the intervention of the group allocation and who then informed participants of their groups." **Comment:** randomisation method was well described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "For ensuring concealment, the study code was sent to a statistician, who produced a computer-generated randomization list and allocated participants to the intervention or control group" **Comment:** allocation was concealed

Hughes 2008 *(Continued)*

Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "The primary aim of this assessor-blinded RCT" **Comment:** participants or study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "The primary aim of this assessor-blinded RCT" **Comment:** participants or study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "The primary aim of this assessor-blinded RCT" **Comment:** outcomes investigators were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "The primary aim of this assessor-blinded RCT" **Comment:** outcomes investigators were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "Of the 134 children who were randomly assigned, 97 (72.4%) attended the 6 month follow up and 86 (64.2%) attended at 12 months" **Comment:** dropout rates were quite high
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Of the 134 children who were randomly assigned, 97 (72.4%) attended the 6 month follow up and 86 (64.2%) attended at 12 months" **Comment:** dropout rates were quite high
Selective reporting (reporting bias)	Low risk	**Comment:** no differences between protocol and publication
Other bias	Unclear risk	**Comment:** unable to assess whether any other biases were present

Kalarchian 2009

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: child 8-12 years, BMI ≥ 97th percentile (CDC growth charts) – severely obese, adult willing to participate in the programme **Exclusion criteria**: mental retardation, pervasive development disorder or psychosis, psychiatric symptoms that require alternative treatment, genetic obesity syndrome, currently undertaking obesity treatment, inability to take part in prescribed daily activity, medical conditions which contraindicate usual care, medication which affects body weight (stable doses of stimulant or antidepressant medication allowed) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no

Kalarchian 2009 *(Continued)*

	Extension period: no **Intervention:** family-based, behavioural weight control group **Comparator:** usual care
Outcomes	**Composite outcome measures reported**: percent overweight, medical outcomes, parental BMI, binge eating, eating disorder symptoms, self-esteem
Study details	**Trial terminated early:** no **Trial ID:** NCT00177229
Publication details	**Language of publication**: English **Funding:** National Institutes of Health grants to Dr Marcus at the University of Pittsburgh (grant R01 HD38425 and minority supplement grant HD38425-02S1), University of Pittsburgh Obesity and Nutrition Research Center (grant P30 DK46204), Children's Hospital of Pittsburgh General Clinical Research Center (grant M01-RR00084), and University of Pittsburgh Clinical and Translational Science Institute (Clinical and Translational Science Award UL1-RR024153) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: **"**We evaluated the efficacy of family-based, behavioural weight control in the management of severe pediatric obesity"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "After baseline assessments, participants were assigned randomly to study conditions (1:1) through permuted block randomization with stratification according to race, with a block size of 2, 4, or 6." **Comment:** randomisation method described
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Assessors did not provide the intervention but were not blinded to the treatment condition." **Comment:** unclear because even though assessors were not involved in the intervention, they were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Quote from publication:** "Assessors did not provide the intervention but were not blinded to the treatment condition."

Kalarchian 2009 *(Continued)*

		Comment: unclear because even though assessors were not involved in the intervention, they were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "However, 18- month assessment completers differed from noncompleters with respect to baseline child BMI (31.7 vs 34.0 kg/m2; *t* =-2.14; *P* = .037), percent overweight (87.4% vs 101.8%; *t* = 2.36; *P* =.023), and number of people in the household (4.11 vs 3.67 persons; *t* = 2.13; *P*=.035)." "Finally, there was a significant proportion of missing data in the ITT analyses for medical risk factors, which suggests that replication is needed before firm conclusions about medical outcomes can be drawn." **Comment:** relatively low amount of missing data
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "However, 18- month assessment completers differed from noncompleters with respect to baseline child BMI (31.7 vs 34.0 kg/m2; *t* =-2.14; *P* = .037), percent overweight (87.4% vs 101.8%; *t* = 2.36; *P* =.023), and number of people in the household (4.11 vs 3.67 persons; *t* = 2.13; *P*=.035)." "Finally, there was a significant proportion of missing data in the ITT analyses for medical risk factors, which suggests that replication is needed before firm conclusions about medical outcomes can be drawn." **Comment:** relatively low amount of missing data
Selective reporting (reporting bias)	High risk	**Comment:** primary outcome on clinical trials register was BMI and cardiovascular risk factors, while in publication it was percentage overweight
Other bias	Unclear risk	**Comment:** unable to assess if any other bias were present

Kalavainen 2007

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: child age 7-9 years, attending primary school, presence of weight for height from 120%-200% (Finnish national growth charts - Tilator Oy Ltd 2004) **Exclusion criteria**: disease or medication causing obesity, obvious movement disturbance, major mental problems in child or parents, family members participating in another weight-management programme **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**:no **Extension period**: no **Intervention:** family-centred group programme **Comparator:** routine treatment
Outcomes	**Outcome measures reported in abstract**: weight for height, BMI, BMI SDS, participation rate, attrition rates, cost effectiveness, waist/height, metabolic risk factors, triglycerides, fasting insulin
Study details	**Trial terminated early:** no

Kalavainen 2007 *(Continued)*

	Trial ID: -
Publication details	**Language of publication**: English **Funding:** in part by grants from Kuopio University Hospital, the Scientific Foundation of Finnish Association of Academic Agronomists, Finnish Cultural Foundation of Northern Savo, Juho Vainio Foundation, Ministry of Social Affairs and Health, Social Insurance Institution, and the Finnish Cultural Foundation (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The aim of the study was to compare the efficacy of group treatment stressing a health-promoting lifestyle with routine counselling in the treatment of childhood obesity"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Three children with weight for height ≥120% at the individual interview, but 115–117% at the baseline measurement, were included (two allocated into the routine treatment and one to group treatment). The children were then stratified on the basis of their weight for height in four blocks, that is weight for height <120%, 120–139%, 140–160% and >160%, and thereafter they were randomly allocated within each block, using closed envelopes, to either routine or group program. The siblings (three pairs in this study) were randomized together, and the stratification was based on the higher weight for height of the siblings." **Comment:** randomisation method well described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "they were randomly allocated within each block, using closed envelopes, to either routine or group program. **Comment:** used closed envelopes so assume allocation was concealed
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** Heale 2008 (see Kalavainen 2007 for reference) states study was unblinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** Heale 2008 (see Kalavainen 2007 for reference) states study was unblinded
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "The number of children participating in the 2-year follow-up was 69 (35 in routine counselling and 34 in the group program) and in the 3-year follow-up was 68 (34 in both treatment arms)." **Comment:** 70 children were randomised and 68 were followed up at 3 years – very low dropout rates, unlikely to have attrition bias
Selective reporting (reporting bias)	Unclear risk	**Comment:** 1 publication reports that they only measured height and weight – however, in a later paper results of additional outcomes were reported (metabolic and body composition) but were compared with a healthy-weight children's group. Results of these outcomes were not significant - potential reporting bias
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Kirk 2012

Methods	**Parallel RCT** **Randomisation ratio**: 1:1:1 **Superiority design**
Participants	**Inclusion criteria**: age 7-12 years, fasting blood glucose level ≤ 100 mg/dL, BMI z score of 1.60-2.65 (CDC growth charts), absence of development or physical disabilities, ability to function independently in group exercise sessions, parent/guardian commitment to the study sessions **Exclusion criteria**: medical conditions such as: cardiac, pulmonary or liver disease; hyperlipidaemia, diabetes or significant mental illness, taking medications which may alter bone density, lipid or glucose metabolism or appetite (e.g. stimulants) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention 1:** low carbohydrate diet + group exercise/education sessions **Intervention 2:** reduced glycaemic load diet + group exercise/education sessions **Comparator:** standard portion-controlled diet + group exercise/education sessions
Outcomes	**Outcome measures reported in abstract**: completion rates, daily caloric intake, adherence, BMI z score, WC, percent body fat
Study details	**Trial terminated early:** no **Trial ID:** NCT00215111
Publication details	**Language of publication**: English **Funding:** Thrasher Research Fund and an Institutional Clinical and Translational Science Award (National Institutes of Health (NIH)/National Center for Research Resources grant, 5UL1RR026314-02) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To compare the effectiveness and safety of carbohydrate (CHO)-modified diets with a standard portion-controlled (PC) diet in obese children"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "The subjects were stratified by pubertal development (4 categories) and BMI z score (2 categories: ≤2.1 SD or >2.1 SD). Within these 8 strata, randomly permuted block sizes were used to generate the randomized allocation sequence. Subjects were randomly assigned to one of 3 diet groups—LC (n = 35), RGL (n = 36), or PC (n = 31)—and informed of their diet assignment at the initial intervention visit."

Kirk 2012 *(Continued)*

		Comment: randomisation method well described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "Within these 8 strata, randomly permuted block sizes were used to generate the randomized allocation sequence" **Comment:** assume allocation was concealed via the randomisation method used
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Neither subjects nor study staff members were blinded to diet assignment." **Comment:** participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Neither subjects nor study staff members were blinded to diet assignment." **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "Neither subjects nor study staff members were blinded to diet assignment." **Comment:** assessment staff were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "Neither subjects nor study staff members were blinded to diet assignment." **Comment:** assessment staff were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Retention of subjects for follow-up assessments was 82% at the 12-month follow-up and did not differ significantly among the 3 diet groups at any time point (RGL: 3 months, 92%; 6 months, 89%; 12 months, 89%; PC: 3 months, 94%; 6 months, 87%; 12 months, 90%; LC: 3 months, 69%; 6 months, 69%; 12 months, 69%)" **Comment:** dropout rates moderate and they used ITT analysis. But was unclear how they replaced missing data
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Retention of subjects for follow-up assessments was 82% at the 12-month follow-up and did not differ significantly among the 3 diet groups at any time point (RGL: 3 months, 92%; 6 months, 89%; 12 months, 89%; PC: 3 months, 94%; 6 months, 87%; 12 months, 90%; LC: 3 months, 69%; 6 months, 69%; 12 months, 69%)" **Comment:** dropout rates moderate and they used ITT analysis. But was unclear how they replaced missing data
Selective reporting (reporting bias)	Low risk	**Comment:** the majority of outcomes given in the clinical trials register were measured and reported in the publication
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Larsen 2015

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**

Larsen 2015 *(Continued)*

Participants	**Inclusion criteria**: overweight (IOTF criteria), children aged 5-9 years, registered with a GP on the island of Fumen **Exclusion criteria**: families unable to speak Danish, previous or current participation in other overweight/obesity project, mental or physical disabilities, endocrine causes of obesity, signs of precocious puberty **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 60 **Run-in period**: no **Extension period**: no **Intervention:** an education programme in addition to health consultations **Comparator:** health consultations only
Outcomes	**Outcome measures reported in abstract**: BMI z scores, attendance
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** Health Insurance Foundation, Rhode's Foundation, the Egmont Foundation, the Tryg Foundation, Institute of Clinical Research, Faculty of Health Sciences, University of Southern Denmark, and Odense University Hospital. (commercial and non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To evaluate the effect of two intervention modalities concerning overweight and obesity among children in general practice."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Participants were randomized using a random number table prepared before recruitment of participants for the study." **Comment:** low risk of bias from the method described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "In order to ensure concealment of the allocated intervention at the time of enrolment of participants, the participants were randomized in blocks of two for patients enrolled in a single-handed practice, and in blocks of four or six for patients enrolled in a group practice. The size of the blocks and the allocation sequence were unknown to the general practitioners (GPs). Besides information to the patients regarding the study and obtainment of oral and written consent, the GPs did not take part in either the allocation process, or information to the families on results of the randomization. The GPs informed the study investigator about the patient's acceptance of participation in the study. The study investigator allocated the patient according to the random number table and informed the family by telephone or letter." **Comment:** allocation was concealed

Larsen 2015 *(Continued)*

Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear whether participants and study personnel were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear whether assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "A total of 10 children in Model 1 and 16 children in Model 2 succeeded in a full two-year follow-up." **Comment:** only 29% of the control group and 36% of the intervention group completed the 2-year follow-up
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trial register entry
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Lison 2012

Methods	**Parallel RCT** **Randomisation ratio**: approximately 2:2:1 **Superiority design**
Participants	**Inclusion criteria**: white children and adolescents aged 6-16 years, both sexes, overweight or obese (≥ 85th percentile, Cole's LMS method – Cole 2000), recruited at the obesity and cardiovascular risk unit, Consorcio Hospital General Unversitario, Valencia ,Spain **Exclusion criteria**: secondary obesity syndromes or acute illnesses, severe obesity (z score > 2.5) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention 1:** hospital clinic group exercise-diet programme **Intervention 2:** home-based combined exercise-diet programme **Comparator:** usual care control group
Outcomes	**Outcome measures reported in abstract**: BMI z score, WC, percentage body fat, attendance
Study details	**Trial terminated early:** no **Trial ID:** NCT01503281
Publication details	**Language of publication**: English **Funding:** grants from the Comunidad Valenciana Government (GV06/227) (non-commercial) **Publication status:** peer-reviewed journal

Lison 2012 *(Continued)*

Stated aim for study	Quote from publication: **"**The aim of this study was to compare the effect of a hospital clinic group- versus home-based combined exercise– diet program for the treatment of childhood obesity"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	**Quote from publication:** "Patients were assigned to experimental groups on the basis of the day of the week in which they attended the outpatient clinic. Patients who attended on Mondays and Wednesdays were assigned to the GRX and those on Tuesdays and Thursdays to the HOX. Those who attended on Fridays were assigned to the control group." **Comment:** potential bias as participants would have been able to predict which group they would be allocated to
Allocation concealment (selection bias)	High risk	**Comment:** unlikely that allocation was concealed due to randomisation method used
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "An open study design was used" "The paediatrician who attended these visits was blinded to group allocation criteria." **Comment:** only the paediatrician was blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "All outcome measures were recorded at baseline and at the end of the program by a trained nurse who was blinded to group allocation." **Comment:** the nurse taking the measurements was blinded
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "The number of treatment completers was similar comparing across the GRX and HOX intervention groups (22 of 45; 21 of 41, respectively)." **Comment:** the number followed up was moderate; however, the number who actually completed the treatment was relatively low
Selective reporting (reporting bias)	Low risk	**Comment:** outcomes given in the clinical trials register the same as reported in the publication. No other differences found
Other bias	Unclear risk	**Comment:** unable to assess whether any other biases are present

Lochrie 2013

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 8-11 years, age-and sex-adjusted BMI ≥ 85th percentile (CDC growth charts) **Exclusion criteria**: impaired glucose tolerance, diabetes mellitus type 2, metabolic syndrome, hypertension or significant learning problems

Lochrie 2013 *(Continued)*

	Diagnostic criteria: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** family-based intervention **Comparator:** education session
Outcomes	**Outcome measures reported in abstract**: BMI z scores, triglycerides, psychosocial data
Study details	**Trial terminated early:** no **Trial ID:** NCT01146314
Publication details	**Language of publication**: English **Funding:** American Diabetes Association (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "This article examined immediate post-treatment and follow-up results of a randomized controlled trial of a 6-month lifestyle intervention involving diet, education, physical exercise, behavior change, and psychosocial methods for overweight or obese school-age children ages 8 to 11 to decrease risk factors associated with medical complications of obesity."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Randomization was stratified based on BMI (85th to 95th or >95th percentiles). For both of the lists, participants were randomized using a random sequence of 1s and 2s, such that 75 were assigned to the IG and 75 were assigned to the EG" **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed participants and personnel were not blinded
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed participants and personnel were not blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed outcome assessors were not blinded
Blinding of outcome assessment (detection bias)	High risk	**Comment:** study author confirmed outcome assessors were not blinded

Lochrie 2013 *(Continued)*

Objective outcomes		
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "We recognize that this study did not achieve adequate retention of participants. Only 68% of participants completed the baseline and post-treatment evaluation and 55% completed the follow-up evaluation." **Comment:** high dropout
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "We recognize that this study did not achieve adequate retention of participants. Only 68% of participants completed the baseline and post-treatment evaluation and 55% completed the follow-up evaluation." **Comment:** high dropout
Selective reporting (reporting bias)	High risk	**Comment:** clinical trial entry similar to publication but publication does not given raw data for any outcomes (only shows BMI z score in a graph but no SDs) – for other outcomes they just say the difference was not statistically significant
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Looney 2014

Methods	**Parallel RCT** **Randomisation ratio**: 1:1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 4-10 years, overweight or obese, BMI ≥ 85th percentile (CDC growth charts) **Exclusion criteria**: medication condition that affected growth, physical activity or dietary intake, child was participating in another weight loss programme and/or taking weight loss medication, primary caretaker did not want to take part, or did not speak or read English, child did not speak English, family did not have a working telephone number, child spent < 50% at the primary caretaker's home, family was planning to move out of the East Tennessee area during the study **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention 1:** newsletter and growth monitoring plus behavioural counselling **Intervention 2:** newsletter and growth monitoring **Comparator:** newsletter only
Outcomes	**Outcome measures reported in abstract**: BMI z score, servings per/d of sugar-sweetened beverages
Study details	**Trial terminated early:** no **Trial ID:** NCT01358448
Publication details	**Language of publication**: English

Looney 2014 *(Continued)*

	Funding: Amy Joye Memorial Research Award from the Academy of Nutrition and Dietetics Foundation (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "This pilot randomized controlled trial investigated the effect of 3 low-intensity (≤25 contact hours over 6 months) pediatric obesity treatments on *z*-BMI"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Sealed blank envelopes with condition assignments enclosed were used to randomize families in blocks of 3." **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** (from study author via email) "Study personnel were not blinded. Participants cannot be blinded as in this type of intervention we are asking them to complete specific tasks depending upon what condition there were randomized too" **Comment:** study author confirmed participants and personnel were not blinded
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** (from study author via email) "Study personnel were not blinded. Participants cannot be blinded as in this type of intervention we are asking them to complete specific tasks depending upon what condition there were randomized too" **Comment:** study author confirmed participants and personnel were not blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed outcome assessors were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed outcome assessors were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "There were no significant differences between conditions for retention at the 6-month assessments (N, 7/8 completed an assessment vs N+GM, 7/7 completed an assessment vs N + GM + BC, 7/7 completed an assessment)." **Comment:** only 1 lost to follow-up and 1 with missing data at 6 months (anthropometrics only)
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "There were no significant differences between conditions for retention at the 6-month assessments (N, 7/8 completed an assessment vs N+GM, 7/7 completed an assessment vs N + GM + BC, 7/7 completed an assessment)."

Looney 2014 *(Continued)*

		Comment: only 1 lost to follow-up and 1 with missing data at 6 months (anthropometrics only)
Selective reporting (reporting bias)	Unclear risk	**Comment:** study still ongoing in clinical trials register. Cost-effectiveness given as a secondary outcome in trials register but not reported in publication – perhaps will be included in an additional publication
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Maddison 2011

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 10-14 years, overweight or obese (IOTF cut offs), owned a Playstation 2 or 3 gaming console (Sony Computer Entertainment Inc, Tokyo, Japan), but no active video games (including EyeToy (Sony) or NintendoWii, played ≥ 2 h of video games per week, only 1 child per household was eligible to take part in the study **Exclusion criteria**: contraindications to performing physical activity (e.g. medical conditions) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** active video game package **Comparator:** no-care control group
Outcomes	**Outcome measures reported in abstract**: BMI, percentage body fat, daily time spent playing active video games and nonactive video games
Study details	**Trial terminated early:** no **Trial ID:** ACTRN12607000632493
Publication details	**Language of publication**: English **Funding:** Health Research Council of New Zealand (grant 07/077B), a Heart Foundation of New Zealand Fellowship (RM), a Heart Foundation of New Zealand Senior Fellowship (CNM), and a Tertiary Education Commission Bright Futures Doctoral Scholarship (LF). Sony Computer Entertainment Europe provided the gaming software for the study (commercial and non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The aim of this study was to evaluate the effect of active video games over a 6-mo period on weight, body composition, physical activity, and physical fitness"
Notes	-
Risk of bias	

Maddison 2011 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "The randomization is via a computerized central randomization service and stratified by sex and ethnicity." **Comment:** randomisation process well described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "However allocation concealment (up to the point of randomization) was maintained" **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "It was not possible to blind participants to their experimental group allocation." "It was also not possible to blind study staff administering interventions and assessing outcomes to experimental group allocation for pragmatic reasons." **Comment:** participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "It was not possible to blind participants to their experimental group allocation." "It was also not possible to blind study staff administering interventions and assessing outcomes to experimental group allocation for pragmatic reasons." **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "It was also not possible to blind study staff administering interventions and assessing outcomes to experimental group allocation for pragmatic reasons." **Comment:** staff who assessed outcomes were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "It was also not possible to blind study staff administering interventions and assessing outcomes to experimental group allocation for pragmatic reasons." **Comment:** staff who assessed outcomes were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Treatment evaluations were performed on the principle of intention to treat for the primary outcome and by using the approach of the last observation carried forward when data were missing." **Comment:** even though they used ITT analysis and included all participants in the analysis, dropout rates were moderate (around 20%) at follow up
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Treatment evaluations were performed on the principle of intention to treat for the primary outcome and by using the approach of the last observation carried forward when data were missing." **Comment:** even though they used ITT analysis and included all participants in the analysis, dropout rates were moderate (around 20%) at follow-up
Selective reporting (reporting bias)	Low risk	**Comment:** no differences found in publication versus clinical trials register/protocol
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Maddison 2014

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 9-12 years, lived in the greater Auckland metropolitan area, overweight or obese (Cole 2007), used electronic media (e.g. television, video games) for at least 15 h/week, speak and understand English, a primary caregiver participating in the study (aged 18 or above) and could speak and understand English **Exclusion criteria**: medical condition precluding them from performing regular physical activity, if they lived in more than 1 household and spent equal time at both households **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** SWITCH intervention group **Comparator:** usual care control group
Outcomes	**Outcome measures reported in abstract**: BMI z score, moderate-intensity physical activity, percentage body fat
Study details	**Trial terminated early:** no **Trial ID:** ACTRN12611000164998
Publication details	**Language of publication**: English **Funding:** Health Research Council of New Zealand (10/077). Dr Ralph Maddison supported by a Heart Foundation Research Fellowship (Grant 1211). Professor Cliona Ni Mhurchu supported by the National Heart Foundation Senior Fellowship (Grant 1380). Dr Louise Foley supported by a Heart Foundation of New Zealand Postdoctoral Fellowship (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The SWITCH (Screen-Time Weight-loss Intervention Targeting Children at Home) study aimed to determine the effect of a home-based, family-delivered intervention to reduce screen-based sedentary behaviour on body composition, sedentary behaviour, physical activity, and diet over 24 weeks in overweight and obese children."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Eligible participants were randomised at a 1:1 ratio to the intervention or control groups via centralised computer randomisation, using stratified blocked randomisation (with variable block sizes) to maintain balance across important prognostic factors. Two stratification factors were considered: sex (male and female) and ethnicity (Māori, Pacific, and non-Māori/non-Pacific)." **Comment:** randomisation process well described

Maddison 2014 *(Continued)*

Allocation concealment (selection bias)	Low risk	**Quote from publication:** "Allocation concealment was maintained up to the point of randomisation" **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Blinding of participants and research assistants was not possible due to the nature of the intervention." **Comment:** participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Blinding of participants and research assistants was not possible due to the nature of the intervention." **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "Blinding of participants and research assistants was not possible due to the nature of the intervention." **Comment:** staff who assessed outcomes were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "Blinding of participants and research assistants was not possible due to the nature of the intervention." **Comment:** staff who assessed outcomes were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "Children were randomly assigned to the intervention (n = 127) and control (n =124) groups, with 121 (95%) and 117 (94%) completing 24 weeks' follow up." **Comment:** low dropout rates
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "Children were randomly assigned to the intervention (n = 127) and control (n =124) groups, with 121 (95%) and 117 (94%) completing 24 weeks' follow up." **Comment:** low dropout rates
Selective reporting (reporting bias)	Low risk	**Comment:** no differences found between publication and clinical trials register
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Markert 2014

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: BMI SDS over the 90th centile (German reference values, Kromeyer-Hauschild 2001), age 4-17 years **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: unclear

Markert 2014 *(Continued)*

	Run-in period: no **Extension period**: no **Intervention:** telephone-based adiposity prevention for families (TAFF) **Comparator:** no-care control
Outcomes	**Outcome measures reported in abstract**: BMI SDS, HRQoL, eating patterns, physical activity, media consumption, participation rates
Study details	**Trial terminated early:** no **Trial ID:** DRKS00000803
Publication details	**Language of publication**: English **Funding:** Federal Ministry of Education and Research, Germany (Integrated Research and Treatment Center IFB "AdiposityDiseases," FKZ: 01E01001), the Roland-Ernst-Stiftung für Gesundheitsforschung, Dresden, Germany, and the Saxonian Ministry for Social Affairs, Germany (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The aim of this paper is to present one-year results of the T.A.F.F. program, a randomized controlled obesity prevention program based on telephone counseling for families with overweight children or adolescents"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Randomization to the intervention or control group was performed with a 1:1 allocation ratio and stratified according to sex and age group (4–9 years, 10–13 years, 14–17 years) using electronically generated four-bloc-random-lists." **Comment:** randomisation process well described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "The lists were generated before the start of the trial and assignment to trial arm was performed consecutively by a member of the team who did not have contact with participants and was not involved in data analysis. Enrolment of participants was carried out by the respective prevention manager." **Comment:** it was likely that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** unclear whether participants or study personnel were blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear whether participants or study personnel were blinded to study group
Blinding of outcome assessment (detection bias)	Unclear risk	**Comment:** unclear whether assessment staff were blinded to study group

Markert 2014 *(Continued)*

Subjective outcomes		
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear whether assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "Since the participants were not seen face to face, it was not always easy to encourage them to be weighed and measured and to return study material at the appropriate time. However, the effect of lag-times was analyzed and not found to have a significant impact on the results." **Comment:** dropout rate in intervention group was high (62.8%)
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Since the participants were not seen face to face, it was not always easy to encourage them to be weighed and measured and to return study material at the appropriate time. However, the effect of lag-times was analyzed and not found to have a significant impact on the results." **Comment:** dropout rate in intervention group was high (62.8%)
Selective reporting (reporting bias)	Unclear risk	**Comment:** there is a clinical trials register entry but it was retrospectively entered. The protocol was also published after recruitment and baseline measures were taken.
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

McCallum 2007

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: overweight or mildly obese (IOTF cut points), not receiving ongoing weight management in a secondary or tertiary care programme and their parents provided contact details **Exclusion criteria**: any chromosomal, endocrine or medical condition/disability/medications which may impact on their weight or growth **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 29 **Run-in period**: no **Extension period**: no **Intervention:** LEAP Intervention **Comparator:** no-care control group
Outcomes	**Outcome measures reported in abstract**: attrition, BMI, nutrition scores, daily physical activity, health status, body image, cost-effectiveness
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN45068927

McCallum 2007 *(Continued)*

Publication details	**Language of publication**: English **Funding:** lead author (McCallum) was funded via Public Health Postgraduate National Health and Medical Research Council Scholarship (ID 216745). The LEAP trial was funded by a grant from the Australian Health Ministers' Advisory Council for Priority Driven Research (AHMAC PDR 2001/15) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The study aims to reduce incremental gain in body mass index (BMI) of overweight/obese children aged 5-9 years"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Randomization was performed by a third-party biostatistician using a pre-generated computerized sequence." **Comment:** randomisation process well described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "Blinding was maintained throughout allocation and data collection." **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Blinding was maintained throughout allocation and data collection. Following randomization, intervention families were contacted by a non-blinded member of the research team and the first GP appointment made. Control families were notified of their status via letter and were not identified to the GPs at any time." **Comment:** participants were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Blinding was maintained throughout allocation and data collection. Following randomization, intervention families were contacted by a non-blinded member of the research team and the first GP appointment made. Control families were notified of their status via letter and were not identified to the GPs at any time." **Comment:** participants were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "Assessors of the 6- and 12-month follow-ups were blinded to randomization status." **Comment:** assessment staff were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Assessors of the 6- and 12-month follow-ups were blinded to randomization status." **Comment:** assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "A total of 12 (15%) subjects in the intervention group and five (6%) subjects in the control group were not visited at 15 months." **Comment:** dropout rates were low

McCallum 2007 *(Continued)*

Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "A total of 12 (15%) subjects in the intervention group and five (6%) subjects in the control group were not visited at 15 months." **Comment:** dropout rates were low
Selective reporting (reporting bias)	Low risk	**Comment:** no differences found between publication and protocol
Other bias	Low risk	**Comment:** no other bias identified - low risk of bias in majority of other domains

Mirza 2013

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: Hispanic children aged 7-15, BMI ≥ 95th percentile for age and sex (CDC growth charts) and otherwise healthy **Exclusion criteria**: any known medical conditions which would interfere with the study's objectives/procedures (e.g. type 2 diabetes, Cushing's syndrome, severe asthma, use of medications known to promote weight gain or loss) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** low-glycaemic load dietary group **Comparator:** conventional low-fat dietary group
Outcomes	**Outcome measures reported in abstract**: completion rates, glycaemic load, BMI z score, WC, systolic blood pressure, BMI, insulin resistance, components of metabolic syndrome
Study details	**Trial terminated early:** no **Trial ID:** NCT01068197
Publication details	**Language of publication**: English **Funding:** NIH grants K23-RR022227 (NMM), MO1-RR-020359, and UL1RR031988, which were awarded by the National Center for Research Resources to support the General Clinical Research Center and the Children's Research Institute at Children's National Medical Center, and ZIA-HD-00641 and the following foundations and organizations: Consumer Health Foundation, The Jessie Ball DuPont Foundation, and United Way of the National Capital Area. J Yanovski is supported by the Intramural Research Program of the Eunice Kennedy Shriver National Institute of Child Health and Human Development and the National Institute on Minority Health and Health Disparities of the NIH. D Ludwig is supported in part by career award K24DK082730 from the National Institute of Diabetes and Digestive and Kidney Diseases (non-commercial) **Publication status:** peer-reviewed journal

Mirza 2013 *(Continued)*

Stated aim for study	Quote from publication: **"**We compared the effects of an LGD and a low-fat diet (LFD) on body composition and components of metabolic syndrome in obese Hispanic youth"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "The order in which groups occurred was determined by random assignment in blocks of 2 within strata determined by the BMI percentile, sex, and pubertal stage" **Comment:** randomisation process well described
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Because of the nature of the dietary intervention, the study was not a double-blind randomized study. Participants were not informed of their dietary group assignment but could ascertain their group on the basis of the diets offered." **Comment:** participants were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Because of the nature of the dietary intervention, the study was not a double-blind randomized study. Participants were not informed of their dietary group assignment but could ascertain their group on the basis of the diets offered." **Comment:** participants were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "The staff who obtained primary and secondary outcome measurements did not take part in the interventions and were blinded to subject group assignments. **Comment:** assessment staff were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "The staff who obtained primary and secondary outcome measurements did not take part in the interventions and were blinded to subject group assignments. **Comment:** assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "Seventy-nine percent of LGD and LFD enrolees completed the 3-mo study, 61% of enrolees completed 1 y of follow-up, and 54.9% enrolees completed 2 y of follow-up (Figure 1)." **Comment:** dropout rates were quite high
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Seventy-nine percent of LGD and LFD enrolees completed the 3-mo study, 61% of enrolees completed 1 y of follow-up, and 54.9% enrolees completed 2 y of follow-up (Figure 1)." **Comment:** dropout rates were quite high
Selective reporting (reporting bias)	High risk	**Comment:** some outcomes not reported - cholesterol, BP, WC, glucose, total body fat mass, fat-free mass - some reported in supplementary data but only as combined groups, not separately. Did report WC and SBP in abstract but

Mirza 2013 *(Continued)*

		could not find in paper. Clinical trial no: NCT01068197 - secondary outcomes hormonal, lipid assay and body fat mass not reported in publication
Other bias	Unclear risk	**Comment:** unable to assess if any biases were present

NCT02436330

Methods	**Parallel RCT** **Randomisation ratio**: 2:1 **Superiority design**
Participants	**Inclusion criteria**: child aged 8-16 years, BMI ≥ 85th percentile, English speaking, approval by Primary Care Doctor **Exclusion criteria**: participants with medical, developmental or psychiatric diagnoses which precluded participation in both the physical activity and classroom portions of the curriculum, participants who were taking medications that positively or negatively affected weight **Diagnostic criteria**: BMI percentile reference unclear
Interventions	**Number of study centres**: unclear **Run-in period**: no **Extension period**: no **Intervention:** exergaming and didactic healthy teaching **Control:** didactic healthy teaching only
Outcomes	**Outcome measures reported in abstract**: no publication
Study details	**Trial terminated early:** no **Trial ID:** NCT02436330
Publication details	**Language of publication**: English **Funding:** unclear **Publication status:** other (results from ClinicalTrials.gov)
Stated aim for study	Quote from publication: "Primary objective: to assess impact of the program on BMI z-scores. Secondary objectives: to measure impact on cardiovascular fitness, self-worth, sedentary screen time, and the influence of exergaming component on attendance and participation."
Notes	Clinical trials register entry only - no published results

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Quote from publication:** "enrolled sequentially and randomized 2:1 in experimental and control groups." **Comment:** no further information about randomisation provided

NCT02436330 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	**Quote from publication:** "enrolled sequentially and randomized 2:1 in experimental and control groups..." **Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Masking: open label..." **Comment:** investigator-assessed
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Masking: open label..." **Comment:** investigator-assessed
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "Masking: open label..." **Comment:** investigator-assessed
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "Masking: open label..." **Comment:** investigator-assessed
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Comment:** in intervention arm 14/60 lost to follow-up and 11/60 withdrew; in the control arm 4/24 lost to follow-up and 7/24 withdrew. Thus over 40% of all intervention participants did not complete
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Comment:** in intervention arm 14/60 lost to follow-up and 11/60 withdrew; in the control arm 4/24 lost to follow-up and 7/24 withdrew. Thus over 40% of all intervention participants did not complete
Selective reporting (reporting bias)	High risk	**Comment:** although all outcomes were reported as stated on the registry, only completers' analyses were presented (and numbers varied for different outcomes). Also the tests used have not undergone peer review as part of formal publication
Other bias	Unclear risk	**Comment:** results have only been extracted from trials register therefore can only be treated as provisional

Nemet 2005

Methods	**Parallel RCT** **Randomisation ratio**: 5:4 **Superiority design**
Participants	**Inclusion criteria**: age 6-16, obese children and adolescents (CDC growth charts) **Exclusion criteria**: organic cause for obesity, receiving medication which may interfere with growth or weight control (e.g. corticosteroids, thyroid hormones) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no

Nemet 2005 *(Continued)*

	Extension period: no **Intervention:** combined dietary and exercise programme **Comparator:** usual care control group
Outcomes	**Outcome measures reported in abstract**: body weight, BMI, body fat percentage, total cholesterol, LDL, fitness, leisure-time physical activity
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** grant from the Israeli Heart Fund (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: **"**To examine prospectively the short- and long-term effects of a 3-month, combined dietary-behavioral-physical activity intervention on anthropometric measures, body composition, dietary and leisure-time habits, fitness, and lipid profiles among obese children"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Thirty children and adolescents were assigned randomly, with a computerized, random number generator, to participate in our 3-month, combined dietary and exercise program for the treatment of childhood obesity, at the Child Health and Sports Center, Meir General Hospital, Tel Aviv University" **Comment:** randomisation process well described
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** not clear if participants and study personnel were blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** not clear if participants and study personnel were blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Comment:** not clear if outcome assessors were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** not clear if outcome assessors were blinded to study group
Incomplete outcome data (attrition bias)	Unclear risk	**Quote from publication:** "Twenty-four subjects completed the 3-month program, and 20 of them returned for evaluation 1 year later. (intervention)"

Nemet 2005 *(Continued)*

Subjective outcomes		"Twenty-two control subjects completed the 3-month evaluation, and 20 of them returned for evaluation after 1 year." **Comment:** moderate missing data, potential attrition bias
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Twenty-four subjects completed the 3-month program, and 20 of them returned for evaluation 1 year later. (intervention)" "Twenty-two control subjects completed the 3-month evaluation, and 20 of them returned for evaluation after 1 year." **Comment:** moderate missing data, potential attrition bias
Selective reporting (reporting bias)	Unclear risk	**Comment:** no clinical trials register entry or protocol available
Other bias	Unclear risk	**Comment:** unable to assess if any biases were present

Nova 2001

Methods	**Parallel RCT** **Randomisation ratio**: 2:5 **Superiority design**
Participants	**Inclusion criteria**: child aged 3-12 years, excess weight, ≥ 20 of ideal body weight, attended a family paediatrician's office 15 November 1997-31 March 1998 **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: unclear **Run-in period**: no **Extension period**: no **Intervention:** enhanced approach **Comparator:** routine approach
Outcomes	**Outcome measures reported in abstract**: percentage overweight, physical activity, computer or television use, dietary behaviour, attendance
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** NIH (the national institute of nursing research) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To compare two types of intervention intended to reduce weight in obese children that can be carried out in the family paediatricians (FPs) office"
Notes	-

Nova 2001 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** randomisation process not described
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** not clear if participants and study personnel were blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** not clear if participants and study personnel were blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Comment:** not clear if outcome assessors were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** not clear if outcome assessors were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "On average 70% of all children attended their 12 month follow up visit. However, if we consider the population of any single FP, we observe a huge dispersion around this mean value: two fps in A and four in group B maintained all their enrolled children, whereas three FPs in A and two in group B lost >75% of participants" **Comment:** in some areas attrition rates were high
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "On average 70% of all children attended their 12 month follow up visit. However, if we consider the population of any single FP, we observe a huge dispersion around this mean value: two fps in A and four in group B maintained all their enrolled children, whereas three FPs in A and two in group B lost >75% of participants" **Comment:** in some areas attrition rates were high
Selective reporting (reporting bias)	High risk	**Comment:** no protocol or clinical trials register available. Potential reporting bias by not reporting BMI at follow-up. Raw results not given for behavioural measures. No results given for 24-month follow-up
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Nowicka 2009

Methods	**Parallel RCT** **Randomisation ratio**: 1:1

Nowicka 2009 *(Continued)*

	Superiority design
Participants	**Inclusion criteria**: obesity defined by the IOTF cut-points **Exclusion criteria**: receiving any other obesity treatment, identifiable medical cause for obesity (with the exception of those with elevated blood lipids and asthma) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** summer camp **Comparator:** no-care control
Outcomes	**Outcome measures reported in abstract**: BMI z score
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** study was funded by Swedish Savings Bank Foundation, the Swedish Sports Confederation and Östra Göinge municipality. Research related to this paper was supported by the Sven Jerring Foundation, Regional Research Support, and the Faculty of Medicine at Lund University, Sweden (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The general aim of this study was to evaluate the effect of management of childhood obesity by promoting increased physical activity, in comparison with an untreated waiting list control group."
Notes	-

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	**Comment:** randomisation process not described
Allocation concealment (selection bias)	High risk	**Comment:** study author confirmed via email that allocation was not concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that participants and study personnel were not blinded to study group

Nowicka 2009 *(Continued)*

Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that outcome assessors were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that outcome assessors were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "13 did not want to be in the control group" **Comment:** 13 of the control group dropped out – potential attrition bias
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "13 did not want to be in the control group" **Comment:** 13 of the control group dropped out – potential attrition bias
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry available
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

O'Connor 2013

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: healthy children aged 5-8 years, overweight (BMI ≥ 85%) but not morbidly obese (BMI < 99%) (CDC growth charts), attended participating Texas Children's Pediatric Associate (TCPA) clinics, and were Texas Children's Health Plan (TCHP) members, only 1 child per family was eligible **Exclusion criteria**: medical consequences of obesity (e.g. hypertension) that required intensive treatment, taking medications which could affect a child's weight status, medical problems which would cause difficulties in participating in the programme, if the child was participating in other weight loss programmes, parent was unable to read or write in English or Spanish, parents had participated in formative studies to develop the Helping HAND intervention **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 4 **Run-in period**: no **Extension period**: no **Intervention:** 'Helping HAND' obesity intervention **Comparator:** waiting-list control
Outcomes	**Outcome measures reported in abstract**: attrition, BMI z score, dietary intake, physical activity, hours of TV per week
Study details	**Trial terminated early:** no **Trial ID:** NCT01195012

O'Connor 2013 *(Continued)*

Publication details	**Language of publication**: English **Funding:** US Department of Agriculture (USDA/ARS) Children's Nutrition Research Center, Department of Pediatrics, BCM funded in part by the USDA/ARS (Cooperative Agreement 6250-51000) and the Gilsson Longenbaugh Foundation BCM Seed Funds (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "Test the feasibility of Helping HAND (Healthy Activity and Nutrition Directions), an obesity intervention for 5- to 8-year-old children in primary care clinics"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Families who met all criteria were enrolled and randomized to immediately starting Helping HAND (intervention group: IG) or wait-listed for the programme (control group: CG) via a random number sequence protocol developed by the project statistician" **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** (from author via email) "Yes, participants were recruited and baseline data obtained prior to them being randomized to the intervention of waitlist control group" **Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "No, it was not possible to blind participants to the study group since this was a feasibility study and the control group did not receive an intervention (wait-listed). For the same reasons and due to the budget available for this feasibility study, study staff were not blinded to condition. We did have a different staff team conduct the assessment from those that delivered the program." **Comment:** participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "No, it was not possible to blind participants to the study group since this was a feasibility study and the control group did not receive an intervention (wait-listed). For the same reasons and due to the budget available for this feasibility study, study staff were not blinded to condition. We did have a different staff team conduct the assessment from those that delivered the program." **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "Because of limited staffing those who collected data could not be blinded to participant group assignment at post assessment for this pilot study." **Comment:** study author confirmed via email that outcome assessors were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "Because of limited staffing those who collected data could not be blinded to participant group assignment at post assessment for this pilot study."

O'Connor 2013 *(Continued)*

		Comment: study author confirmed via email that outcome assessors were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "There was 20% attrition from Helping HAND (attended 4/6 sessions)." **Comment:** relatively low attrition rates
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "There was 20% attrition from Helping HAND (attended 4/6 sessions)." **Comment:** relatively low attrition rates
Selective reporting (reporting bias)	Unclear risk	**Comment:** clinical trials register only states that family attendance was the primary outcome – does not provide any secondary or other outcomes
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Reinehr 2010

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 8-16 years, overweight, BMI > 90th percentile and < 97th percentile using German percentiles (Kromeyer-Hauschild 2001), apparently healthy and not on any medication, attending a regular school **Exclusion criteria**: obese children **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 2 **Run-in period**: no **Extension period**: no **Intervention:** 'Obeldicks Light' lifestyle intervention **Comparator:** waiting list control
Outcomes	**Outcome measures reported in abstract**: dropout rates, BMI SDS, WC, blood pressure, skinfold thickness, fat mass (BIA and skinfold thickness), dietary intake (energy, fat, sugar), HRQoL, self-esteem
Study details	**Trial terminated early:** no **Trial ID:** NCT00422916
Publication details	**Language of publication**: English **Funding:** German Federal Ministry of Research (grant numbers 01EL619 and 01EL0603) (non-commercial) **Publication status:** peer-reviewed journal

Reinehr 2010 *(Continued)*

Stated aim for study	Quote from publication: "Our primary hypothesis was that this lifestyle intervention is effective in reducing the degree of overweight based on standard deviation scores of body mass index"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "The children were randomized in the control group (CG) (waiting period of 6 months) or in the intervention group (IG) (6 months intervention) using a computer" **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "The study was an open randomized controlled trial since blinding was not possible due to the nature of the intervention." **Comment:** participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "The study was an open randomized controlled trial since blinding was not possible due to the nature of the intervention." **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "The study was an open randomized controlled trial since blinding was not possible due to the nature of the intervention." **Comment:** outcome assessors were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "The study was an open randomized controlled trial since blinding was not possible due to the nature of the intervention." **Comment:** outcome assessors were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "Only one child (3%) dropped out of the intervention group, and 5 children (16%) dropped out of the control group" **Comment:** in addition there were 5 families who withdrew consent prior to baseline measurements. Dropout rates quite low
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "Only one child (3%) dropped out of the intervention group, and 5 children (16%) dropped out of the control group" **Comment:** in addition there were 5 families who withdrew consent prior to baseline measurements. Dropout rates quite low
Selective reporting (reporting bias)	High risk	**Comment:** in the main publication (Reinehr 2010) there is no mention of them measuring QoL. The clinical trials register entry specifies QoL as a secondary measure and an additional publication (Finne 2013, see Reinehr 2010) but does not present results for intervention and control separately even though they were measured at these time points
Other bias	Unclear risk	**Comment:** unable to assess whether any other biases are present

Rodearmel 2007

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 7-14 years, overweight or risk for overweight (BMI ≥ 85th percentile for age and gender based on CDC growth charts), at least 1 parent/guardian to participate in the study **Exclusion criteria**: children or parents with medical or physical conditions that prevented them for participating in physical activity (assessed by health history questionnaire), pregnancy or lactation (child or parent) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** 'America on the Move' intervention group **Comparator:** self-monitoring group
Outcomes	**Outcome measures reported in abstract**: BMI for age, parental weight, steps/d
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** McNeil Nutritionals, LLC, and National Institutes of Health grant DK42549 (commercial and non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The intent of this study was to evaluate whether small changes in diet and physical activity, as promoted by the America on the Move initiative, could prevent excessive weight gain in overweight children"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Quote from study author (via email):** "During initial telephone contact, families with a child meeting eligibility criteria were randomized to the control or experimental groups using the next assignment provided by a simple randomization schedule" **Comment:** unclear if this method would have resulted in selection bias
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed

Rodearmel 2007 *(Continued)*

Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Quote from study author (via email):** "Participants were not aware that there were two study groups. At the point of randomization they were only told about their assigned group. Personnel were not blinded to study group." **Comment:** participants potentially were blinded to study group but personnel were not – unclear level of bias
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Quote from study author (via email):** "Participants were not aware that there were two study groups. At the point of randomization they were only told about their assigned group. Personnel were not blinded to study group." **Comment:** participants potentially were blinded to study group but personnel were not – unclear level of bias
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed via email that assessors were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed via email that assessors were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "Overall, the dropout rate for target children was 16%, with the rate slightly but not statistically significantly higher in AOM than in SM families." **Comment:** low dropout rates
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "Overall, the dropout rate for target children was 16%, with the rate slightly but not statistically significantly higher in AOM than in SM families." **Comment:** low dropout rates
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry available
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Sacher 2010

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 8-12 years, obese (BMI ≥ 98th percentile, UK 1990), no apparent clinical problems, comorbidities, physical disabilities or learning difficulties which would interfere with taking part, at least 1 parent/carer who could attend the programme sessions **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 5 **Run-in period**: no

Sacher 2010 *(Continued)*

	Extension period: no **Intervention:** MEND program **Comparator:** waiting list control
Outcomes	**Outcome measures reported in abstract**: BMI z score, WC z score, cardiovascular fitness, physical activity, sedentary activity, self-esteem, attendance
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN30238779
Publication details	**Language of publication**: English **Funding:** National Institute for Health Research, Sainsbury's Supermarkets Ltd., Bromley Mytime, Bromley Primary Care Trust (PCT), Great Ormond Street Hospital for Children NHS Trust, London Borough of Lewisham, MEND Central Ltd., New Cross Gate New Deal for Communities, Parkwood Leisure, Southwark PCT, The Lewisham Hospital NHS Trust, UCL Institute of Child Health, and Waveney PCT (commercial and non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The aim of this study was to evaluate the effectiveness of the Mind, Exercise, Nutrition, Do it (MEND) Program, a multicomponent community-based childhood obesity intervention (www.mendcentral.org)."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "randomization was conducted by an independent researcher using a random permuted block design with blocks of size 6. The randomization schedule was computer generated" **Comment:** randomisation process well described
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from study author (via email):** "As we used a delayed intervention control group, it was not possible to blind participants to the study group. Study personnel were not blinded" **Comment:** participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from study author (via email):** "As we used a delayed intervention control group, it was not possible to blind participants to the study group. Study personnel were not blinded" **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from study author (via email): "**Study personnel were not blinded but all measurements were repeated and double checked by blinded additional research staff." **Comment:** even though study personnel were not blinded, measurements were checked by blinded staff

Sacher 2010 *(Continued)*

Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from study author (via email): "**Study personnel were not blinded but all measurements were repeated and double checked by blinded additional research staff." **Comment:** even though study personnel were not blinded, measurements were checked by blinded staff
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "Of the 60 intervention children, 54 started and all 54 completed the intensive phase of the intervention (9-week MEND Program), while 62% of the 60 were seen at 6 months and 83% either at 6 or 12 months" **Comment:** dropout rates relatively low in control group but moderate in intervention – potential attrition bias
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Of the 60 intervention children, 54 started and all 54 completed the intensive phase of the intervention (9-week MEND Program), while 62% of the 60 were seen at 6 months and 83% either at 6 or 12 months" **Comment:** dropout rates relatively low in control group but moderate in intervention – potential attrition bias
Selective reporting (reporting bias)	High risk	**Comment:** outcomes reported in clinical trials register entry report outcomes not reported in the publication (family functioning, child mental health, dietary intake) – potential reporting bias
Other bias	Unclear risk	**Comment:** unable to assess if any other biases are present

Saelens 2013

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 7-11 years, above the 85th percentile for age- and gender-specific BMI but not > 175% above median BMI for age and gender (CDC growth charts), at least 1 overweight parent (BMI ≥ 25), no existing thought disorder, suicidality, substance abuse disorder, no disability or illness stopping them from engaging in at least moderate intensity activity, English speaking and at least second grade reading level, no current or prior diagnosed eating disturbance, live < 50 miles from the treatment site, parent/caregiver willing to attend treatment sessions and engage in the behaviour change around eating and physical activity, parents were allowed to participate in other weight programmes if the behavioural changes recommended were consistent with the study's targets **Exclusion criteria**: conditions known to promote obesity (e.g. Prader-Willi), participating in another weight control programme, recently started taking medications which affect weight (e.g. stimulants) **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** self-directed approach **Comparator:** prescribed approach

Saelens 2013 *(Continued)*

Outcomes	**Outcome measures reported in abstract**: BMI z score, parental BMI
Study details	**Trial terminated early:** no **Trial ID:** NCT00746629
Publication details	**Language of publication**: English **Funding:** Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health under award number R21HD054871 and the Seattle Children's Hospital Research Institute (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To examine the efficacy of an adjunct motivational and autonomy-enhancing intervention (self-directed) for behavioral family-based pediatric obesity relative to the standard prescription of uniform behavioural skills use and interventionist goal assignment (prescribed)"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Families were randomly assigned to receive either the prescribed or self-directed approach, with child gender and child level of overweight [< or >60% above median body mass index (BMI) for age and gender] as stratification variables. Randomization blocks were randomly selected to be either four or six participating families" **Comment:** randomisation process well described
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Quote from publication:** "During consenting, families were provided a brief description of each approach, but were otherwise blind to approach differences during treatment." **Comment:** participants blinded to which was the intervention and which was the control group. Unclear if study personnel were
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Quote from publication:** "During consenting, families were provided a brief description of each approach, but were otherwise blind to approach differences during treatment." **Comment:** participants blinded to which was the intervention and which was the control group. Unclear if study personnel were
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "Assessors were not interventionists and were blind to approach differences" **Comment:** outcome assessors were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Assessors were not interventionists and were blind to approach differences" **Comment:** outcome assessors were blinded to study group

Saelens 2013 *(Continued)*

Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "There were 57 assessment completers at post-treatment, 58 at 3-month follow-up, 54 at 6-month follow-up, 52 at 1-year follow-up, and 46 at 2-year follow-up." **Comment:** dropout rates fairly high (48%). Did use an imputation method to replace some data but attrition bias likely to still exist
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "There were 57 assessment completers at post-treatment, 58 at 3-month follow-up, 54 at 6-month follow-up, 52 at 1-year follow-up, and 46 at 2-year follow-up." **Comment:** dropout rates fairly high (48%). Did use an imputation method to replace some data but attrition bias likely to still exist
Selective reporting (reporting bias)	Unclear risk	**Comment:** no clinical trial entry or protocol available
Other bias	Unclear risk	**Comment:** unable to assess if any other biases are present

Satoh 2007

Methods	**Parallel RCT** **Randomisation ratio**: 2:1 **Superiority design**
Participants	**Inclusion criteria**: aged 8-14 years, obesity (definition adopted from The Ministry of Health, Labor and Welfare in Japan, body weight exceeded 120% of standard body weight corresponding to height for age and sex obtained from national statistics for Japanese school children 1990) **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 3 **Run-in period**: no **Extension period**: no **Treatment before study** *:* before starting dietary guidance both intervention and control subjects and their parents received conventional dietary guidance **Intervention:** dietary guidance using an easily handled model nutritional balance chart (MNBC) **Comparator:** usual care
Outcomes	**Outcome measures reported in abstract**: percentage overweight, nutritional balance (sugar and beans)
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** unclear

Satoh 2007 *(Continued)*

	Publication status: peer-reviewed journal
Stated aim for study	Quote from publication: "In the present study, an easily handled model nutritional balance chart (MN-BC) for obese children and their families was investigated"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** randomisation process not described
Allocation concealment (selection bias)	Unclear risk	**Comment:** not clear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** not clear whether study personnel or participants were blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** not clear whether study personnel or participants were blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Comment:** not clear if outcome assessors were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** not clear if outcome assessors were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "Among the 43 obese children, 29 were randomly chosen for the obesity intervention groups and the other 14 children comprised the control group. Three children in the intervention group refused to participate in the study and five children in the intervention group withdrew after 1 month of intervention, leaving 21 remaining children in the intervention group. Among the 14 children in the control group, six children refused to participate in the study, leaving eight remaining children in the control group. These two groups were stable during the entire length of the study." **Comment:** dropout high in both groups at 6 months (around 47%) – attrition bias likely
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Among the 43 obese children, 29 were randomly chosen for the obesity intervention groups and the other 14 children comprised the control group. Three children in the intervention group refused to participate in the study and five children in the intervention group withdrew after 1 month of intervention, leaving 21 remaining children in the intervention group. Among the 14 children in the control group, six children refused to participate in the study, leaving eight remaining children in the control group. These two groups were stable during the entire length of the study." **Comment:** dropout high in both groups at 6 months (around 47%) – attrition bias likely

Satoh 2007 *(Continued)*

Selective reporting (reporting bias)	Unclear risk	**Comment:** no clinical trial entry or protocol available
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Schwingshandl 1999

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: obese children and adolescents (unclear how obesity was defined) **Exclusion criteria**: none **Diagnostic criteria**: unclear
Interventions	**Number of study centres**: unclear **Run-in period**: no **Extension period**: no **Intervention:** physical activity programme and dietary advice **Comparator:** dietary advice alone
Outcomes	**Outcome measures reported in abstract**: weight, fat-free mass
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** unclear **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To study the effect of a standardised training programme focusing on maintenance of fat free mass during weight reduction by energy reduction in obese children."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** randomisation process not described
Allocation concealment (selection bias)	Unclear risk	**Comment:** not clear if allocation was concealed

Schwingshandl 1999 *(Continued)*

Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** not clear whether study personnel or participants were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** not clear if outcome assessors were blinded to study group
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Thirty obese children and adolescents (14 group A, 16 group B) participated in the 12 week long programme; 20 children (10 group A, 10 group B) were also reassessed after one year" **Comment:** dropout rates relatively high
Selective reporting (reporting bias)	High risk	**Comment:** no clinical trials register entry or protocol available. The authors do not provide data for BMI at 12 months' follow-up (only provide at 12 weeks)
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Serra-Paya 2015

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 6-12 years, overweight or obese (IOTF), sedentary, < 2 h/week of physical activity outside of school, live in or near the municipality of Lleida (Spain) and their healthcare paediatric unit has been accepted to take part, at least 1 parent/guardian able to participate **Exclusion criteria**: co-morbidities e.g. Cushing's disease, or serious chronic illness, use of medication that might affect weight loss or adaptations to exertion, previous enrolment in other obesity treatment interventions, regular participation in physical exercise programmes in the past 6 months **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 16 **Run-in period**: no **Extension period**: no **Intervention:** Nereu programme **Comparator:** counselling group
Outcomes	**Outcome measures reported in abstract**: BMI SDS, moderate-intense physical activity, daily fruit servings, daily soft drink consumption
Study details	**Trial terminated early:** no **Trial ID:** NCT01878994
Publication details	**Language of publication**: English **Funding:** partially funded by the Instituto de Salud Carlos III in Spain, from the Ministry of Economy and Competitiveness (Grant PI12/02220) co-funded by FEDER and the Institute of Physical Education of

Serra-Paya 2015 *(Continued)*

	Catalonia (INEFC), University of Lleida, Spain, (Grants: VCP/3570/2010, 29th October, DOGC NÚM. 5753 – 11.11.2010; VCP/28/2009, 14th January, DOGC NÚM. 5302 – 22/01/2009) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To evaluate the effectiveness of the Nereu Program in improving anthropometric parameters, physical activity and sedentary behaviours, and dietary intake."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Each cooperating healthcare paediatric unit was provided a sort list (using a computer-generated random number) of their eligible patients who met the inclusion criteria (age and BMIsd), according to the data contained in clinical records. These eligible children had been randomly assigned to one of the study arms, stratified by age group in each HPU" **Comment:** randomisation process described in detail
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if randomisation process would introduce selection bias through allocation concealment
Blinding of participants and personnel (performance bias) Subjective outcomes	Low risk	**Comment:** study author confirmed via email that they were both blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	Low risk	**Comment:** study author confirmed via email that they were both blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "All the measurements and questionnaires were administered by the same expert interviewers, who were blinded to the allocated study group in both sessions (baseline and at the end of the intervention)." **Comment:** outcome assessors were blinded to study group for subjective outcomes
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** not clear if outcome assessors were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Despite high program adherence, the rate of losses and missing values affected the effect size, depending on the parameter, which limited the statistical power to detect differences between groups in the changes observed" **Comment:** moderate dropout rates – potential attrition bias
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Quote from publication:** "Despite high program adherence, the rate of losses and missing values affected the effect size, depending on the parameter, which limited the statistical power to detect differences between groups in the changes observed" **Comment:** moderate dropout rates – potential attrition bias

Serra-Paya 2015 *(Continued)*

Selective reporting (reporting bias)	Unclear risk	**Comment:** publication did not report some of the outcomes given in the protocol – e.g. QOL – or endpoint (12 months after intervention). Perhaps will be reported in another publication
Other bias	Low risk	**Comment:** no other bias identified - study generally low risk of bias in other domains

Siwik 2013

Methods	**Cross-over RCT** (analysed as a parallel RCT) **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: child age 8–11 years, BMI above the 85th percentile (CDC growth charts), child was in the 3rd-5th grades **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** 'Choices' group office-visit intervention **Comparator:** lagged control group
Outcomes	**Outcome measures reported in abstract**: BMI z score, weight for age z score, low and high METs, behaviours and attitudes
Study details	**Trial terminated early:** no **Trial ID:** NCT01674920
Publication details	**Language of publication**: English **Funding:** National Institutes of Health grant R21 HD50962 (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To improve coping skills and increase the likelihood of success in making lifestyle changes, we enhanced the concept of "choices" by providing an innovative approach to problem-solving skills designed to strengthen resiliency. We developed a group office curriculum and conducted an early phase trial to test the efficacy of the program using a lagged intervention/control design."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement

Siwik 2013 *(Continued)*

Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Allocation was done using design-adaptive allocation that minimizes the differences between groups as participants enter the study. Balancing factors were sex, age, and BMI." **Comment:** randomisation process described
Allocation concealment (selection bias)	Unclear risk	**Comment:** not clear whether allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** unclear if participants and study personnel were blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear if participants and study personnel were blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Comment:** unclear if outcome assessors were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear if outcome assessors were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "Two families were unable to attend sessions, but the children received nearly all the measurements and are included in all analyses" **Comment:** only 3 children were not available for follow-up measurements and missing data were imputed
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "Two families were unable to attend sessions, but the children received nearly all the measurements and are included in all analyses" **Comment:** only 3 children were not available for follow-up measurements and missing data were imputed
Selective reporting (reporting bias)	Low risk	**Comment:** clinical trials register entry available – no bias
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Taveras 2015

Methods	**Cluster RCT** **Randomisation ratio**: 1:1:1 **Superiority design**
Participants	**Inclusion criteria**: child aged 6-12.9 years, BMI ≥ 90th percentile for age and sex at baseline well child visit (CDC growth charts), child has received well child care at Harvard Vanguard Medical Associates (HVMA) within the past 15 months, at least 1 parent able to communicate in English

Taveras 2015 *(Continued)*

	Exclusion criteria: if child has already enrolled in study, family planning to leave HVMA within the study time frame, their clinician feels the study is not appropriate for them, had chronic medical conditions which impacted on their diet/physical activity **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 14 **Run-in period**: no **Extension period**: no **Intervention 1:** computerised point-of-care alerts plus direct to parent outreach and support **Intervention 2:** computerised point-of-care alerts only **Comparator:** usual care
Outcomes	**Outcome measures reported in abstract**: BMI, Healthcare Effectiveness Data and Information Set (HEDIS) performance measures for obesity
Study details	**Trial terminated early:** no **Trial ID:** NCT01537510
Publication details	**Language of publication**: English **Funding:** this study was supported by award R18 AE000026 from the American Recovery and Reinvestment Act (Dr Taveras) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To examine the extent to which computerized clinical decision support (CDS) delivered to pediatric clinicians at the point of care of obese children, with or without individualized family coaching, improved body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) and quality of care"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:**· "We used a stratified block randomization scheme to assign practices to one of the 3 study arms. Strata were based on the volume of children aged 6.0 to 12.9 with a BMI 95th percentile seen for well-child visits at each site from April 2010 through March 2011. A biostatistician (KPK) blinded to the names of the practices ordered them on this characteristic, then introduced a false practice at a random spot within the order to make the number of "practices" evenly divisible by 3. Strata consisted of consecutive groups of three practices from this ordered list. He then used a pseudo-random number generator in SAS 9.2 (SAS Institute, Cary NC) to assign one practice from each strata to each of the arms, with the exception that the false practice was deterministically assigned to the usual care arm. This resulted in 5 practices in each of the intervention arms and 4 in the usual care arm." **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Comment:** unlikely that selection bias would have occurred from the randomisation process described above

Taveras 2015 *(Continued)*

Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Quote from publication:** "Study participants and the pediatricians in each practice are blinded to specific study hypotheses but not to intervention assignment" **Comment:** were not blinded to treatment group, but did not know study hypothesis – unclear if any bias would have occurred
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Quote from publication:** "Study participants and the pediatricians in each practice are blinded to specific study hypotheses but not to intervention assignment" **Comment:** were not blinded to treatment group, but did not know study hypothesis – unclear if any bias would have occurred
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "Research staff performing all assessments is blinded to specific study hypotheses and to intervention assignment" **Comment:** outcomes assessors were blinded to treatment group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Research staff performing all assessments is blinded to specific study hypotheses and to intervention assignment" **Comment:** outcomes assessors were blinded to treatment group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "we obtained BMI from 518 children (94.4% and HEDIS measurement from 491 visits (89.4%)." **Comment:** relatively low dropout rates
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "we obtained BMI from 518 children (94.4% and HEDIS measurement from 491 visits (89.4%)." **Comment:** relatively low dropout rates
Selective reporting (reporting bias)	Unclear risk	**Comment:** clinical trial mentions measuring costs and health behaviours- but these are not reported in the publication – may be published in an additional paper
Other bias	Low risk	**Comment:** was a cluster RCT and adjusted for clustering in their analyses

Taylor 2015

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: age 4-8 years-, enrolled at several Dunedin general practices, overweight or obese (BMI ≥ 85th percentile, CDC growth charts) **Exclusion criteria**: unable to participate in a behavioural intervention, on medication known to affect body composition or growth, planning on moving out of Dunedin in the next 2 years **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no

Taylor 2015 *(Continued)*

	Extension period: no **Intervention:** tailored package family-based intervention **Comparator:** usual care
Outcomes	**Outcome measures reported in abstract**: BMI, BMI z score, WC, fruit and vegetables intake, noncore food intake, noncore food availability, physical activity, parental feeding practices, parenting, QoL, child sleep, behaviours, satisfaction
Study details	**Trial terminated early:** no **Trial ID:** ACTRN12609000749202
Publication details	**Language of publication**: English **Funding:** Health Research Council of New Zealand. Dr Dawson was in receipt of a Freemasons New Zealand Fellowship at the time the data were collected. Dr R.W. Taylor is funded by the KPS Research Fellowship (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To determine whether a 2-year family-based intervention using frequent contact and limited expert involvement was effective in reducing excessive weight compared with usual care."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Randomization to intervention condition occurred using random block lengths (Stata 12.0, StataCorp) after stratifying for feedback condition." **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "We also met virtually all study quality criteria, including blinding of outcome assessors to treatment, allocation concealment, and appropriate statistical analyses" **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication: "**Participants were not blinded to intervention condition because the 2 conditions differed in the amount of contact." **Comment:** participants were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication: "**Participants were not blinded to intervention condition because the 2 conditions differed in the amount of contact." **Comment:** participants were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "Outcome assessments were undertaken at baseline (including screening), 12 and 24 months by trained assistants blinded to intervention allocation." **Comment:** outcomes assessors were blinded to treatment group

Taylor 2015 *(Continued)*

Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Outcome assessments were undertaken at baseline (including screening), 12 and 24 months by trained assistants blinded to intervention allocation." **Comment:** outcomes assessors were blinded to treatment group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "A major strength of our study is the high retention, with 88% of children at study end." **Comment:** relatively low dropout rates
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "A major strength of our study is the high retention, with 88% of children at study end." **Comment:** relatively low dropout rates
Selective reporting (reporting bias)	Low risk	**Comment:** no differences found between publication and online clinical trials register
Other bias	Unclear risk	**Comment:** unable to assess if any other bias present

Vann 2013

Methods	**Parallel RCT** **Randomisation ratio**: 1:1:1:1 **Superiority design**
Participants	**Inclusion criteria**: age 3-18 years (sample were 4-17 years), enrolled at Healthy Lifestyle Clinic at University of South Carolina, overweight or obese (CDC growth charts), had a DVD player **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention 1:** pedometer + DVD group **Intervention 2:** pedometer group **Intervention 3:** fitness DVD group **Control:** usual care
Outcomes	**Outcome measures reported in abstract**: adherence, BMI
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** Richland Memorial Hospital Research and Education Foundation (non-commercial)

Vann 2013 *(Continued)*

	Publication status: peer-reviewed journal
Stated aim for study	Quote from publication: "The primary research aims were as follows: 1) Increase physical activity of obese children and adolescents 2) Encourage at least 10,000 steps per patient daily 3) Increase awareness that physical activity can lead to improved overall health status. The ultimate goal was to determine if the use of pedometers and/or fitness DVDs will improve physical activity parameters in the Healthy Lifestyles patient population."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from study author (via email):** "Study participants were randomly assigned in equal groups to four arms: 1) control group; 2) Pedometer group; 3) Fitness DVD group; 4) Pedometer and fitness DVD**"** **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Quote from study author (via email):** "Yes. The persons involved in recruitment of subjects were not a part of the allocation process." **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Quote from study author (via email):** "Participants were blinded to group selection. They only knew we were conducting a study which evaluated exercise patterns in their population. So, it is technically a single blinded study." **Comment:** participants were blinded to group selection - not study personnel
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Quote from study author (via email):** "Participants were blinded to group selection. They only knew we were conducting a study which evaluated exercise patterns in their population. So, it is technically a single blinded study." **Comment:** participants were blinded to group selection - not study personnel
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Comment:** study author confirmed assessors were not blinded
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Comment:** study author confirmed assessors were not blinded
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "While the participants seemed eager to participate in this study at its onset, there was a drastic drop in patient follow through as the study proceeded" **Comment:** a large amount of missing data. Only 14/28 (50%) were followed up at end of the study
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "While the participants seemed eager to participate in this study at its onset, there was a drastic drop in patient follow through as the study proceeded" **Comment:** a large amount of missing data. Only 14/28 (50%) were followed up at end of the study

Vann 2013 *(Continued)*

Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Wafa 2011

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 7-11 years, obese (BMI > 95th percentile, CDC growth charts), at least 1 parent who perceived their child's weight status as a problem and were willing to participate in the intervention **Exclusion criteria**: the child had a serious co-morbidity requiring treatment **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** low-intensity intervention **Control:** waiting list control
Outcomes	**Outcome measures reported in abstract**: BMI z scores, weight change, HRQoL, objectively-measured physical activity and sedentary behaviour
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN14241825
Publication details	**Language of publication**: English **Funding:** Scottish Funding Council (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To test whether a good practice intervention for the treatment of childhood obesity would have a greater impact on weight status and other outcomes than a control condition in Kuala Lumpur, Malaysia"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Participating children attended a research clinic where all baseline measures (see below) were taken, then assigned a unique study code prior to random allocation into treatment or control group. To ensure concealment of allocation, codes were sent electronically to a statistician (JHM) who produced a computer generated randomization list which allocat-

Wafa 2011 *(Continued)*

		ed participants to intervention or control group so that groups were balanced in blocks of 20. The statistician informed the researchers responsible for delivering the intervention (HNH, LN) of the allocation, and families were invited to intervention or waiting list control groups as appropriate." **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Comment:** allocation was concealed via the randomisation method described above
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from study author (via email):** "personnel who measured outcomes were blinded to group allocation, participating families were not (not possible/realistic we thought)" **Comment:** participants and personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from study author (via email):** "personnel who measured outcomes were blinded to group allocation, participating families were not (not possible/realistic we thought)" **Comment:** participants and personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "Outcome measures were made at baseline and again at six months (25 – 27 weeks) after the start of the intervention by the same trained researcher (SWW) who was blinded to group allocation and was not involved in delivery of the treatment program **Comment:** study author confirmed assessors were blinded
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Outcome measures were made at baseline and again at six months (25 – 27 weeks) after the start of the intervention by the same trained researcher (SWW) who was blinded to group allocation and was not involved in delivery of the treatment program **Comment:** study author confirmed assessors were blinded
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "Of the 107 participants entered at baseline, 80 (75%) attended for outcome measures at the six-month follow-up." **Comment:** moderate dropout rates that were higher in the intervention group
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Of the 107 participants entered at baseline, 80 (75%) attended for outcome measures at the six-month follow-up." **Comment:** moderate dropout rates that were higher in the intervention group
Selective reporting (reporting bias)	Low risk	**Comment:** no differences found between online clinical trial entry and publication
Other bias	Unclear risk	**Comment:** unable to assess if any other biases were present

Wake 2009

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**

Wake 2009 *(Continued)*

Participants	**Inclusion criteria**: age 5 years-10th birthday, attending participating practices between May 2005-July 2006, not receiving an ongoing weight management programme, overweight or obese (IOTF cut points) **Exclusion criteria**: BMI z score was ≥ 3.0 **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 45 **Run-in period**: no **Extension period**: no **Intervention:** LEAP2 behavioural intervention **Control:** no-care control group
Outcomes	**Outcome measures reported in abstract**: attrition, BMI, BMI z scores, physical activity (accelerometry), nutrition scores (diary), harm, costs
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN52511065
Publication details	**Language of publication**: English **Funding:** Australian National Health and Medical Research Council (NH&MRC) Project Grant 334309. M Wake is supported by NH&MRC Career Development Award 284556; L Gold by NH&MRC Capacity Building Grant 425855; and OC Ukoumunne by NH&MRC Capacity Building Grant 436914 (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To determine whether ascertainment of childhood obesity by surveillance followed by structured secondary prevention in primary care improved outcomes in overweight or mildly obese children."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Randomisation by child was stratified by GP and by overweight versus obese status; it was performed by an independent biostatistician using computer generated random numbers." **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "The randomisation sequence was concealed from the study investigators, and the researchers collecting data remained blind to participants' trial status until follow-up was complete." **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from study author (via email):** "Randomisation and outcomes measurement, but not participants, were blinded to group assignment" **Comment:** participants were not blinded to study group

Wake 2009 *(Continued)*

Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from study author (via email):** "Randomisation and outcomes measurement, but not participants, were blinded to group assignment" **Comment:** participants were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "Randomisation and outcomes measurement, but not participants, were blinded to group assignment" **Comment:** assessment staff were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Randomisation and outcomes measurement, but not participants, were blinded to group assignment" **Comment:** assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "attrition was 3.1% at 6 months and 6.2% at 12 months." **Comment:** attrition rates were fairly low for 12 months' follow-up
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "attrition was 3.1% at 6 months and 6.2% at 12 months." **Comment:** attrition rates were fairly low for 12 months' follow-up
Selective reporting (reporting bias)	Unclear risk	**Comment:** clinical trials register entry was retrospectively entered so difficult to assess reporting bias
Other bias	Low risk	**Comment:** no other bias identified - study generally of low risk of bias in other domains

Wake 2013

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 3-11 (but not including their 11th birthday), obese (BMI ≥ 95th percentile, CDC growth charts) **Exclusion criteria**: receiving ongoing weight management in a secondary or tertiary care programme, known endocrine or genetic cause for their obesity, major disability or health conditions precluding participation, family did not speak English sufficiently enough to complete questionnaires and participate in the study **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 22 **Run-in period**: no **Extension period**: no **Intervention:** HopSCOTCH (the shared care obesity trial) intervention **Control:** usual care

Wake 2013 *(Continued)*

Outcomes	**Outcome measures reported in abstract**: attrition, attendance, BMI, BMI z scores, benefit or harm on secondary outcomes
Study details	**Trial terminated early:** no **Trial ID:** ACTRN12608000055303
Publication details	**Language of publication**: English **Funding:** the Australian National Health and Medical Research Council (NHMRC Project Grant 491212) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The aim of the HopSCOTCH trial is to develop, implement and trial an innovative shared-care approach to manage childhood obesity."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Randomisation occurred via a concealed, computerised random number sequence stratified by general practitioner and pregenerated by the Clinical Epidemiology and Biostatistics Unit at the Royal Children's Hospital. Once enrolled (i.e. on receipt of written informed consent and baseline questionnaire) a research assistant, who was not otherwise involved with the trial, randomised children to either the shared-care or usual-care arm." **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "All families were advised of their child's allocation by a mailed letter." **Comment:** it was likely that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Researchers collecting outcome measurements, but not participants, were blinded to group assignment." **Comment:** participants were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Researchers collecting outcome measurements, but not participants, were blinded to group assignment." **Comment:** participants were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "Researchers collecting outcome measurements, but not participants, were blinded to group assignment." **Comment:** assessment staff were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "Researchers collecting outcome measurements, but not participants, were blinded to group assignment." **Comment:** assessment staff were blinded to study group
Incomplete outcome data (attrition bias)	Low risk	**Quote from publication:** "Figure 2 shows that, of the 118 eligible children enrolled who provided baseline data, 107 (91%) contributed outcome data."

Wake 2013 *(Continued)*

Subjective outcomes		**Comment:** attrition rates were fairly low at follow-up
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "Figure 2 shows that, of the 118 eligible children enrolled who provided baseline data, 107 (91%) contributed outcome data." **Comment:** attrition rates were fairly low at follow-up
Selective reporting (reporting bias)	Low risk	**Comment:** no differences found between publication, protocol or clinical trials register entry
Other bias	Low risk	**Comment:** no other bias identified - study generally of low risk of bias in other domains

Waling 2012

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: age- and gender-adjusted BMI ≥ 25 kg/m2 (Cole 2000, international survey), born between 1995 and 1998, live in or nearby the city of Umea **Exclusion criteria**: chronic diseases that could influence metabolic parameters, attention deficit disorders, lack of access to internet **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** family-based intervention **Control:** usual care control group
Outcomes	**Outcome measures reported in abstract**: BMI z scores, WC, waist/hip ratio, apo A/apo B ratio, physical activity level, steps/d, screen time, energy expenditure, time spent at > 3 MET, energy intake, refined sugar, dietary fibre, saturated fatty acids
Study details	**Trial terminated early:** no **Trial ID:** NCT01012206
Publication details	**Language of publication**: English **Funding:** Vardal Foundation for Healthcare Sciences and Allergy Research; the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning; the Swedish Research Council; the Medical Faculty and the Faculty of Social Sciences at Umeå University; Västerbotten County Council; Dr PersFood AB; Majblommans Riksforbund, the Magnus Bergvall Foundation; Jamtland Council Research Unit (commercial and non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To evaluate the effect of a family-based intervention on anthropometric and metabolic markers in overweight and obese children."

Waling 2012 *(Continued)*

Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "The children were consecutively randomised (1: 1) and stratified by gender into either an intervention group or a control group by the researchers." **Comment:** randomisation process described
Allocation concealment (selection bias)	Unclear risk	**Comment:** author of study was unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Neither the researchers nor the participants were blinded." **Comment:** participants and study personnel were not blinded to study group
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Neither the researchers nor the participants were blinded." **Comment:** participants and study personnel were not blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Quote from publication:** "The nurse did not receive information about the allocation group of the child, but blindedness cannot be assured" **Comment:** unclear if assessment staff were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Quote from publication:** "The nurse did not receive information about the allocation group of the child, but blindedness cannot be assured" **Comment:** unclear if assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "From baseline to the 1-year measurement, 42% of the children in the intervention group and 33% of the children in the control group dropped out (Figure 1), which left 58 children who had completed the 1-year measurement" **Comment:** attrition rates were quite high
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "From baseline to the 1-year measurement, 42% of the children in the intervention group and 33% of the children in the control group dropped out (Figure 1), which left 58 children who had completed the 1-year measurement" **Comment:** attrition rates were quite high
Selective reporting (reporting bias)	Low risk	**Comment:** no differences between publications and clinical trials register entry observed
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Warschburger 2016

Methods	**Parallel RCT**

Warschburger 2016 *(Continued)*

	Randomisation ratio: 1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 7-12 years (extended to 13 years due to recruitment problems), obese children: BMI > 97th percentile (Kromeyer-Hauschild 2001 – German references), parent participation at the beginning of their child's inpatient stay, **Exclusion criteria**: parents who had already done parent training, parents with inadequate language skills or severe mental disorders, children had secondary causes of obesity or suffering from severe mental health problems **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** parental CBT training group plus child inpatient intervention **Control:** parental information-only group plus child inpatient intervention
Outcomes	**Outcome measures reported in abstract**: BMI SDS, QoL, healthy food intake, exercise
Study details	**Trial terminated early:** no **Trial ID:** ISRCTN24655766
Publication details	**Language of publication**: English **Funding:** DFG (German Research Foundation) grant (WA 1143/4-1; 4-2) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The main goal was to develop a brief behaviourally oriented parent training program that enhances 'obesity-specific' parenting skills in order to prevent relapse"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "A stratified (gender, age groups (7-10 or11-13 years), and clinic) and blocked (block size 8) computerized randomization was performed centrally at the Institute of Medical Epidemiology, Biometry and Informatics at the University Halle-Wittenberg, which sent the results of the randomization by fax to the study centers within one day." **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Comment:** the randomisation method described was unlikely to introduce selection bias. Author confirmed allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Comment:** unlikely participants were blinded as some crossed over

Warschburger 2016 *(Continued)*

Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Comment:** unlikely participants were blinded as some crossed over
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "At the follow-ups, children were asked to visit their physicians, who were blind to trial-group assignment and the study goals." **Comment:** assessment staff were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "At the follow-ups, children were asked to visit their physicians, who were blind to trial-group assignment and the study goals." **Comment:** assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "Limitations include the relatively high attrition rate, which might have caused a sample bias for the follow-up analyses." **Comment:** attrition rates were quite high
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Limitations include the relatively high attrition rate, which might have caused a sample bias for the follow-up analyses." **Comment:** attrition rates were quite high
Selective reporting (reporting bias)	Unclear risk	**Comment:** clinical trials register entry retrospectively entered
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Weigel 2008

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**
Participants	**Inclusion criteria**: aged 7-15 years, obese (> 97th percentile, according to European Childhood Obesity Group and the German Working Group on Pediatric Obesity) **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** active intervention group **Control:** usual care control group
Outcomes	**Outcome measures reported in abstract**: BMI z score, BMI, fat mass, SBP
Study details	**Trial terminated early:** no

Weigel 2008 *(Continued)*

	Trial ID: -
Publication details	**Language of publication**: English **Funding:** Bavarian State Ministry of Environment, Public Health, and Consumer Protection and the health insurance company SBK, Germany. The "Sea Lion Club" was financed by health insurance companies and by membership fees from the parents (commercial and non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The authors performed a group-based program for obese children and adolescents in Bavaria, Germany to enable them to establish a health-oriented lifestyle and to reduce overweight. The authors compared this program with a control approach based on the patients' own initiative."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** randomisation process not described
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear if participants and study personnel were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear if assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "Generally, 83% to 100% of participants attended each session, and there was only 1 dropout in the "Sea Lion Club." "Conversely, in the control group, 6 children were lost to follow up despite telephone calls, and none joined the local sports club as offered 12 months after their first visit." **Comment:** dropout rate very low in intervention group and low in control group
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry available
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Weintraub 2008

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 **Superiority design**

Weintraub 2008 *(Continued)*

Participants	**Inclusion criteria**: BMI percentile ≥ 85th percentile for age and sex (CDC growth charts), in grades 4 and 5 in a low-income community in northern California **Exclusion criteria**: had a medical condition or were taking medications which affected growth, had conditions which limited their participation in the study **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Intervention:** after-school team sports programme **Control:** "active placebo" control
Outcomes	**Outcome measures reported in abstract**: completion rates, BMI z scores, total physical activity, moderate physical activity, vigorous physical activity
Study details	**Trial terminated early:** no **Trial ID:** NCT00186173
Publication details	**Language of publication**: English **Funding:** co-operative agreement from the CDC through the Association of American Medical Colleges (grants U36/CCU319276 and AAMCID MM-0851-05/05) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To evaluate the feasibility, acceptability, and efficacy of an after-school team sports program for reducing weight gain in low-income overweight children."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "After completing baseline assessments, children were randomized using a computer by the Database Manager (K.F.H.) to either an after-school team sports program or a traditional nutrition and health education program." **Comment:** randomisation process described
Allocation concealment (selection bias)	Low risk	**Quote from publication:** "Children were notified by the study coordinator (E.C.T.) of their assigned intervention." **Comment:** allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** unclear if participants and personnel were blinded
Blinding of participants and personnel (performance bias)	Unclear risk	**Comment:** unclear if participants and personnel were blinded

Weintraub 2008 *(Continued)*

Objective outcomes		
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "Owing to limited staffing for this pilot study, data collectors were not blinded at follow-up assessments" **Comment:** data collectors were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "Owing to limited staffing for this pilot study, data collectors were not blinded at follow-up assessments" **Comment:** data collectors were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Quote from publication:** "No participants were lost to follow-up" **Comment:** no missing data
Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Quote from publication:** "No participants were lost to follow-up" **Comment:** no missing data
Selective reporting (reporting bias)	High risk	**Comment:** clinical trials register has secondary outcomes such as WC and triceps skinfold thickness which were not mentioned in publication – potential reporting bias
Other bias	Unclear risk	**Comment:** unclear if the study was at risk of any other bias

Wilfley 2007

Methods	**Parallel RCT** **Randomisation ratio**: 1:1:1 **Superiority design**
Participants	**Inclusion criteria**: children aged 7-12 years who were 20%-100% overweight (CDC growth charts) and had at least 1 parent with BMI> 25 **Exclusion criteria**: families were excluded if either the child or parent was currently involved in psychological or weight loss treatment, was using appetite- or weight-affecting medications, or had a psychiatric condition (e.g. eating disorder, psychosis) that would interfere with participation **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: no **Treatment before study** : all participants received a weight-loss treatment focusing on dietary modification, physical activity increases and behaviour change skills (5 months' weight-loss treatment prior to randomisation) **Intervention 1:** behavioural skills maintenance group **Intervention 2:** social facilitation maintenance group **Control:** no-care control group

Wilfley 2007 *(Continued)*

Outcomes	**Outcome measures reported in abstract**: BMI z scores, percentage overweight, weight, attendance, parental weight change, parent BMI, behaviour problems, adherence
Study details	**Trial terminated early:** no **Trial ID:** NCT00301197
Publication details	**Language of publication**: English **Funding:** Grant 5R01HD36904-5 from the National Institute of Child Health and Human Development (NICHD; grant 1K24MH070446-01 from the National Institute of Mental Health (Dr Wilfley); and grant 1K23DK060476-01 from the National Institute of Diabetes and Digestive and Kidney Diseases (Dr Saelens) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To determine the short-term and long-term efficacy of 2 distinct weight maintenance approaches vs no continued treatment control following standard family based behavioral weight loss treatment for childhood overweight, and to examine children's social functioning as a moderator of outcome."
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Quote from publication:** "Random assignment was conducted by using computer-generated random numbers." **Comment:** randomisation method described
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** unclear if participants and personnel were blinded
Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear if participants and personnel were blinded
Blinding of outcome assessment (detection bias) Subjective outcomes	High risk	**Quote from publication:** "It was not possible to keep assessors blind to treatment condition" **Comment:** assessment staff were not blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	High risk	**Quote from publication:** "It was not possible to keep assessors blind to treatment condition" **Comment:** assessment staff were not blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Low risk	**Comment:** 42/51 completed behavioural intervention, 43/50 completed social group and 37/49 completed control group (total 81.3% retention)

Wilfley 2007 *(Continued)*

Incomplete outcome data (attrition bias) Objective outcomes	Low risk	**Comment:** 42/51 completed behavioural intervention, 43/50 completed social group and 37/49 completed control group (total 81.3% retention)
Selective reporting (reporting bias)	Low risk	**Comment:** no differences found between publication and clinical trial register entry
Other bias	Unclear risk	**Comment:** unable to assess whether any other biases were present

Woo 2004

Methods	**Parallel RCT** **Randomisation ratio**: 1:1 (but 2 initial arms become 3 arms after 6 weeks) **Superiority design**
Participants	**Inclusion criteria**: children aged 9-12 years, BMI ≥ 21 kg/m2 (CDC growth charts), no known medical illness and no alternative cause of obesity, no family history of premature cardiovascular disease, not taking regular medications or vitamin supplementation, resting brachial artery diameter > 2.55 mm **Exclusion criteria**: history of diabetes, renal disease or cardiovascular disease, sexual maturity status was more advanced than Tanner stage 2 **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 1 **Run-in period**: no **Extension period**: none **Intervention 1:** diet plus supervised structured exercise programme with continuing training **Intervention 2:** diet plus supervised structured exercise programme with detraining **Control:** diet modification only
Outcomes	**Outcome measures reported in abstract**: waist-to-hip-ratio, cholesterol, arterial endothelial function, carotid wall thickening, body fat, lipid profiles, vascular function
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** Hong Kong Institute of Heart Health Promotion, the Shaw Foundation, and the Research Grant Council of Hong Kong (CUHK4060/2000M) (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "To assess the reversibility of such early arterial damage in children, we studied obese children before and after random assignment to an intervention program of diet alone or diet with exercise training to define potentially effective strategies to improve obesity-related vascular abnormalities."
Notes	-

Woo 2004 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	**Comment:** study author confirmed via email that randomisation was done via a computer – likely no selection bias
Allocation concealment (selection bias)	Low risk	**Comment:** study author confirmed via email that allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	High risk	**Quote from publication:** "Both groups (children and parents) participated in the same diet education program and were interviewed by the same dietitian, who was blinded to the exercise program allocation" **Comment:** dietitian blinded but author confirmed participants and study personnel were not
Blinding of participants and personnel (performance bias) Objective outcomes	High risk	**Quote from publication:** "Both groups (children and parents) participated in the same diet education program and were interviewed by the same dietitian, who was blinded to the exercise program allocation" **Comment:** dietitian blinded but author confirmed participants and study personnel were not
Blinding of outcome assessment (detection bias) Subjective outcomes	Low risk	**Quote from publication:** "All ultrasound-derived vascular functions were measured by a blinded investigator, and the high reproducibility between serial observations and in control subjects over time have been documented by us previously." **Comment:** study author confirmed all outcome investigators were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Low risk	**Quote from publication:** "All ultrasound-derived vascular functions were measured by a blinded investigator, and the high reproducibility between serial observations and in control subjects over time have been documented by us previously." **Comment:** study author confirmed all outcome investigators were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	Unclear risk	**Comment:** unclear how many dropouts there were and how they were treated
Incomplete outcome data (attrition bias) Objective outcomes	Unclear risk	**Comment:** unclear how many dropouts there were and how they were treated
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register entry available
Other bias	High risk	**Comment:** outcomes reported in this refer to 3 arms that were randomised into 2 arms originally, then 1 arm is split (non-randomly)

Wright 2012

Methods	**Cluster** RCT

Wright 2012 *(Continued)*

	Randomisation ratio: 2:3 **Superiority design**
Participants	**Inclusion criteria**: 8-12 years, English or Spanish speaking, BMI ≥ 85th percentile (CDC growth charts), had no physical limitations that prevented regular exercise **Exclusion criteria**: none **Diagnostic criteria**: see above
Interventions	**Number of study centres**: 5 **Run-in period**: no **Extension period**: no **Intervention:** Kids N Fitness (KNF) intervention **Control:** general education (GE)
Outcomes	**Outcome measures reported in abstract**: BMI, BMI z scores, dietary intake (vegetables, fruit, fruit juice), self-efficacy of healthy food choices, parent and community involvement, TV viewing, daily physical activity, physical education class attendance
Study details	**Trial terminated early:** no **Trial ID:** -
Publication details	**Language of publication**: English **Funding:** partly supported by a grant from the National Institutes of Health/National Institute on Minority Health and Health disparities (NIH/NIMHD) Loan repayment programme and a grant from the Robert Wood Johnson Foundation (grant no. 64195). (non-commercial) **Publication status:** peer-reviewed journal
Stated aim for study	Quote from publication: "The main objective of this study was to measure over a 1 year period whether a CSHP with parental, school and home based components to promote optimal nutrition will reduce BMI percentiles and z scores and improve dietary behaviours in a sample of low-income, school aged children"
Notes	-

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	**Comment:** randomisation process not described
Allocation concealment (selection bias)	Unclear risk	**Comment:** unclear if allocation was concealed
Blinding of participants and personnel (performance bias) Subjective outcomes	Unclear risk	**Comment:** unclear if participants and study personnel were blinded to study group

Wright 2012 *(Continued)*

Blinding of participants and personnel (performance bias) Objective outcomes	Unclear risk	**Comment:** unclear if participants and study personnel were blinded to study group
Blinding of outcome assessment (detection bias) Subjective outcomes	Unclear risk	**Comment:** unclear if assessment staff were blinded to study group
Blinding of outcome assessment (detection bias) Objective outcomes	Unclear risk	**Comment:** unclear if assessment staff were blinded to study group
Incomplete outcome data (attrition bias) Subjective outcomes	High risk	**Quote from publication:** "Thirty children (25%) in the KNF© group were lost to follow-up at 12 months, compared to 31 children (23%) in the GE group (P = 0.75)." **Comment:** high dropout rates, potential attrition bias
Incomplete outcome data (attrition bias) Objective outcomes	High risk	**Quote from publication:** "Thirty children (25%) in the KNF© group were lost to follow-up at 12 months, compared to 31 children (23%) in the GE group (P = 0.75)." **Comment:** high dropout rates, potential attrition bias
Selective reporting (reporting bias)	Unclear risk	**Comment:** no protocol or clinical trials register available so unable to assess reporting bias
Other bias	High risk	**Comment:** was cluster RCT but did not adjust for clustering in their analyses

AMA: American Medical Association; apo A: apolipoprotein A; apo B: apolipoprotein B;
BFC: Big Friends Club; BIA: bioimpedence analysis; BMI: body mass index; BMI SDS: standardised body mass index;
CDC: Centre for Disease Control and Prevention; CSHP: coordinated school health program;
DVD: digital versatile disc;
GP: general practitioners;
HAND: Healthy Activity and Nutrition Directions; HDL: high density lipoprotein; HRQoL: health-related quality of life;
IOTF: International Obesity Taskforce; ITT: intention-to-treat;
LDL: low-density lipoprotein; LEAP: Live, Eat and Play; LEAP2: Live, Eat and Play 2; LFD: low fat diet; LGD: low-glycaemic diet; LMS: Lambda-Mu-Sigma;
MEND: Mind, Exercise, Nutrition; MET(s): metabolic equivalents;
N: number
PCT: primary care trust;
QoL: quality of life;
RCT: randomised controlled trial; RE: Reggio Emilia; ROC: Regulation of Cues; RED: high energy dense;
NIH: National Institutes of Health; NIHR: National Institute for Health Research;
SBP: systolic blood pressure;
SIGN: Scottish Intercollegiate Guidelines Network; SMSMT: short message service maintenance treatment; SWITCH: Screen-Time Weight-loss Intervention Targeting Children at Home;
TAFF: telephone based adiposity prevention for families;
WC: waist circumference; WHO: World Health Organization;
YMCA: Young Men's Christian Association; z-BMI: standardised BMI

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Adam 2009	Not an RCT

Study	Reason for exclusion
Albala 2008	Duration < 6 months
Alberga 2013	Duration of follow-up < 6 months from baseline
Alexander 2014	Prevention
Amini 2016	Duration: 18 weeks only
Andre 2015	Participants: adolescents
Astrup 2013	Prevention: not all children overweight/obese at baseline
Bachman 2010	Secondary data analysis
Baker 2012	Not an RCT
Ball 2012	Parent-only intervention
Banks 2011	2 alternative interventions, head-to-head trial (no control group)
Banks 2012a	2 alternative interventions, head-to-head trial (no control group)
Banks 2012b	2 alternative interventions, head-to-head trial (no control group)
Banks 2014	2 alternative interventions, head-to-head trial (no control group)
Banos 2009	Not an RCT
Baranowski 2011	Aim - not to treat childhood obesity
Barbeau 2007	Prevention - not all overweight
Bau 2016	Participants: mean age at recruitment = 13 years old (adolescents)
Bauer 2010	Not an RCT
Bayat 2014	Duration of follow-up < 6 months from baseline, non-randomised
Bean 2012	Parent-only intervention
Bean 2014	Parent-only intervention
Benestad 2014	Not an RCT: 2 different treatments, no clear control group
Benson 2008	Aim of study - not to treat childhood obesity
Bernstein 2015	Thesis - not an RCT
Best 2016	Aim of study - not to treat childhood obesity
Bloom 2013	Duration (6-month follow-up only given for intervention group)
Bocca 2014	Participants: preschool children
Bohnert 2013	Aim - not all children overweight/obese at baseline (prevention)

Study	Reason for exclusion
Boutelle 2011	2 alternative interventions, head-to-head trial (no control group)
Boutelle 2013	Duration: follow-up < 6 months for 1 group
Braden 2014	Not an RCT
Braet 1997a	2 alternative interventions, head-to-head trial (no control group)
Braet 1997b	2 alternative interventions, head-to-head trial (no control group)
Braet 2000	2 alternative interventions, head-to-head trial (no control group)
Buhari 2014	Prevention
Burrows 2008	Parent-only intervention
Burrows 2010a	Parent-only intervention
Burrows 2010b	Parent-only intervention
Burrows 2011	Parent-only intervention
Bush 2007	Prevention
Bustos 1997	Not an RCT
Caballero 2003a	Prevention
Caballero 2003b	Prevention
Canas 2012a	Not a lifestyle intervention
Canas 2012b	Not a lifestyle intervention
Canas 2014	Not a lifestyle intervention: main part of trial was carotenoid supplementation
Carrel 2005	Participants: adolescents
Carrel 2007	Participants: adolescents
Cash 2009	Prevention study
Catenacci 2014	Prevention: included healthy weight children
Cespedes 2014	Participants: preschool children
Chen 2013	Not an RCT
Chen 2015	Not an RCT
Chen 2016	Not an RCT
Chirita-Emandi 2014	Not a lifestyle intervention
Chongviriyaphan 2010	Duration of follow-up < 6 months from baseline

Study	Reason for exclusion
Cohen 2012	Duration 12 weeks
Collins 2010	Parent-only intervention
Cooperberg 2014	Participants: preschool children
Coppinger 2016	Protocol for obesity prevention intervention (will include both healthy and overweight children, therefore not treatment)
Cradock 2016	Prevention study - included normal weight children
Crova 2014	Prevention
Cunningham-Sabo 2016	Prevention
da Silva 2015	Participants: adolescents
Dahiya 2012	Secondary data analysis: comparison with normal weight children
Dai 2006	Duration of follow-up < 6 months from baseline
Dalton 2013	Parent-only intervention
Daniels 2009a	Aim of study - not to treat overweight/obese children
Danielsen 2013	Duration: control group only followed up for 12 weeks then given intervention
Danielzik 2007	Prevention
Davis 1999	Prevention
Davis 2011a	Not an RCT
Davis 2011b	Aim - not to treat overweight/obese children
Davis 2014	Duration - only 13 weeks' follow-up
Davis 2016a	2 alternative interventions, head-to-head trial (no control group)
Davis 2016b	Duration of follow up < 6 months from baseline
de Mello 2004	2 alternative interventions, head-to-head trial (no control group)
De Ruyter 2013	Aim of study - not to treat childhood obesity
Dennis 2013	Duration of follow-up < 6 months from baseline
DeVault 2009	Not an RCT
Dias 2016	Duration - 12 weeks
Dodds 2014	Prevention
Donnelly 2009	Aim - not to treat childhood obesity

Study	Reason for exclusion
Doyle-Baker 2011	Duration of follow-up < 6 months from baseline
Dreyer 2014	Participants: adolescents
DuBose 2008	Not an RCT
Duckworth 2009	Duration of follow-up < 6 months from baseline
Duncan 2009	Aim of study - not to treat childhood obesity
Dura 2006	Not an RCT, clinical record reviews
Economos 2007	Not an RCT
El Hage 2012	Aim to investigate hip strength in obese children
Endevelt 2014	Not an RCT
Epstein 1981	2 alternative interventions, head-to-head trial (no control group)
Epstein 1984b	Duration of follow-up < 6 months from baseline
Epstein 1986	2 alternative interventions, head-to-head trial (no control group)
Epstein 1987a	Prevention - not all overweight
Epstein 1987b	2 alternative interventions, head-to-head trial (no control group)
Epstein 1987c	2 alternative interventions, head-to-head trial (no control group)
Epstein 1987d	Not an RCT
Epstein 1990	2 alternative interventions, head-to-head trial (no control group)
Epstein 1993	Secondary data analysis: aim to assess height growth of children
Epstein 1994a	2 alternative interventions, head-to-head trial (no control group)
Epstein 1994b	10-year follow-up (study 2 = Epstein 1984a) - however, does not follow up the control group
Epstein 1995	Not an RCT - unclear which is the control group
Epstein 2000b	2 alternative interventions, head-to-head trial (no control group)
Epstein 2004	2 alternative interventions, head-to-head trial (no control group)
Epstein 2007	Not an RCT
Epstein 2008a	2 alternative interventions, head-to-head trial (no control group)
Epstein 2008b	Duration of follow-up < 6 months from baseline
Epstein 2012	Not an RCT
Erceg 2012	Not an RCT

Study	Reason for exclusion
Escobedo 2014	Not a lifestyle intervention - diet supplements
Escoto 2008	Aim - not to treat obesity
Esfarjani 2013	Parent-only intervention
Estabrooks 2009	Parent-only intervention
Falbe 2015	Duration - 10 weeks
Farpour-Lambert 2009	Follow-up from baseline < 6 months
Ferguson 1999a	Duration: crossover, 4 months only
Ferguson 1999b	Duration: crossover, 4 months only
Ferrara 2013	Duration only 60 d (2 months)
Ferrer 1998	Not an RCT
Figueroa-Colon 1993	2 alternative interventions, head-to-head trial (no control group)
Figueroa-Colon 1996	2 alternative interventions, head-to-head trial (no control group)
Firoozi 2013	Duration of study - 6 weeks
Fischer 2014	Not a lifestyle intervention
Foger 1993	Not an RCT
Follansbee-Junger 2010	Not an RCT
Frohna 2008	Commentary on Wilfley 2007
Fullerton 2007a	Participants: adolescents
Fullerton 2007b	Participants: adolescents
Furze 2008	Not an RCT
Gajewska 2011	Duration of follow-up < 6 months from baseline
Galhardo 2012	Participants: adolescents
Garipagaoglu 2009	2 alternative interventions, head-to-head trial (no control group)
Gerards 2012	Parent-only intervention
Ghatrehsamani 2010	Duration 3 months
Goldfield 2000	Duration of follow-up < 6 months from baseline
Goldfield 2001	2 alternative interventions, head-to-head trial (no control group)
Goldfield 2006	Duration of follow-up < 6 months from baseline

Study	Reason for exclusion
Goldfield 2007	Duration of follow-up < 6 months from baseline
Goldfield 2008	Not an RCT
Goldfield 2009	Not an RCT
Golley 2007	Parent-only intervention
Golley 2011	Not an RCT
Gong 2014	Prevention study
Graf 2006	Not an RCT
Graf 2008	Not an RCT
Graham 2008	Aim - not to treat overweight/obese children
Graves 1988	2 alternative interventions, head-to-head trial (no control group)
Gregori 2014	Duration of follow-up < 6 months from baseline
Griffin 2013	Not an RCT
Grow 2014	Not an RCT
Guixeres 2009	Not an RCT
Gunnarsdottir 2011b	Not an RCT
Gunnarsdottir 2014	Not an RCT (single group)
Gunther 2007	Not an RCT
Gussinyer 2008	Not an RCT
Gutin 1996	Not an RCT
Gutin 1999a	Duration of follow-up < 6 months from baseline
Gutin 1999b	Duration of follow-up < 6 months from baseline
Gutin 2008	Prevention
Habib-Mourad 2014a	Prevention
Habib-Mourad 2014b	Prevention
Habib-Mourad 2014c	Prevention
Haemer 2013	Not an RCT
Hager 2016	Not an intervention study
Hajihashemi 2014	Duration of follow-up < 6 months from baseline

Study	Reason for exclusion
Hammarlund 1993	Duration of follow-up < 6 months from baseline
Hansen 2013	Not an RCT
Harder-Lauridsen 2014	Duration of follow-up < 6 months from baseline
Hardman 2009	Duration of follow-up < 6 months from baseline
Harrell 1998	Duration of follow-up < 6 months from baseline (between 8 and 10 weeks)
Harrison 2006	Prevention
Hartlieb 2015	Participants: adolescents
Hashemipour 2009	Not a lifestyle intervention
Haszard 2015	Secondary analysis of RCT data
Heuser 2008	Prevention - not all overweight
Hollinghurst 2014	2 alternative interventions, head-to-head trial (no control group)
Holmes 2008	Not an RCT (discussion paper)
Horsak 2015	Protocol only with primary aim not to treat overweight
Horton 2013	Duration - 14 weeks
Huang 2007	Duration of follow-up < 6 months from baseline
Huang 2015a	Participants: adolescents
Huang 2015b	Participants: adolescents
Hystad 2013	2 alternative interventions, head-to-head trial (no control group)
Iannuzzi 2009	Not an RCT - no control group
Ibarra-Reynoso 2015	Duration - 2 months
Ildiko 2007	Not an RCT
Innes-Hughes 2016	Not an RCT
Israel 1984	Not an RCT
Israel 1985	Duration - control group only 9 weeks long
Israel 1994	2 alternative interventions, head-to-head trial (no control group)
Jacobson 2009	Thesis - duration of follow up < 6 months from baseline
Jago 2013	Prevention
James 2000	Commentary on a prevention intervention

Study	Reason for exclusion
Janicke 2008a	Parent-only intervention
Janicke 2008b	Parent-only intervention
Janicke 2009	Parent-only intervention
Janicke 2011	Duration of follow-up < 6 months from baseline
Janicke 2013	Participants: preschool children
Jansen 2011	Parent-only intervention
Jensen 2012	Duration of follow-up < 6 months from baseline
Jensen 2013	Duration only 10 weeks
Jensen 2015	Not an RCT
Jernigan 2015	Not an RCT
John 2009	Participants: preschool children
Johnston 2013	Prevention
Jones 2015a	Includes children that were not actually overweight or obese (but determined as 'at risk')
Jurg 2006	Prevention
Kain 2009	Prevention
Kalarchian 2013	Not an RCT
Kang 2008	Duration of follow-up < 6 months from baseline
Karacabey 2009	Duration of follow-up < 6 months from baseline
Kelishadi 2008	2 alternative interventions, head-to-head trial (no control group)
Kelishadi 2009	Participants: preschool children
Kelishadi 2010	Participants: preschool children
Kerr 2000	Prevention
Khadilkar 2012	Duration of follow-up < 6 months from baseline
Kim 2016	Duration - 5 weeks
Kipping 2008	Prevention
Kirschenbaum 1984	Alternative interventions, head-to-head trial (no control group)
Klesges 2008	Prevention
Klitzman 2015	Parent-only intervention

Study	Reason for exclusion
Kohno 1994	Not an RCT
Kokkvoll 2014	2 alternative interventions, head-to-head trial (no control group)
Kolko 2010	Participants: preschool children
Krafft 2014a	Aim not to treat obesity, aim to assess brain function
Krafft 2014b	Aim not to treat obesity, aim to assess brain function
Krafft 2014c	Aim not to treat obesity, aim to assess brain function
Kriemler 2010	Prevention
Kuni 2015	Aim of study - not to treat childhood obesity
Larsen 2010	Prevention
Larsen 2016	Participants: adolescents
Lau 2015	Duration of follow-up < 6 months from baseline
Leach 2008	Aim of study - not to treat childhood obesity
Li 2010	2 alternative interventions, head-to-head trial (no control group)
Looney 2012	Secondary data analysis
Lopes 2009	Prevention
Loughrey 2009	Not an RCT (discussion paper)
Luley 2010	Alternative interventions (no control group)
Madsen 2013	Aim of study - not to treat childhood obesity
Makkes 2011	Participants: adolescents
Maloney 2012	Participants: adolescents
Manchester 1978	Not an RCT
Marcus 2009	Prevention
Marild 2013	2 alternative interventions, head-to-head trial (no control group)
Maron 2014	Not an RCT
Martinez 2008	Prevention
Matheson 2015	Not a lifestyle intervention
Mayurachat 2013	Duration only 18 weeks
Mazzeo 2008	Parent-only intervention

Study	Reason for exclusion
Mazzeo 2011	Parent-only intervention
Mazzeo 2014	Parent-only intervention
McFarland 2014	Not an RCT
McGuigan 2009	Not an RCT
Medrano 2015	Duration - 22 weeks
Minossi 2014	Duration of follow-up < 6 months from baseline
Minossi 2015	Protocol - inclusion criteria will allow the inclusion of non-overweight children with co-morbidity such as hypertension, dyslipidaemia or diabetes (prevention study)
Mo-suwan 1998	Prevention
Moens 2012	Parent-only intervention
Moreno 2015	Secondary data analysis of 2 RCTs
Morgan 2014	Prevention
Muckelbauer 2009a	Aim - not to treat overweight/obese children
Muckelbauer 2009b	Aim - not to treat overweight/obese children
Munsch 2008	Parent-only intervention
Murphy 2009	Not an RCT
Mustila 2012	Not an RCT
Muth 2008	Prevention
NCT00284557	Not all children were overweight or obese (inclusion criteria stated "at risk of overweight")
Nemet 2006	Duration - 3 months' follow-up, not an RCT
Nemet 2013a	Duration - 3 months' follow-up, not an RCT
Nemet 2013b	Prevention - not all overweight
Nogueira 2014	Trial was not exclusively in overweight children - therefore not a treatment trial
Nogueira 2015	Trial was not exclusively in overweight children - therefore not a treatment trial
Nowicka 2010	Not an RCT
Nuutinen 1992	Not an RCT
O'Malley 2011	Aim of study - not to treat childhood obesity
Okely 2010	Parent-only intervention

Study	Reason for exclusion
Oliveras 2013	Not a lifestyle intervention
Parente 2006	Duration - only 5 months' follow-up
Parillo 2012	Not an RCT - 2 alternative interventions
Parra-Medina 2011	Duration - only 18 weeks' follow-up
Pedrosa 2011a	2 alternative interventions, head-to-head trial (no control group)
Pedrosa 2011b	2 alternative interventions, head-to-head trial (no control group)
Perman 2008	Not an RCT
Perry 1979	Aim: to assess eating behaviours, not treat obesity
Petty 2009	Aim - not to treat overweight/obese children
Plachta-Danielzik 2007	Prevention
Plummer 2014	Not an RCT
Polacsek 2009	Not an RCT
Pontin 2004	Commentary, prevention
Poulsen 2011	Not an RCT
Prado 2009	Duration of follow-up < 6 months from baseline
Puder 2009	Prevention
Qu 2014	Prevention - not all overweight
Racine 2010	Not a lifestyle intervention
Ramon-Krauel 2013	Aim - to treat fatty liver
Rank 2012	Not an RCT
Rausch 2013	Prevention
Raynor 2002	2 alternative interventions, head-to-head trial (no control group)
Raynor 2012	Parent-only intervention
Reinehr 2006	Not an RCT
Reinehr 2009	Not an RCT
Reinehr 2011	Commentary on a parent-only intervention
Resaland 2014	Prevention
Resnick 2009	Parent-only intervention

Study	Reason for exclusion
Resnicow 2012	Parent-only intervention
Riddiford-Harland 2012	Parent-only intervention: analysis from the HIKCUPS study
Riddiford-Harland 2016	Secondary analysis of RCT data examining foot-related outcomes
Riggs 2007	Prevention
Robertson 2012	Not an RCT
Robinson 1999	Prevention
Rodearmel 2006	Duration of follow-up < 6 months from baseline
Rohrer 2008	Not an RCT
Rooney 2005	Prevention - not all children overweight at baseline
Rosado 2008	Duration of follow-up < 6 months from baseline
Safavi 2013	Duration of follow up 8 weeks from baseline (<6 months)
Salcedo 2010	Prevention (not all overweight)
Salehi-Abargouei 2014	Duration of follow-up < 6 months from baseline
Sallis 1993	Prevention
Salmon 2008	Prevention
Sanchez-Gomez 2012	Prevention
Schaeffer 2014	Aim of study - not to treat childhood obesity
Seabra 2014	Duration of follow-up < 6 months from baseline
Senediak 1985	2 alternative interventions, head-to-head trial (no control group)
Sgro 2009	Not an RCT
Shalitin 2009	Not an RCT- no control group identified
Sherman 1992	Not an RCT
Slusser 2013	Prevention - includes healthy weight children
Small 2014	Participants: preschool children
Sothern 2000a	Not an RCT
Sothern 2000b	Not an RCT
Soto-Sanchez 2014	Not an RCT
Speroni 2007	Prevention

Study	Reason for exclusion
Spriet 2014	Commentary paper
St-Onge 2009	Duration of follow-up < 6 months from baseline
Steele 2012	2 alternative interventions, head-to-head trial (no control group)
Steele 2014	Secondary data analysis
Stettler 2015	Prevention study
Stevens 2003	Aim - not to treat overweight/obese children
Stewart 2009	Not an RCT
Stone 2003	Aim - not to treat overweight/obese children
Stovitz 2014	Duration of follow-up < 6 months from baseline
Sweeney 2010	Not an RCT
Sze 2015	Duration - 4 weeks
Tak 2007	Duration of follow-up < 6 months from baseline
Tanas 2011	Not an RCT
Taveras 2014	Not a lifestyle intervention
Taylor 2006	Not an RCT
Taylor 2007	Aim of study - not to treat childhood obesity
Teevale 2015	Qualitative study
Ten 2016	Not an intervention study
Theim 2012	Not an RCT
Thompson 2013	Not all overweight or obese
Tirlea 2016	Participants: adolescents - mean age > 12
Todd 2008	Duration of follow-up < 6 months from baseline
Trinh 2013	Not an RCT
Trost 2014	Duration of follow-up < 6 months from baseline
Tucker 2014	Not an RCT
Uysal 2014	Not an RCT
Van Grieken 2013	Participants: preschool children
Van Grieken 2014	Participants: preschool children

Study	Reason for exclusion
Vandongen 1995	Prevention
Vargo 2012	Not an RCT
Vasickova 2011	Duration of follow-up < 6 months from baseline
Verbeken 2013a	Duration of follow-up< 6 months from baseline
Verbeken 2013b	Duration - 12 weeks follow up (<6 months from baseline)
Verduci 2011	Not an RCT
Verduci 2013	Not a lifestyle intervention
Vetter 2014	Prevention
Vido 1993	Not a lifestyle intervention
Virgen 2007	Not an RCT
Vos 2011	Participants: adolescents
Vrablik 2014	Participants: adolescents, mean age > 12
Wake 2011	Aim of study - not to treat childhood obesity
Walker 2008	Parent-only intervention
Walsh 2014	Not an RCT
Wang 2013	Not an RCT - uses baseline data from another study
Ward 2011	Aim of study - not to treat childhood obesity
Watowicz 2014	Not an RCT
Wheeler 1976	Duration of follow-up from baseline not clear
Wijesuriya 2011	Participants: adults
Wile 1992	Not an RCT
Williamson 2008	Prevention
Williamson 2010	Prevention
Williamson 2012	Prevention
Wislo 2013	Not an RCT
Wohlfarth 2013	Duration of follow-up < 6 months from baseline
Wong 2013	Duration of follow-up < 6 months from baseline
Wright 2013	Duration of follow-up < 6 months from baseline

Study	Reason for exclusion
Wyatt 2011	Prevention
Xu 2012	Prevention
Yackobovitch-Gavan 2009	Not an RCT
Yam 2012	Prevention
Yu 2008	Duration of follow-up < 6 months from baseline
Zahner 2006	Prevention
Zask 2012	Aim of study - not to treat childhood obesity
Zhang 2011a	Not a lifestyle intervention
Zhang 2011b	Not an RCT
Zheng 2015	Not an RCT
Zorba 2011	Duration of follow-up < 6 months from baseline

RCT: randomised controlled trial

Characteristics of studies awaiting assessment *[ordered by study ID]*

ACTRN12611000862943

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** target 107 **Inclusion criteria:** • 5-16 year old boys and girls • BMI > 98th WHO centile • significant weight-related co-morbidities and ready to change **Exclusion criteria:** • significant co-morbidities that would make programme participation impossible
Interventions	**Intervention:** 1-h home visits with diet and activity assessment and education, then weekly 1.5-h activity session for 40 weeks and psychology group (2 x 1-h sessions) **Control:** brief dietary education and diet, activity and well-being assessments
Outcomes	**Primary outcome:** reduction of 0.5 SDS at 0, 6, 12, 18 and 24 months, quality-of-life improvements and physical activity improvements as the same time points

ACTRN12611000862943 *(Continued)*

	Secondary outcomes: improvements in dietary and sedentary behaviours and improved glycaemic control
Study identifier	ACTRN12611000862943
Official title	Whanau Pakari: a multidisciplinary intervention for child and adolescent obesity
Stated purpose of study	"Our objectives are firstly to undertake a multi-disciplinary intervention which is accessible and appropriate for those most affected by child obesity. Secondary, we aim to assess whether a quantitative RFC questionnaire is useful in predicting response to the intervention."
Notes	Study author reply: 14/10/16. "I have just submitted the 12-month outcome paper today. I am not sure of your timeframes, but if you like, I can put you on our communications update list, so you hear as soon as it is published."

ISRCTN45032201

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: investigator-blind **Primary purpose**: treatment
Participants	**Condition: c**hildhood overweight and obesity **Enrolment:** target 120 families **Inclusion criteria:** • child overweight (> 91st centile) or obese (> 98th centile) child • age 7-11 years • family with at least 1 parent/guardian and child willing to take part **Exclusion criteria:** • insufficiently able to speak English (child or parent) • metabolic or other medical cause of obesity • severe learning difficulties or behavioural problems in the child
Interventions	**Intervention:** 10-week family-based intervention (group-based with children and parents, focusing on parenting, social and emotional development, and changing behaviour) **Control:** receive usual care given in their area
Outcomes	BMI/BMI z score (primary), waist circumference, percentage body fat, habitual activity via accelerometer, quality of life, fruit and vegetable consumption, parental BMI, parental well-being, family eating and activity, quality of parent-child relationships, Parenting style Health state valuation, economic evaluation, process evaluation Endpoint = 12 months
Study identifier	ISRCTN45032201

ISRCTN45032201 *(Continued)*

Official title	"A randomised controlled trial evaluating the effectiveness and cost-effectiveness of "Families for Health", a family-based childhood obesity treatment intervention delivered in a community setting for ages 7 to 11"
Stated purpose of study	"Our objectives are to: 1. Assess the effectiveness of the 'Families for Health' programme in reducing BMI z-score in children aged 7 to 11 who are overweight and obese 2. Evaluate the cost-effectiveness and cost-utility of the 'Families for Health' programme 3. Investigate parents' and children's views of the programme and their observations on approaches to maximising impact 4. To investigate facilitators' views of the programme and their observations on approaches to maximising impact"
Notes	**Study author reply:** 11 October 2016 Not published yet, should not be too long

ISRCTN97887613

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: unclear **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrolment:** target 200 **Inclusion criteria:** • children aged 8-12 years • obesity type I and II (BMI ≥ age- and gender-adjusted 95 percentile) • capacity to walk for 10 min **Exclusion criteria:** • diabetes type I • hyperactivity • morbid obesity • contraindications to do exercise (biological or mental)
Interventions	**Intervention:** the 6-month programme includes two 1-h sessions of an exercise programme per week. Each session includes 20-min physical exercise to improve fitness, a 30-min activity to improve sport skills, and 10-min of healthy behaviour-changing advice (nutrition, possibilities of doing physical exercise during leisure time) **Control:** usual care only
Outcomes	Level of physical activity, fitness tests, healthcare costs, health-related quality of life, nutritional intake, blood samples
Study identifier	ISRCTN97887613
Official title	Exercise looks after you: piloting the programme to prevent obesity in children

ISRCTN97887613 *(Continued)*

Stated purpose of study	Not given
Notes	Trial record retrospectively registered. Trial completed. Emailed study author (April 2016) - no reply

JPRN-UMIN000014896

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrolment:** target 300 **Inclusion criteria:** • elementary school children (6-12 years) • a percent relative body weight of ≥ 20% **Exclusion criteria:** • participants who were treated or educated for obesity in medical setting(s)
Interventions	**Intervention:** educational, counselling, training (pedometer, limit screen time) **Control:** record pedometer count and screen time without intervention
Outcomes	Percent relative body weight, cardiovascular risk factors
Study identifier	JPRN-UMIN000014896
Official title	Study on the medical check-up system for prevention of behaviour changing diseases including diabetes in underage groups, especially infants, elementary and junior high school children [Study on the Prevention and Treatment of Obesity by Behavioral Approach (Lifestyle modification approach) for Elementary School Children]
Stated purpose of study	"Study on the treatment of childhood obesity by behavioral approach"
Notes	Study completed. Study author reply: 11 October 2016. Results have not been published yet

Jung 1978

Methods	
Participants	
Interventions	
Outcomes	

Jung 1978 *(Continued)*

Study identifier	
Official title	
Stated purpose of study	
Notes	Cannot obtain full publication from the British Library

NCT00528164

Methods	**Type of study:** interventional, efficacy **Allocation**: randomised **Intervention model**: parallel **Masking**: single-blind (assessors) **Primary purpose**: treatment
Participants	**Conditions:** obesity **Enrolment:** 270 **Inclusion criteria:** • Age 4-7 years • Boys or girls, and of any race • BMI > 85thpercentile for age • Children and parents must speak and understand English **Exclusion criteria:** • Currently participating in a clinical trial, but they may be involved in an observational study • Physical disabilities which inhibit physical activity • Taking drugs known to alter glucose homeostasis • History of diabetes mellitus • History of significant hepatic, renal, gastrointestinal or cardiovascular disease • Diagnosis of hypertension requiring limited physical activity • Psychological disabilities limiting participation • Other medical or behavioural factors which might interfere with the study (judged by principal investigator) • Unable to speak and understand English • No telephone or transportation
Interventions	**Intervention:** Team PLAY Group (6-month family-centered intervention to increase physical activity and healthy eating patterns, primarily directed at parents) **Control:** standard care group (primary care physician)
Outcomes	BMI (primary), body composition (DEXA), physical activity via accelerometry, dietary changes, Body Esteem Scale, Flexibility and Cohesion Evaluation Scales, MacArthur Behavior and Health Questionnaire
Study identifier	NCT00528164

NCT00528164 *(Continued)*

Official title	Treating childhood obesity with family lifestyle change
Stated purpose of study	"The purpose of this study is to determine whether an intense family-centered program to help children, 4 to 7 years old, control their weight is more effective than the advice and referrals their health provider gives in the primary care office."
Notes	There are three publications attached to the trial register. 1 is a protocol, the second provides baseline results and measures of attendance, and the third is a secondary data analysis examining the relationship between BMI and self-esteem. Therefore, emailed study author to ask when the full set of outcome results shall be published. **Study author reply:** 12 October 2016. "I am sorry to report to you that our results have not been published. The study has been completed. We are working on the outcome manuscript – hope to have it published soon."

NCT00723853

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: prevention
Participants	**Condition:** type 2 diabetes and obesity **Enrolment:** 131 **Inclusion criteria:** • age 9-12 years • overweight (> 85th percentile BMI for age and gender) • African American • family history of type 2 diabetes in a first or second degree relative • parents are secondary participants **Exclusion criteria:** • Inability to give informed consent or unwillingness to be randomised • Prior diagnosis of diabetes in the child planning to participate • Pregnancy (women who become pregnant during the study will be omitted from the analysis. Pregnant women will not participate in the exercise sessions) • Uncontrolled hypertension (SBP > 160 or DBP > 100) • Uncontrolled dyslipidaemia by NCEP III criteria • Evidence of significant cardiovascular, pulmonary disease, or other serious illness • Evidence of alcohol or drug abuse (identified by self-report) • Musculoskeletal disease serious enough to prevent participation in exercise sessions • Known or suspected major psychiatric disorder • Inability to participate in aerobic exercise activities • Inability to comply with a calorie- or fat-restricted diet • Age over 65 years
Interventions	**Intervention:** Reach-Out Program, Nutritional and Exercise Intervention

NCT00723853 *(Continued)*

	Control: Reach-In Program, Standard of Care
Outcomes	Height, weight, waist and hip circumference, body fat by BIA, biochemical markers (glucose tolerance, lipid panel, insulin, hemoglobin A-1-C)
Study identifier	NCT00723853
Official title	REACH-OUT: Chicago Children's Diabetes Prevention Program
Stated purpose of study	"The purpose of this research study is to evaluate two nutrition and exercise programs in children ages 9-12 who are at risk for developing type 2 diabetes. This study also includes the involvement of parents or guardians who are willing to participate in these programs with the child."
Notes	Study completed. Emailed study author (April 2016) - no reply

NCT00759746

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** childhood overweight and obesity **Enrolment:** 482 **Inclusion criteria:** • age 7-11 years • ≥ 85th percentile for weight • at least 1 parent of the participating child must be overweight (BMI ≥ 25) • 1 parent must agree to attend all parent/child treatment meetings as the participating parent • participants must be able to speak and comprehend English **Exclusion criteria:** • participating parent or child having a thought disorder, suicidality, bipolar disorder, or drug or alcohol dependence • participating parent or child having a physical disability or illness that prevents performance of physical activity at level equivalent to a brisk walk or that places severe restriction on diet • participating parent or child being on a medication regimen that affects weight • participating parent or child being involved in active psychiatric treatment for an ongoing problem that causes either social or occupational impairment • parents (participating and nonparticipating) and children having an eating disorder (i.e. anorexia nervosa, bulimia nervosa, binge eating disorder) or having subclinical levels of eating disturbance (i.e. reporting key eating disorder behaviours of purging, fasting, or binge eating more than 2 times per month)
Interventions	**Intervention 1:** behavioural: SFM + low dose (intervention focuses on helping families create a social environment that supports weight maintenance) **Intervention 2:** behavioural: SFM + high dose

NCT00759746 *(Continued)*

	Control: behavioural: weight maintenance education
Outcomes	Child percent overweight
Study identifier	NCT00759746
Official title	Childhood obesity treatment: a maintenance approach
Stated purpose of study	"The purpose of this study is to determine the effect of dose and content of an enhanced weight maintenance treatment on children's ability to maintain weight loss following a standard weight loss treatment."
Notes	Study completed. Study author did not reply October 2016. Only 16-week data are currently published

NCT00851201

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: prevention
Participants	**Condition:** obesity, diabetes **Enrolment:** 506 **Inclusion:** • age 7-12 years • BMI > 85th percentile for sex **Exclusion:** • health or condition that would interfere with study participation, • unwilling or inability to provide parent/guardian consent or child assent • intention to move from area
Interventions	**Intervention:** intensive behaviour changing: same as control but add on: 1) 12 core group modules for parents (to address roles and skills) and for children (to enhance motivation and skills and to provide physical activity), 3) Tailored support using a 'toolbox' approach from community health workers as extensions of the Family Weight Management professional education staff, and 4) monthly after-core follow-up groups **Control:** 1-Standard Intervention: 1) an initial consult, which includes an overview of behaviour-changing goals, 2) quarterly follow-up, 3) and a monthly newsletter
Outcomes	BMI percentile for age and sex, biomarkers (e.g. glucose, insulin, lipids), dietary intake, and physical activity measures
Study identifier	NCT00851201
Official title	Comprehensive approach to family weight management

NCT00851201 *(Continued)*

Stated purpose of study	"The purpose of this study is to address the Healthy People 2010 obesity prevention objective"
Notes	Study completed. Baseline data available but no follow-up data identified

NCT01110096

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrolment:** 100 **Inclusion:** • age 7-12 years • BMI > iso-BMI 30 (Coles index) **Exclusion:** • syndromatic obesity • obesity related to diseases • local community not involved • child has present follow-up because of obesity in secondary health care • parent has current/planned follow-up because of obesity in secondary health care
Interventions	**Intervention:** 2-week family camp: Parent Management Training - Oregon (PMTO), motivational interviewing, dynamic group therapy **Control:** 4-d family behaviour-changing school
Outcomes	BMI SDS, quality of life, physical fitness, behaviour, blood samples
Study identifier	NCT01110096
Official title	Randomised controlled clinical trial comparing two family interventions to treat obesity in children between 7 and 12 years
Stated purpose of study	"The study compares the effect on BMI of two different treatment options for obesity in childhood. Families with at least 1 obese child and parent are invited to join the project. The hypothesis is that family camp gives an additional reduction in BMI compared to a less intensive family lifestyle school."
Notes	Author reply: 27 November 2016. "Thank you for your interest in our article! It is in the final stage before publishing, we just sent the final proof to the journal. I have not yet received the exact date for publishing (I assume within a week or two), but I will send you the article as soon as it is published."

NCT01290016

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** 132 **Inclusion criteria:** • Aged 6-12 years • boys and girls, who consume less than 2 servings of milk/milk products • receptive to recommendations • BMI > 97 WHO centile **Exclusion criteria:** • serious or chronic illnesses of childhood • medication use in last 3 months known to affect bone or mineral metabolism • diabetes • non dietary hyperlipidaemia
Interventions	**Intervention:** arm 1: family counselling to maintain 2 servings of dairy/d and physical activity improvement instructions; arm 2 as arm 1 but advised to eat 4 dairy servings (for ages 6-8 years); arm 3: as arm 2 but for 9-12 years **Control:** diet and exercise information only
Outcomes	**Primary outcome:** body composition at 0, 3, 6, 9 and 12 months **Secondary outcomes:** blood biochemistry, satiety and bone mass
Study identifier	NCT01290016
Official title	MY LIFE Study - McGill Youth Lifestyle Intervention With Food and Exercise Study
Stated purpose of study	"The aim of this study is to determine the effects of a 1 y family centered lifestyle intervention, focused on both nutrient dense food including increased intakes of milk and alternatives, plus total and weight bearing PA, on body composition and bone mass in overweight or obese children."
Notes	Study author reply: 11 October 2016."Thank you for asking, our work is in press with Can J Public Health, we do not yet have page proofs."

NCT01506245

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label

NCT01506245 *(Continued)*

	Primary purpose: treatment
Participants	**Condition:** childhood obesity **Enrollment:** 75 **Inclusion criteria:** • childhood obesity (> 97 percentile WHO references) **Exclusion criteria:** • being involved in any weight control, physical activity, behaviour therapy, or gastric surgery programme • familial history of dyslipidaemia or essential hypertension • medications or hormones, which may influence cardiovascular function, body composition, lipid or glucose metabolism in the preceding 6 months • orthopaedic affection limiting physical activity • genetic disorder or another chronic disease
Interventions	**Intervention:** family-based behavioural therapy (6 months) either in group or in individual setting. Parents can choose between the 2 types of therapy **Control:** no intervention
Outcomes	BMI, total body and abdominal fat, waist circumference, blood pressure, arterial intima-media thickness, arterial flow-mediated dilation, arterial stiffness, cardiorespiratory fitness, physical activity, biological markers, quality of life, child's behaviour, parental psychological health
Study identifier	NCT01506245
Official title	Exercise training and family-based behavioural treatment in pre-pubertal obese children and their mother
Stated purpose of study	"The aim of this study is to compare the effects of exercise training and family-based behavioural treatment, either in individual or in group setting, in pre-pubertal children and their mother"
Notes	Estimated completion date June 2012 - trial record not updated since Janaury 2012. Emailed study author (April 2016) - no reply. Conference abstract identified

NCT01610219

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** diabetes mellitus (type 2), obesity **Enrollment:** 52 **Inclusion criteria:** • age 4-8 year

NCT01610219 *(Continued)*

	• age- and sex-specific BMI ≥ 95th percentile **Exclusion criteria:** • children with serious medical conditions • children who show signs of elevated psychopathology, as assessed by the Child Behavior Checklist (CBCL) • children of parents with significantly elevated psychiatric disorders
Interventions	**Intervention:** Lifestyle modification for diabetes prevention (traffic light diet, self-monitoring, parental behavioural training, promoting physical activity) **Control:** Nutrition and physical activity family-based intervention (no behavioural skills training, goal setting, self-monitoring or physical activity tool kit)
Outcomes	BMI/BMI z score (primary), % overweight (primary), waist circumference (primary), blood pressure (primary), pulse (primary), physical activity via accelerometer (primary), glucose (primary), insulin (primary), lipid profile measures (primary), dietary intake (primary), parent BMI
Study identifier	NCT01610219
Official title	Lifestyle modification for type 2 diabetes prevention in overweight youth
Stated purpose of study	"The objective of proposed study was to test a family-based intervention designed to reduce excess body weight, improve metabolic and cardiovascular profile, and improve diet and physical activity levels in 4 - 8 year old youth who are "at risk" for T2D"
Notes	Author reply: 12 October 2016. "The study is complete. We have not yet published the results."

NCT01662570

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** 65 **Inclusion criteria:** • ages 4-8 years old • BMI ≥ 85th percentile (based on age and sex) • consumes large (≥ 16 oz/d) sugar sweetened beverages **Exclusion criteria:** • child has a serious medical condition • signs of elevated psychopathology are present, as assessed by the Child Behavior Checklist (CBCL) • parent demonstrates elevated psychiatric problems or eating disorders • failure of parent or child to meet BMI criteria

NCT01662570 *(Continued)*

Interventions	**Intervention:** Beverage choice lifestyle modification **Control:** Nutrition education (NE)
Outcomes	BMI, BMI z score, BMI percentile, child percent overweight, waist circumference, energy intake, sugar-sweetened beverage intake, treatment acceptance/satisfaction, child preferences and motivation for sugar-sweetened beverages
Study identifier	NCT01662570
Official title	Beverage choice and lifestyle modification in overweight youth
Stated purpose of study	"This research study developed and tested a "Beverage Choice and Lifestyle Modification" (BCLM) intervention for 4 to 8 year old children who are at-risk for being overweight or are overweight and who consume large amounts of sugar sweetened beverages and juice."
Notes	Study completed. Emailed author (April 2016) - no reply

NCT02724943

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** 549 **Inclusion criteria:** • Age 2-12 years • BMI ≥ 85th centile **Exclusion criteria:** • obesity-related complications that would interfere with participant • underlying causes of obesity • severe psychological problems • participation in an obesity treatment programme in the year prior to enrolment
Interventions	**Intervention:** the intervention consists of: (1) BMI screening, (2) Next Steps brief counselling materials for the healthcare provider, (3) a 3-month intensive Mind Exercise Nutrition Do It! and Coordinated Approach To Child Health (MEND/CATCH) phase, which included the Mind Exercise Nutrition Do it! with adapted CATCH activities, and (5) a 9-month transition MEND/CATCH Transition phase of monthly reinforcement sessions for parents and children, and twice-weekly Young Men's Christian Association (YMCA) sports for children. Community Health Workers (CHWs) serve as programme liaisons and assist in delivering all intervention group sessions as well as tracking families **Control:** (active comparator – additional component to a behaviour-changing intervention and usual care) Next Steps brief clinical intervention which is a 12-month clinic-based programme conducted at 12 partner healthcare clinics and entailed (1) EHR changes to support childhood obesity clinical visits; (2) BMI screening, (3) Next Steps brief counselling materials for the healthcare

NCT02724943 *(Continued)*

	provider, and (4) Next Steps self-paced booklet for parents and children to work on nutrition and physical activity targets in a self-directed manner. Families were encouraged to seek repeated clinical visits to address child obesity.
Outcomes	**Primary outcome:** change in obesity prevalence at baseline, 3 and 12 months **Secondary outcomes:** waist-to-height ratio, fat-free mass, blood pressure, fitness, quality of life at the same time points
Study identifier	NCT02724943
Official title	Texas Childhood Obesity Research Demonstration (TX CORD) Project
Stated purpose of study	"Aim 1: To implement and evaluate the efficacy of a systems approach to child obesity on reducing BMI (expressed as %95th percentile) by embedding a 12-month family-based secondary prevention program within a community primary prevention program. The secondary prevention weight management program will target overweight/obese children and their families in the primary prevention catchment areas in Austin and Houston. Overweight/obese children (total N = 576), aged 2-12 years, will be randomly assigned to either the 12-month secondary prevention program (experimental) or the community primary prevention program alone (control), in equal age subgroups (2-5, 6-8, and 9-12 years). Analyses will be conducted by age group, and outcomes will include BMI as expressed as %95th percentile), obesity-related behaviors, quality of life, and program use indicators. Aim 2: To quantify the incremental cost-effectiveness of the 12-month family-based secondary prevention program relative to primary prevention alone for child obesity. Activity Based Costing methods will be used to quantify the incremental cost of delivering the secondary prevention program relative to optimized healthcare. These costs will then be combined with the effectiveness data to quantify the incremental cost-effectiveness of the community-based intervention."
Notes	Study author did not reply, October 2016. Study completed. Protocol and baseline data available but no follow-up data identified

NCT02771951

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: factorial assignment **Masking**: single-blind (outcome assessor) **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** 297 **Inclusion criteria:** • aged 6-11 years • Latino boys and girls • clinic visit within past 24 months prior to enrolment in study • BMI % for age/gender between 75th-99.9th centiles • plan on living in target area for following 18 months • have transportation to participating clinic

NCT02771951 *(Continued)*

	Exclusion criteria: not provided
Interventions	**Intervention:** participants receive 7 group classes taught by trained clinic health educators; in addition to a series of phone calls; clinical visits with a mid-level provider; and 6 booster group classes over 1 year **Control:** usual care provision of up to 2 visits with a usual care health educator over 1 year
Outcomes	**Primary outcome:** BMI over 1 year **Secondary outcomes:** not stated
Study identifier	NCT02771951
Official title	Clinical/behavioral approach to overweight in Latino youth: luces de cambio
Stated purpose of study	No official aim stated
Notes	Study completed. Study author reply: 11 October 2016. "Still ongoing…give us a few months." Unclear whether healthy weight children are included as it doesn't state which BMI growth reference is being used – however authors state that the overweight participants recruited from paediatric clinics

NCT02779647

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** 54 **Inclusion criteria:** • age 8-12 years • obese boys and girls **Exclusion criteria:** • hormonal, orthopedic, respiratory or other complications
Interventions	**Intervention:** physical activity programme (4 x 90 min sessions/wk for 9 months and nutrition advice for children and parents) **Control:** nutrition advice only
Outcomes	**Primary outcome:** body composition over 12 months **Secondary outcomes:** physical activity (1 month), sleep apneas (6 months)
Study identifier	NCT02779647

NCT02779647 *(Continued)*

Official title	Play as a method to reduce overweight and obesity in children. Kids-Play Study
Stated purpose of study	"The aim of this study is to analyse an intervention based on play as a means of improving the body composition of children with overweight or obesity."
Notes	Study author did not reply, October 2016. Study completed

NCT02794090

Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** 37 **Inclusion criteria:** • age 5-14 years • boys and girls who are outpatients of the paediatric centre • parents had to attend at least 4 or 7 meetings in the parental education group **Exclusion criteria:** • not speaking Swedish • obesity-related syndromes
Interventions	**Intervention:** telephone consultation every month (except summer holidays) for 18 months. The treating nurse communicating with 1 of the parents **Control:** usual care according to regular treatment routines at the clinic
Outcomes	**Primary outcome:** BMI z score – baseline, during intervention and follow-up in total 3.7 years **Secondary outcomes:** health care personnel time, families' experience of the programme
Study identifier	NCT02794090
Official title	Exclusive telephone coaching in maintaining weight loss - an randomized controlled trial of childhood obesity treatment
Stated purpose of study	No official aim stated
Notes	Author reply: 12 October 2016. "The paper is submitted and we are waiting for response from our first revision."

Shapiro 1976

Methods	
Participants	
Interventions	
Outcomes	
Study identifier	
Official title	
Stated purpose of study	
Notes	Cannot obtain full publication from the British Library

Terwilliger 2008

Methods	
Participants	
Interventions	
Outcomes	
Study identifier	
Official title	
Stated purpose of study	
Notes	Thesis - unable to obtain

BIA: Bioelectrical impedance analysis; BMI: body mass index; CBCL: Child Behavior Checklist; DBP: diastolic blood pressure; DEXA: dual energy X-ray absorptiometry; EHR: electronic health records; N: number; NCEP: National Cholesterol Education Program; PA: physical activity; SBP: systolic blood pressure; SDS: standard deviation score; SFM: Social Facilitation Maintenance; T2D: Type II diabetes; WHO: World Health Organization

Characteristics of ongoing studies *[ordered by study ID]*

ACTRN12613001037796

Trial name or title	Effect of exercise intensity on cardiac and vascular function, and intra-abdominal fat in obese children and adolescents
Methods	**Type of study:** interventional, efficacy/safety **Allocation**: randomised **Intervention model**: parallel **Masking**: blinded (masking used). The people assessing the outcomes. The people analysing the results/data

ACTRN12613001037796 *(Continued)*

	Primary purpose: treatment
Participants	**Condition:** obesity **Enrolment:** target 60 **Inclusion criteria:** • 7-16 years • boys and girls • obese (CDC growth charts) – those above 99th centile will be assessed on an individual basis • all ethnic groups • blood pressure < 95th percentile • fasting total cholesterol < 5.5 mmol/L and low-density lipoprotein cholesterol < 3.0 mmol/L • participants willing to be randomised to high or moderate intensity exercise or control group, and able to follow protocol • successful completing of self-monitoring materials before randomisation **Exclusion criteria:** • participating in another study • smoking • diabetes • taking medications such as steroids • coronary heart disease or congenital cardiac abnormalities • family history of hypertrophic obstructive cardiomyopathy • abnormalities during the resting or exercise stress echo • orthopaedic and/or neurological limitations to exercise • considerable pulmonary disease • self-reported kidney failure • major organ transplant • epilepsy or history of seizures • attention deficit hypersensitivity disorder diagnosis
Interventions	**Intervention 1:** a high-intensity interval training group (dietary sessions over 3 months, physical activity training sessions plus home training) **Intervention 2:** a moderate-intensity exercise group (same as above but moderate intensity training instead of high)
Outcomes	**Other outcome(s)**: peak systolic (S') tissue velocity (primary), intra-abdominal fat via MRI (primary), arterial endothelial-dependent dilatation (primary), arterial stiffness, VO2 max, body composition via DEXA, oxidised LDL, adiponectin, total nitrate, HOMA, blood pressure, diet, accelerometry data, height, weight, waist circumference
Starting date	**Start date:** estimated first participant enrolled: 1 October 2013 **Completion date:** unclear. Estimated last participant enrolled: 1 January 2015
Contact information	**Responsible party/principal investigator**: Miss Katrin Dias, The University of Queensland, Australia, katrin.dias@uqconnect.edu.au
Study identifier	ACTRN12613001037796; NCT01991106
Official title	Effect of exercise intensity on cardiac and vascular function, and intra-abdominal fat in obese children and adolescents

ACTRN12613001037796 *(Continued)*

Stated purpose of study	Quote: "The objective of the study is to investigate the effects of high intensity exercise intensity on myocardial and arterial function, intra-abdominal fat and cardiovascular disease risk factors in obese children and adolescents over one year."
Notes	Study author reply 12 October 2016: "While the study is still ongoing (12-month follow up), we are currently collating results from the three-month supervised phase of the study. We aim to submit two papers with these results to journals by the end of the year. Given the time taken from submission to publication, I would expect them to be published between mid to end 2017."

ChiCTR-IOB-15005874

Trial name or title	Effects of weight management program on postural stability and neuromuscular function among obese children
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: single-blind **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** target 120 **Inclusion criteria:** • children aged 8-10 years • obese (IOTF definition • tanner stage 1 • can participate in 3 exercise classes/week for 6 months, • 1 parent willing to attend treatment meetings and no family member involved in another weight control programme **Exclusion criteria:** • cannot communicate in Chinese • diabetic • suffer from psychiatric disorder • angina in past 3 months or severe dyspnoea at rest • syndromic of medicinal cause of obesity • other illness that prevents participation
Interventions	**Intervention:** weight management: combined diet and exercise programme: dietary intervention only (6 dietetic visits) and weekly nurse telephone support. Exercise: 50 min session at sports centre 1 x/week to be repeated twice that week at home **Control:** 60 min weekly education session
Outcomes	**Primary outcome:** body height and weight **Secondary outcomes:** waist and hip circumference, % body fat, movement biomechanistics and postural stability tests
Starting date	**Start date:** unclear

ChiCTR-IOB-15005874 *(Continued)*

	Completion date: unclear until completed
Contact information	**Responsible party/principal investigator**: wanglin@sus.edu.cn
Study identifier	ChiCTR-IOB-15005874
Official title	Not provided
Stated purpose of study	"The present study attempts to investigate the effect of a six-month weight management program on postural stability and neuromuscular control among obese children"
Notes	Study author reply: 11 October 2016. "The study is ongoing now. In fact, we meet a few problems in participant's recruitment and funding support, therefore, there are not any data currently."

DRKS00007879

Trial name or title	Development and evaluation of a computer-based self-regulation training for obese children and adolescents
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: blinded patient/subject, investigator/therapist, caregiver, assessor **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** target 226 **Inclusion criteria:** • 8-16 years • boys and girls • BMI > 97 centile • informed parental consent **Exclusion criteria:** • secondary obesity • hyperkinetic disorder with medication • mental retardation
Interventions	**Intervention:** self-regulation training with the developed computer program (Approach-Avoidance-Training), in addition to treatment as usual (inpatient rehab treatment), conducted over 6 sessions (10-15 min each), over 2 consecutive weeks. **Control:** placebo training (similar to the intervention computer program but with no learning effect) in addition to treatment as usual (inpatient rehab treatment), conducted over 6 sessions (10-15 min each), over 2 consecutive weeks
Outcomes	**Primary outcome:** BMI z score pre, post rehab and 6 and 12 months after the end of rehab **Secondary outcomes:** self-regulation skills pre and post rehab

DRKS00007879 *(Continued)*

Starting date	**Start date:** 6 March 2015 **Completion date:** unclear until study has completed
Contact information	**Responsible party/principal investigator**: Prof. Petra Warschburger, Karl-Liebknecht-Str. 24/25, 14476 Potsdam, Germany. E-mail: warschb at uni-potsdam.de
Study identifier	DRKS00007879
Official title	Development and evaluation of a computer-based self-regulation training for obese children and adolescents
Stated purpose of study	No formal aims provided
Notes	Author reply: 12 October 2016. "Yes, our study is still ongoing and we expect the results in April/May next year. A paper of our pilot study is in preparation."

ISRCTN81798055

Trial name or title	Child weigHt mANaGement for Ethnically diverse communities study (CHANGE)
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: - **Primary purpose**: prevention

Participants	**Condition:** childhood obesity
	Enrolment: estimate 160-180
	Inclusion criteria:
	• phase 1
	  * aged 4-11 years
	  * overweight/obese
	  * Bangladeshi and Pakistani parents and carers
	  * offered the existing children's weight management service.
	• phase 2
	  * aged 4-11 years
	  * overweight/obese
	  * children and their families who have been referred to the Birmingham children's weight management service
	Exclusion criteria:
	• phase 2
	  * families who self-refer to the service but do not have an overweight or obese child (defined as ≥ 91st centile) aged 4-11 year will be excluded from the study

Interventions	**Intervention:** an adapted children's weight management programme, 8 weeks

ISRCTN81798055 *(Continued)*

	Control: existing children's weight management programme, 7 weeks
Outcomes	Completion rates (primary), height, weight, BMI, waist circumference, percentage body fat (BIA), dietary intake, physical activity (accelerometry), parent-reported sedentary behaviours, health-related quality of life, a health utility measure, body image, self-concept
Starting date	**Start date:** 1 September 2014 (recruitment) **Completion date:** unclear. 28 February 2017 (recruitment)
Contact information	**Responsible party/principal investigator**: Dr Miranda Pallan, University of Birmingham, UK
Study identifier	ISRCTN81798055
Official title	Development of a culturally adapted weight management programme for children of Pakistani and Bangladeshi origin
Stated purpose of study	"Therefore the main aim of this study is to develop and assess the feasibility and acceptability of a weight management programme for children aged 4-11 years and their families, tailored to be culturally relevant to Bangladeshi and Pakistani communities, but also suitable for delivery to an ethnically diverse population."
Notes	Study not yet completed

Moore 2013

Trial name or title	**Acronym**: IMPACT
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: assessor blinded **Primary purpose**: treatment
Participants	**Condition:** childhood obesity **Enrolment:** unknown **Inclusion criteria:** • entering 6th grade • BMI ≥ 85th percentile determined from height and weight measurements (CDC growth charts) • provision of consent by parents and assent by children **Exclusion criteria:** • medications that alter appetite or weight • stage 2 hypertension or stage 1 hypertension with end organ damage (e.g. left ventricular hypertrophy, microalbuminuria) • sickle cell disease • severe behavioural problems that preclude group participation as reported by parent/guardian • involvement in another weight management programme • family expectation to move from the region within 1 year

Moore 2013 *(Continued)*

	• the presence of a known medical condition that itself causes obesity (e.g. Prader-Willi syndrome)
Interventions	**Intervention:** HealthyCHANGE intervention (family-based weight management programme based in cognitive-behavioural theory with elements of motivational interviewing (MI)) **Control:** SystemCHANGE intervention (based on system process improvement theory and focuses on redesign of the activities in a family's daily routines related to home, school, and work to support positive behaviour changes)
Outcomes	Weight, height, waist circumference, triceps skinfold, BMI, dietary intake, physical activity (accelerometry), blood pressure, haemoglobin A1c (HbA1c), glucose, total cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, high-sensitivity C-reactive protein (hs-CRP), insulin and alanine aminotransferase (ALT), child's self-efficacy, social support, motivation, and family problem-solving, systems thinking, self-regulation child's self-efficacy, social support, motivation, and family problem-solving, self-regulation, sleep, stress levels, cardiovascular risk, socioeconomic and demographic factors, environmental (home, school, neighbourhood) factors, peer norms
Starting date	**Start date:** unclear **Completion date:** unclear
Contact information	**Responsible party/principal investigator**: Shirley Moore, Frances Payne Bolton School of Nursing, Case Western Reserve University, Cleveland, USA. smm8@case.edu
Study identifier	-
Official title	A multi-level family and school intervention targeting obesity in urban youth
Stated purpose of study	"The primary aim of this study is to compare the effects of three distinct behavioral obesity management interventions on BMI in overweight/obese middle school, urban youth."
Notes	Author reply: 16 October 2016. "This study is still ongoing. We will not be unblended until spring 2017 and cannot share results prior to publication of the results (hopefully fall 2017)."

NCT01221220

Trial name or title	Environmental strategies & behavior change to reduce overeating in obese children
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: single-blind (assessor) **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrolment:** estimated 160 **Inclusion criteria:** • 8-15 years • obese based on 95th percentile (CDC growth references) • parent and child must both want to join the study • parent and child must agree to attend sessions and not miss more than 2 consecutive sessions

NCT01221220 *(Continued)*

	Exclusion criteria: • diagnosed with a medical condition affecting growth (e.g. type 1 or 2 diabetes, chronic renal diseases, pregnancy) • taking medication known to affect growth • have a condition which would limit their participation in the study or the assessments • not able to read or understand English or Spanish, or unable to compete consent forms • within the next 18 months the family plans to move from the San Francisco Bay area
Interventions	**Intervention:** behavioural: Standard Packard Pediatric Weight Control Program plus home-based advising on environmental changes (6 months program) **Control:** Standard Packard Pediatric Weight Control Program only
Outcomes	BMI (primary), waist circumference, triceps skinfold, resting heart rate, dietary intake, weight concerns, depressive symptoms, daily energy intake, physical activity, blood pressure, fasting blood lipids
Starting date	**Start date:** September 2010 **Completion date:** February 2015 (final assessment)
Contact information	**Responsible party/principal investigator**: Thomas Robinson, Stanford University, USA
Study identifier	NCT01221220
Official title	Environmental strategies & behavior change to reduce overeating in obese children
Stated purpose of study	"There is a need for effective weight control methods for obese children. Environmental strategies such as reducing the size of dishware and serving utensils, storing food out of view and reducing food consumption while watching television may reduce food intake without requiring conscious, cognitive self-control. The investigators propose to test these methods when added to a current state-of-the-art behavioral program."
Notes	**Author reply:** 11 October 16. Ongoing. Not yet published

NCT01574352

Trial name or title	**Acronym**: OOIS
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: single blind (investigator) **Primary purpose**: treatment
Participants	**Condition:** children, overweight, obesity, metabolic syndrome **Enrolment:** 100 **Inclusion criteria:** • live in municipality of Odense, Denmar • overweight or obese (BMI) - IOTF

NCT01574352 *(Continued)*

	Exclusion criteria: • participating in other similar research studies • following a special school programme • the use of weight-altering medicine 3 months before the baseline • motor-skill determined handicap which hinders participation
Interventions	**Intervention:** behavioural: intervention camp (6-week day-camp: physical activity, health education, healthy foods, social activities) **Control:** behavioural: small intervention (weekly 1-h session over 6 weeks plus 2 parental diet and exercise information sessions)
Outcomes	BMI (primary), cognitive function, motor skills, body composition by DEXA, brain-derived neurotrophic factor, blood pressure, subclinical atherosclerosis, cardio-respiratory fitness, insulin, glucose, blood lipids, C-reactive protein, waist/hip circumference, clustered CVD risk factor, physical strength measured by hand grip and Sargent vertical jump Endpoint: 12 months
Starting date	**Start date:** April 2012 **Completion date:** July 2017
Contact information	**Responsible party/principal investigator**: Lars Bo Andersen, Professor, Center of Research in Childhood Health (RICH), University of Southern Denmark
Study identifier	NCT01574352
Official title	The Odense Overweight Intervention Study (OOIS): a randomized controlled trial on overweight prevention in children
Stated purpose of study	"This study is carried through as a randomized controlled trial which investigates the effect of participating in a 6 week health promoting resident for overweight fifth grade children camp followed by 42 weeks of family support"
Notes	Data collection is complete. **Protocol:** Larsen et al. Effectiveness of a 1-year multi-component day-camp intervention for overweight children: study protocol of the Odense overweight intervention study (OOIS). BMC Public Health 2014, 14:313

NCT01642836

Trial name or title	**Acronym**: Stanford GOALS
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: single blind (outcome assessment) **Primary purpose**: treatment
Participants	**Condition:** obesity

NCT01642836 *(Continued)*

	Enrolment: 240 **Inclusion criteria:** • 7-11 years • BMI ≥ 85th percentile for age and sex on the 2000 CDC BMI reference **Exclusion criteria:** • have been diagnosed with a medical condition affecting growth (a genetic or metabolic disease/syndrome associated with obesity, type 1 diabetes, type 2 diabetes taking medication, chronic gastrointestinal diseases, chronic renal diseases, uncorrected structural heart disease, heart failure, heart transplant, anorexia nervosa or bulimia nervosa or binge eating disorder (present or past), AIDS or HIV infection, pregnancy); • take medications affecting growth (systemic corticosteroids > 2 weeks in the past year, insulin, oral hypoglycaemic, thyroid hormone, growth hormone); • have a condition limiting their participation in the interventions (e.g. unable to participate in routine physical education classes at school, requiring oxygen supplementation for exertion, developmental or physical disability preventing participation in interventions, children or parents/guardians who cannot medically participate in mild dietary restrictions and/or increased physical activity for any reason); • have a condition limiting participation in the assessments (child or primary caregiver not able to read surveys in English or Spanish, child 2 or more grade levels delayed in school for reading and writing in native language); • are unable to read, understand or complete informed consent in English or Spanish; • plan to move from the San Francisco Bay Area within the next 36 months; • are deemed to have another characteristic that makes them unsuitable for participation in the study in the judgment of the Principal Investigator
Interventions	**Intervention:** multi-component, multi-level, multi-setting (MMM) – sports programme, home-based family intervention, behavioural counselling **Control:** enhanced standard care/health and nutrition education intervention
Outcomes	BMI (primary), physical activity (accelerometry), waist circumference, triceps skinfold thickness, resting blood pressure, resting heart rate, cholesterol, triglycerides, insulin, glucose, haemoglobin A1c, HsCRP, ALT, screen time and other sedentary behaviours, energy intake, waist-to-height ratio, weight concerns, depressive symptoms, school performance, sleep habits Endpoint: 3 years
Starting date	**Start date:** July 2012 **Completion date:** April 2017
Contact information	**Responsible party/principal investigator**: Thomas N Robinson, Stanford University, USA
Study identifier	NCT01642836
Official title	Clinic, family & community collaboration to treat overweight and obese children
Stated purpose of study	"Primary Research Question: Will a 3-year, innovative, interdisciplinary, multi-component, multi-level, multi-setting (MMM) community-based intervention to treat overweight and obese children significantly reduce BMI compared to an enhanced standard care/health and nutrition education active comparison intervention?"
Notes	Ongoing, finished recruiting **Protocol:** Robinson TN, Matheson D, Desai M, Wilson DM, Weintraub DL, Haskell WL, McClain A, McClure S, Banda JA, Sanders LM, Haydel KF, Killen JD. Family, community and clinic collabora-

NCT01642836 *(Continued)*

	tion to treat overweight and obese children: Stanford GOALS-A randomized controlled trial of a three-year, multi-component, multi-level, multi-setting intervention. Contemp Clin Trials. 2013 Nov; 36(2):421-35. doi: 10.1016/j.cct.2013.09.001. Epub 2013 Sep 10

NCT01736748

Trial name or title	**Acronym**: CIRCUIT
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: double-blind (subject, caregiver, investigator, outcomes assessor) **Primary purpose**: prevention
Participants	**Condition:** obesity **Enrolment:** 100 **Inclusion:** • children aged 6-18 years • BMI > 95th percentile for age and sex **Exclusion:** • children with a physical or psychological condition that would impair their ability to participate in physical activity
Interventions	**Intervention:** sensor-based PA intervention **Control:** traditional PA counselling
Outcomes	Change in physical activity levels (primary), blood pressure, glucose homeostasis, lipid status, BMI
Starting date	**Start date**: January 2015 **Completion date:** January 2019
Contact information	**Responsible party/principal investigator**: Melanie Henderson, St. Justine's Hospital, Canada
Study identifier	NCT01736748
Official title	Implementing Dynamo: a tailored lifestyle promotion intervention among pediatric patients with cardiometabolic risk factors
Stated purpose of study	"Its primary goal is to promote physical activity and reduce sedentary time to improve children's cardiometabolic profile"
Notes	This study was not yet open for participant recruitment (as of March 2016)

NCT02082080

Trial name or title	Prevention and control of obesity in primary school children in Tehran
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: prevention
Participants	**Condition:** childhood obesity prevention **Enrolment:** estimated 360 **Inclusion criteria:** • BMI z score ≥ 1 (WHO) • students in the fifth or sixth grades (age 9-14) **Exclusion criteria:** • metabolic disorders (hypo or hyperthyroidism) • any disease which interferes with adherence to the intervention • intake of any appetite-reducing drug • doing professional sports • being on a weight-reduction diet
Interventions	**Intervention:** education and social support intervention **Control:** no care
Outcomes	**Primary outcome measure(s):** Pain on the 11-point Short Pain Scale (SPS-11), BMI
Starting date	**Start date:** December 2012 **Completion date:** June 2013
Contact information	**Responsible party/principal investigator**: Tehran University of Medical Sciences, Iran
Study identifier	NCT02082080
Official title	Prevention and control of obesity in primary school children in Tehran
Stated purpose of study	"This study evaluates the effect of an interventional model for preventing and controlling over-weight and obesity in male and female fifth-graders"
Notes	Unable to find contact details

NCT02124460

Trial name or title	Connect 4 Health: an intervention to improve childhood obesity outcomes
Methods	**Type of study:** interventional **Allocation**: randomised

NCT02124460 *(Continued)*

	Intervention model: parallel **Masking**: single-blind (outcomes assessor) **Primary purpose**: treatment
Participants	**Condition:** overweight, obesity **Enrolment:** 721 **Inclusion criteria:** • aged 2.0-12.9 years at baseline primary care visit, • BMI ≥ 85th percentile for age and sex at baseline primary care visit • at least 1 parent has an active email address • at least 1 parent is comfortable reading and speaking in English **Exclusion criteria:** • children who do not have at least 1 parent/legal guardian who is able to follow study procedures for 1 year • families who plan to leave Harvard Vanguard Medical Associates within the study time frame • families for whom the primary care clinician thinks the intervention is inappropriate, e.g. emotional or cognitive difficulties • children who have a sibling already enrolled in the study • children with chronic conditions that substantially interfere with growth or physical activity participation
Interventions	**Intervention:** Connect 4 Health: using health coaches for behavioural counselling and community connections **Control:** enhanced primary care
Outcomes	BMI (primary), quality of life (primary), Quality and Family-Centeredness of Pediatric Obesity Care, specified behavioural outcomes, process measures, socioeconomic variables, geographic variables
Starting date	**Start date:** June 2014 **Completion date:** November 2016
Contact information	**Responsible party/principal investigator**: Elsie M Taveras, Massachusetts General Hospital, USA
Study identifier	NCT02124460
Official title	Improving childhood obesity outcomes: testing best practices of positive outliers
Stated purpose of study	"The primary specific aims are to examine the extent to which the intervention, compared to the control condition, results in: A smaller age-associated increase in BMI over a 12-month period. Improved parental and child ratings of pediatric health-related quality of life."
Notes	This study is ongoing, but not recruiting participants (as of March 2016)

NCT02258126

Trial name or title	**Acronym**: EFIGRO
Methods	**Type of study:** interventional

NCT02258126 *(Continued)*

	Allocation: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** • non-alcoholic fatty liver disease • obesity • metabolic syndrome **Enrolment:** 160 **Inclusion criteria:** • 9-11 years • overweight or obesity status **Exclusion criteria:** • medical conditions that hamper their participation in the exercise programme • secondary obesity
Interventions	**Intervention:** multidisciplinary intervention programme – education programme, behavioural advice, supervised exercise **Control:** healthy behaviour-changing education including supportive therapy and behavioural advice for both children and parents to improve nutrition and physical activity
Outcomes	Hepatic fat (primary), insulin sensitivity, serum lipid profile, liver enzymes, dietary habits, physical activity, body composition, blood pressure, leptin, adiponectin, C-reactive protein (CRP)
Starting date	**Start date:** November 2014 **Completion date:** June 2018
Contact information	**Responsible party/principal investigator**: Idoia Labayen, Department of Nutrition and Food Sciences, Faculty of Pharmacy, University of the Basque Country, Spain
Study identifier	NCT02258126
Official title	The effect of exercise on hepatic fat in overweight children; the EFIGRO Study
Stated purpose of study	"The objective of the present study is to evaluate the effect of 6 months exercise intervention program on hepatic fat fraction in overweight children"
Notes	Recruiting participants (as of March 2016)

NCT02343367

Trial name or title	**Acronym**: H4K
Methods	**Type of study:** interventional **Allocation**: randomised

NCT02343367 *(Continued)*

	Intervention model: parallel **Masking**: double-blind (caregiver, investigator, outcomes assessor) **Primary purpose**: treatment
Participants	**Condition:** paediatric obesity **Enrolment:** estimated 460 **Inclusion criteria:** • aged 6-11 years • identified as Hispanic (by parent/guardian) • overweight or obese (85th to < 99th percentile for age and gender) • parent/guardian to participate in intervention **Exclusion criteria:** • child who has a mental, emotional, or physical handicap which may interfere with participation • cardiovascular, pulmonary, or digestive disease diagnosis • parent without a cell phone, or parent unable/unwilling to receive text messages • child or parent planning to move from the local area during study
Interventions	**Intervention:** experimental: paediatric obesity management (standard care plus counselling session face-to face and over the telephone, newsletters, text messages, information on community events) **Control:** active comparator: standard care - brief behavioural counselling and education materials
Outcomes	Weight (primary), waist circumference (primary), BMI z score (primary), fasting insulin, fasting glucose, cholesterol, MVPA assessed by accelerometry, consumption of sugar-sweetened beverages, consumption of fruit and vegetables
Starting date	**Start date:** January 2015 **Completion date:** October 2018 (final assessment)
Contact information	**Responsible party/principal investigator**: Deborah Parra-Medina, The University of Texas Health Science Center at San Antonio, USA
Study identifier	NCT02343367
Official title	Pediatric obesity management intervention trial for Hispanic families
Stated purpose of study	"Our proposed randomized controlled trial, the Health4Kids (H4K) Trial for Hispanic Families, aims to improve Hispanic children's body composition by testing a comprehensive, culturally and linguistically relevant, family-oriented intervention for overweight and obese (body mass index (BMI) between the 85th and 99.9thth (<99th) percentile for age and gender) Hispanic children ages 6-11 in pediatric clinics in San Antonio, Texas, a largely Hispanic city."
Notes	Currently recruiting participants (March 2016)

NCT02560493

Trial name or title	**Acronym**: GameSquad
Methods	**Type of study:** interventional

NCT02560493 *(Continued)*

	Allocation: randomised **Intervention model**: parallel **Masking**: single-blind (outcome assessor) **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** target 46 **Inclusion criteria:** • aged 10-12 years • overweight or obese (according to CDC charts) • boys and girls • at least 1 family member willing to undertake 3 h/week exergaming **Exclusion criteria:** • pregnancy • impairments of normal ambulation • previous cardiovascular disease, muscular-skeletal injury or epilepsy
Interventions	**Intervention:** 3 h/week of exergame play and encouraged to achieve recommended 60 active min/d **Control:** no intervention
Outcomes	**Primary outcome:** BMI z score over 6 months **Secondary outcomes:** body fat, blood pressure, physical activity, diet and health behaviours over 6 months
Starting date	**Start date:** October 2015 **Completion date:** March 2017
Contact information	**Responsible party/principal investigator**: Amanda Staiano, Principal Investigator, Pennington Biomedical Research Center
Study identifier	NCT02560493
Official title	Gaming technology to encourage healthy weight and activity in youth
Stated purpose of study	"1) establishing the efficacy of exergaming to reduce BMIz among overweight and obese children and 2) demonstrating the potential of exergaming to reduce body fat and improve children's cardiovascular health."
Notes	Study has recruited but is ongoing

NCT02573142

Trial name or title	**Acronym**: BCHF
Methods	**Type of study:** interventional **Allocation**: randomised

NCT02573142 *(Continued)*

	Intervention model: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** estimated: 100 **Inclusion criteria:** • aged 5-11 years • boys and girls • BMI ≥ 95th centile **Exclusion criteria:** • "Inability to read and write in English; Family currently has paid membership to a gym or fitness center; Parent with severe medical or mental health condition limiting ability to attend appointments; Child with severe medical or mental health condition limiting ability to attend appointments or participate in behavioral therapies; Parent and child live greater than 30 miles (48.2km) from the Duke Healthy Lifestyles clinic; Plan to move out of state in next 6 months; Child with medical condition as cause of obesity (e.g., hypothyroidism, Cushing's Syndrome, Prader-Willi syndrome, drug-induced obesity)"
Interventions	**Intervention**: Bull City Fit Intervention, where participants will receive standard of care clinical treatment in the Duke Healthy Lifestyles clinic and unlimited access to a community-based wellness programme that includes physical fitness activities and cooking classes **Control:** This active control is comprised of education only, where participants will receive standard of care clinical treatment in the Duke Healthy Lifestyles clinic and educational materials describing community-based resources for physical activity and how to access them
Outcomes	**Primary outcome:** BMI 3 and 6 months post enrolment **Secondary outcomes:** adherence, health habits and cardiovascular fitness at 3 and 6 months post enrolment
Starting date	**Start date**: October 2015 **Completion date:** anticipated: October 2017
Contact information	**Principal investigator:** Sarah C Armstrong, sarah.c.armstrong@duke.edu
Study identifier	NCT02573142
Official title	Integrated child obesity treatment study: Bull City Healthy and Fit (BCHF)
Stated purpose of study	"The primary aim of this study is to reduce body mass index (BMI) among children ages 5-11 who are obese by integrating behavioral treatment strategies in both clinic (Healthy Lifestyles) and community (Bull City Fit) settings."
Notes	Currently still recruiting

NCT02684214

Trial name or title	Implementing Prevention Plus for childhood overweight and obesity in food secure and insecure families
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: single-blind (outcome assessor) **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** target 120 **Inclusion criteria:** • 4-10 years • boys and girls • patients at designated clinics • caregiver willing to participate **Exclusion criteria:** • caregiver not able to speak English
Interventions	**Intervention:** "PP+: Following baseline assessment, children will continue to receive standard care at CHS and the monthly newsletter. Additionally, each family will be provided with a scale; wall growth chart to measure height; a BMI wheel to calculate BMI; a BMI-for-age growth chart; a binder for intervention materials; a self-monitoring diary to record child's monthly height, weight, BMI and BMI percentile; and picture-based diaries to monitor daily energy balance behaviours. Family materials provided at each session will outline a process to measure growth and include information about how children grow, as well as cover behavioral parenting strategies to assist with changing child behavior for energy balance behaviors. Families will meet in person with a BHC at the CHS clinic in which they receive care for 30 minutes during months 1, 3, and 5. In these sessions, child height and weight will be taken, and BMI will be plotted on the BMI-for-age growth chart. Families will receive feedback about growth and the weight status of their child. Additionally, the session materials will be reviewed and behavioral parenting strategies will be encouraged to aid with changing two dietary and two leisure-time activity (energy balance) behaviors of the child. As is traditional in a family-based approach, the caretaker will also change the same energy balance behaviors as the child, as adult caretakers can then model healthy behaviors for the child, assisting the child in learning the new weight-related behaviors.13 Thus, both the caretaker and child will be encouraged to change and self-monitor energy balance behaviors with the use of the picture-based diaries. During months 2, 4, and 6, BHCs will complete a 20-minute phone call with the caretaker. Caretakers will be asked to measure the height and weight of their child, calculate BMI and plot it on the BMI-for-age growth chart prior to the call. During the call, the BHC will provide feedback on the changes in child growth since the previous contact. Additionally, the BHC will discuss the family's progress on achieving child and caretaker energy balance behavior goals and implementation of behavioral parenting strategies. The child's energy balance behavioral goals will be to consume < 3 sugar-sweetened beverage (e.g., regular carbonated soft drinks, sports drinks, lemonades, ice teas, flavoured milk, juice drinks < 100% juice, and punches) servings /wk, ≥1 ½ cups/day of whole vegetables and ≥ 1 cup/day of whole fruit, engage in ≥ 60 minutes/day of moderate- to vigorous-intensity physical activity, and reduce TV viewing to < 2 hours/day. The caretaker's energy balance behavioral goals will be to consume < 3 sugar-sweetened beverage servings/wk, ≥ 2 ½ cups/day of whole vegetables and ≥ 1 ½ cups/day of whole fruit, engage in ≥ 150 minutes of moderate- to vigorous-intensity physical activ-

NCT02684214 *(Continued)*

	ity per week, and reduce TV viewing to < 10 hours/wk. To increase self-efficacy, the goals will be incrementally increased, with families implementing the full programme goals at month four. Additionally, children and caretakers will be asked to achieve at least three of the five goals each day (child) or week (adult caretaker)." **Control:** "PP: This condition will be identical to PP+ except that caretakers will not receive any energy balance behavior goals. Additionally, the caretaker will not self-monitor energy balance behaviors. The focus will be on all other behavioral parenting strategies to assist the child with making changes in the targeted behaviors (i.e., stimulus control, positive reinforcement, and assisting child in self-monitoring energy-balance behaviors)." NB both conditions will be given to high and low household food security
Outcomes	**Primary outcomes:** baseline to 6 month: demographics, weight history, weight, child and care-giver dietary intake, activity levels, quality control, parent weight history, height, BMI, BMI z score **Secondary outcomes:** participant rate and characteristics of non participators, programme adherence, implementation costs, programme sustainability
Starting date	**Start date:** April 2016 **Completion date:** April 2018
Contact information	**Responsible party/principal investigator**: Hollie Raynor, University of Tennessee, USA
Study identifier	NCT02684214
Official title	Not stated
Stated purpose of study	Not stated
Notes	Trial only just started

NCT02711488

Trial name or title	**Acronym**: PAAPAS-DC
Methods	**Type of study:** interventional **Allocation:** randomised **Intervention model:** parallel **Masking:** single-blind (outcome assessors) **Primary purpose:** treatment
Participants	**Condition:** obesity **Enrollment:** estimated: 3000 **Inclusion criteria:** • 9-15 years • boys and girls • parental consent to participate **Exclusion criteria:**

NCT02711488 *(Continued)*

	• pregnancy
Interventions	**Intervention:** participants will be subject to primary prevention activities at school level combined with secondary prevention at home **Control:** no intervention
Outcomes	**Primary outcome:** BMI over 1 year **Secondary outcomes:** body composition, physical activity, diet and adherence over 1 year
Starting date	**Start date:** March 2016 **Completion date:** anticipated December 2016
Contact information	**Responsible party/principal investigator**: Rosely Sichieri, MD, PhD. Full Professor of Epidemiology, Rio de Janeiro State University, Brasil
Study identifier	NCT02711488
Official title	Managing adolescent obesity at local level by combining primary and secondary intervention (PAA-PAS-DC)
Stated purpose of study	No formal aims provided
Notes	Not yet completed, mean age of participants at baseline will determine whether this trial is included in this review or the adolescent review

NCT02720302

Trial name or title	**Acronym**: TeleSOFT
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** target 120 **Inclusion criteria:** • aged 9-12 years • boys and girls • overweight but not obese according to the IOTF classification **Exclusion criteria:** • non Swedish speaking • monogenic obesity • present at school less than 80% in the previous year • no foster care for the child or siblings

NCT02720302 *(Continued)*

Interventions	**Intervention:** SOFT – a programme based on 'systemic and solution-focused theories to change lifestyle', shown to facilitate positive effects on children in terms of obesity, physical fitness, self-esteem and family functioning **Control:** TeleSOFT - where therapists communicate with the overweight child and family by the SOFT method at distance via video
Outcomes	**Primary outcome:** BMI z score at baseline and 12 months **Secondary outcomes:** change in body fat, activity levels, metabolic health, session rating and dietary habits
Starting date	**Start date:** March 2016 **Completion date:** anticipated June 2021
Contact information	**Responsible party/principal investigator**: Inge Lissau, inlis18@gmail.com
Study identifier	NCT02720302
Official title	Treatment of overweight in children on distance. A comparison between consultations on the hospital with video-consultations on distance
Stated purpose of study	"aim to treat overweight in children 9-11 years of age"
Notes	Currently recruiting

NCT02773823

Trial name or title	A behavior intervention study on cardiovascular health among chinese obese schoolchildren
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** obesity **Enrollment:** target 200 **Inclusion criteria:** • aged 8-12 years • obese • boys and girls **Exclusion criteria:** • history of cardiovascular disease • disability
Interventions	**Intervention:** diet advice and activity intervention (60 min/d of sport 5 d/week for 8 months)

NCT02773823 *(Continued)*

	Control: no intervention
Outcomes	**Primary outcome:** body weight, BMI, blood pressure, blood lipids, glucose and cardiorespiratory fitness at 8 months **Secondary outcomes:** well-being and depression at 8 months
Starting date	**Start date:** November 2015 **Completion date:** June 2017 (anticipated)
Contact information	**Responsible party/principal investigator**: Qiqiang He, 4657473@qq.com
Study identifier	NCT02773823
Official title	A comprehensive intervention study on Klotho gene methylation and cardiovascular risk factors
Stated purpose of study	No formal aim stated
Notes	Study not completed

RBR-8ttw64

Trial name or title	Effects of dietary guidance in children attending outpatient preventive cardiology: randomized clinical trial
Methods	**Type of study:** interventional **Allocation**: randomised **Intervention model**: parallel **Masking**: open label **Primary purpose**: treatment
Participants	**Condition:** overweight, obesity, heart disease **Enrolment:** 74 **Inclusion criteria:** • aged 7-11 years • overweight or obese according to the criteria of the World Health Organization • boys and girls • parents or caregivers signed an informed consent form • reside in the state of Rio Grande do Sul **Exclusion criteria:** • children with neurological disorders that interfere with learning • cognitive deficits e.g. Disorder Attention Deficit Hyperactivity Disorder • contraindications for physical activity group • using drugs that interfere with the body weight or lipid profile, such as statins, ritonavir, furosemide, hydrochlorothiazide, propranolol, nadolol, prednisolone among others
Interventions	**Intervention:** nutritional education group

RBR-8ttw64 *(Continued)*	
	Control: conventional treatment with a nutritionist
Outcomes	Total cholesterol (primary), BMI
Starting date	**First enrolment:** October 2013 **Last enrolment**: April 2014
Contact information	**Responsible party/principal investigator**: Vanessa Minossi, Instituto de Cardiologia Fundação Universitária de Cardiologia- IC/FUC, Brazil, pellanda.pesquisa@gmail.com
Study identifier	RBR-8ttw64
Official title	Effects of dietary guidance in children attending outpatient preventive cardiology: randomized clinical trial
Stated purpose of study	"The objective of this study is to evaluate the effectiveness of an innovative, simple and cost effective educational program to improve eating habits, physical activity and the knowledge about healthy habits in children, as well as in their families, as compared to routine outpatient care."
Notes	Recruiting (as of March 2016)

A1c (HbA1c): haemoglobin; ALT: alanine aminotransferase; BIA: bioelectrical impedance analysis; BMI: body mass index; CDC: United States Centers for Disease Control and Prevention; CHS: Community Health Systems; CVD: cardiovascular disease; DEXA: dual energy X-ray absorptiometry; HDL-cholesterol: high density lipoprotein cholesterol; HOMA; homeostasis assessment model; hs-CRP: high-sensitivity C-reactive protein; IOTF: International Obesity Task Force; LDL-cholesterol: low density lipoprotein cholesterol; MVPA: moderate-to-vigorous physical activity; PA: physical activity; PP: Prevention Plus; VO2 max: maximum volume of oxygen; WHO: World Health Organization

DATA AND ANALYSES

Comparison 1. Behaviour-changing interventions versus no treatment/usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Change in BMI (all trials)	24	2785	Mean Difference (IV, Random, 95% CI)	-0.53 [-0.82, -0.24]
2 Change in BMI z score (all trials)	37	4019	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.10, -0.02]
3 Change in weight (all trials)	17	1774	Mean Difference (IV, Random, 95% CI)	-1.45 [-1.88, -1.02]
4 Serious adverse events	31	4096	Risk Ratio (M-H, Random, 95% CI)	0.57 [0.17, 1.93]
5 Health-related quality of life (parent-report measures)	5	718	Std. Mean Difference (IV, Random, 95% CI)	0.13 [-0.06, 0.32]
5.1 PedsQL caregiver-report	4	526	Std. Mean Difference (IV, Random, 95% CI)	0.13 [-0.13, 0.40]
5.2 CHQ-PF50 – global score, parental report	1	192	Std. Mean Difference (IV, Random, 95% CI)	0.14 [-0.14, 0.42]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6 Health-related quality of life (child-report measures)	3	164	Std. Mean Difference (IV, Random, 95% CI)	0.15 [-0.34, 0.64]
6.1 PedsQL child-report	2	142	Std. Mean Difference (IV, Random, 95% CI)	0.10 [-0.60, 0.79]
6.2 KINDL-R child-report	1	22	Std. Mean Difference (IV, Random, 95% CI)	0.33 [-0.51, 1.18]
7 Self-esteem (Harter global score)	2	144	Mean Difference (IV, Random, 95% CI)	0.19 [-0.04, 0.42]
8 Waist circumference	11	1325	Mean Difference (IV, Random, 95% CI)	-2.41 [-3.59, -1.23]
9 Overweight	3	347	Mean Difference (IV, Random, 95% CI)	-3.27 [-7.47, 0.92]
10 Body fat	10		Mean Difference (IV, Random, 95% CI)	Subtotals only
10.1 Bioelectrical impedance	5	1004	Mean Difference (IV, Random, 95% CI)	-1.25 [-2.62, 0.12]
10.2 Dual energy X-ray absorptiometry	5	443	Mean Difference (IV, Random, 95% CI)	-1.04 [-2.88, 0.80]
11 Diet	2	168	Mean Difference (IV, Random, 95% CI)	-161.53 [-583.79, 260.73]
12 Television viewing	2	55	Mean Difference (IV, Random, 95% CI)	-6.60 [-12.88, -0.31]
13 Physical activity (accelerometer MVPA)	6	744	Mean Difference (IV, Random, 95% CI)	-0.76 [-5.30, 3.78]
14 Change in BMI - type of control	24	2785	Mean Difference (IV, Random, 95% CI)	-0.53 [-0.82, -0.24]
14.1 Intervention versus no treatment	11	1452	Mean Difference (IV, Random, 95% CI)	-0.43 [-0.87, -0.00]
14.2 Intervention versus usual care	13	1333	Mean Difference (IV, Random, 95% CI)	-0.67 [-1.12, -0.21]
15 Change in BMI z score - type of control	37	4019	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.10, -0.02]
15.1 No treatment	15	1709	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.12, 0.01]
15.2 Usual care	22	2310	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.11, -0.02]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
16 Change in weight - type of control	17	1774	Mean Difference (IV, Random, 95% CI)	-1.45 [-1.88, -1.02]
16.1 No treatment	7	906	Mean Difference (IV, Random, 95% CI)	-1.73 [-2.47, -0.98]
16.2 Usual care	10	868	Mean Difference (IV, Random, 95% CI)	-1.31 [-1.84, -0.78]
17 Change in BMI - type of intervention	24	2785	Mean Difference (IV, Random, 95% CI)	-0.53 [-0.82, -0.24]
17.1 Diet only	1	73	Mean Difference (IV, Random, 95% CI)	-0.12 [-0.85, 0.61]
17.2 Physical activity only	4	443	Mean Difference (IV, Random, 95% CI)	-0.29 [-0.50, -0.09]
17.3 Diet and physical activity	2	209	Mean Difference (IV, Random, 95% CI)	-1.03 [-3.43, 1.38]
17.4 Diet and behavioural therapy	1	39	Mean Difference (IV, Random, 95% CI)	-0.7 [-3.65, 2.25]
17.5 Physical activity and behavioural therapy	1	230	Mean Difference (IV, Random, 95% CI)	-0.01 [-1.29, 1.27]
17.6 Diet, physical activity and behavioural therapy	15	1791	Mean Difference (IV, Random, 95% CI)	-0.67 [-1.12, -0.23]
18 Change in BMI z score - type of intervention	37	4019	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.10, -0.02]
18.1 Diet only	1	73	Mean Difference (IV, Random, 95% CI)	-0.05 [-0.17, 0.07]
18.2 Physical activity only	3	365	Mean Difference (IV, Random, 95% CI)	-0.05 [-0.23, 0.14]
18.3 Diet and physical activity	7	577	Mean Difference (IV, Random, 95% CI)	-0.03 [-0.10, 0.04]
18.4 Diet and behavioural therapy	2	152	Mean Difference (IV, Random, 95% CI)	-0.07 [-0.16, 0.03]
18.5 Physical activity and behavioural therapy	1	230	Mean Difference (IV, Random, 95% CI)	-0.03 [-0.26, 0.20]
18.6 Diet, physical activity and behavioural therapy	24	2622	Mean Difference (IV, Random, 95% CI)	-0.08 [-0.13, -0.02]
19 Change in weight - type of intervention	17	1774	Mean Difference (IV, Random, 95% CI)	-1.45 [-1.88, -1.02]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
19.1 Diet only	1	73	Mean Difference (IV, Random, 95% CI)	-0.12 [-2.45, 2.21]
19.2 Physical activity only	3	422	Mean Difference (IV, Random, 95% CI)	-1.34 [-1.94, -0.73]
19.3 Diet and physical activity	1	125	Mean Difference (IV, Random, 95% CI)	-0.15 [-3.81, 3.51]
19.4 Physical activity and behavioural therapy	1	230	Mean Difference (IV, Random, 95% CI)	0.21 [-4.29, 4.71]
19.5 Diet, physical activity and behavioural therapy	11	924	Mean Difference (IV, Random, 95% CI)	-1.76 [-2.41, -1.11]
20 Change in BMI - attrition bias	24	2785	Mean Difference (IV, Random, 95% CI)	-0.53 [-0.82, -0.24]
20.1 High	4	238	Mean Difference (IV, Random, 95% CI)	-0.47 [-1.04, 0.10]
20.2 Low	15	1910	Mean Difference (IV, Random, 95% CI)	-0.50 [-0.93, -0.07]
20.3 Unclear	5	637	Mean Difference (IV, Random, 95% CI)	-0.72 [-1.45, 0.01]
21 Change in BMI z score - attrition bias	37	4019	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.10, -0.02]
21.1 Low	17	1745	Mean Difference (IV, Random, 95% CI)	-0.08 [-0.16, -0.01]
21.2 Unclear	9	897	Mean Difference (IV, Random, 95% CI)	-0.05 [-0.13, 0.03]
21.3 High	11	1377	Mean Difference (IV, Random, 95% CI)	-0.03 [-0.06, 0.01]
22 Change in weight - attrition bias	17	1774	Mean Difference (IV, Random, 95% CI)	-1.45 [-1.88, -1.02]
22.1 Low	9	986	Mean Difference (IV, Random, 95% CI)	-1.20 [-1.73, -0.67]
22.2 Unclear	4	553	Mean Difference (IV, Random, 95% CI)	-1.73 [-3.54, 0.07]
22.3 High	4	235	Mean Difference (IV, Random, 95% CI)	-1.99 [-2.80, -1.17]
23 Change in weight - setting	17	1774	Mean Difference (IV, Random, 95% CI)	-1.45 [-1.88, -1.02]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
23.1 Schools	1	55	Mean Difference (IV, Random, 95% CI)	-1.20 [-4.20, 1.80]
23.2 Community	1	78	Mean Difference (IV, Random, 95% CI)	-1.37 [-1.99, -0.75]
23.3 Child's home	3	625	Mean Difference (IV, Random, 95% CI)	-0.26 [-1.97, 1.45]
23.4 Primary care	2	191	Mean Difference (IV, Random, 95% CI)	-2.02 [-5.28, 1.24]
23.5 Secondary care (outpatient)	4	248	Mean Difference (IV, Random, 95% CI)	-1.52 [-2.77, -0.27]
23.6 Research clinic	4	374	Mean Difference (IV, Random, 95% CI)	-1.88 [-2.75, -1.02]
23.7 Mixed	2	203	Mean Difference (IV, Random, 95% CI)	-0.54 [-3.17, 2.08]
24 Change in BMI z score - setting	37	4019	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.10, -0.03]
24.1 Schools	2	76	Mean Difference (IV, Random, 95% CI)	-0.01 [-0.17, 0.15]
24.2 Community	2	76	Mean Difference (IV, Random, 95% CI)	0.04 [-0.04, 0.11]
24.3 Child's home	6	998	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.12, -0.00]
24.4 Primary care	8	864	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.12, -0.01]
24.5 Secondary care (outpatient)	10	583	Mean Difference (IV, Random, 95% CI)	-0.12 [-0.25, 0.01]
24.6 Hospital inpatient	1	523	Mean Difference (IV, Random, 95% CI)	0.02 [-0.06, 0.10]
24.7 Research clinic	4	388	Mean Difference (IV, Random, 95% CI)	-0.03 [-0.07, 0.02]
24.8 Mixed	5	511	Mean Difference (IV, Random, 95% CI)	-0.09 [-0.16, -0.01]
25 Change in BMI - setting	24	2785	Mean Difference (IV, Random, 95% CI)	-0.55 [-0.85, -0.26]
25.1 Schools	1	21	Mean Difference (IV, Random, 95% CI)	-0.57 [-4.94, 3.80]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
25.2 Community	1	78	Mean Difference (IV, Random, 95% CI)	-0.53 [-1.05, -0.01]
25.3 Child's home	4	667	Mean Difference (IV, Random, 95% CI)	-0.32 [-0.86, 0.22]
25.4 Primary care	6	1055	Mean Difference (IV, Random, 95% CI)	-0.10 [-0.35, 0.14]
25.5 Secondary care (outpatient)	7	384	Mean Difference (IV, Random, 95% CI)	-1.46 [-2.42, -0.50]
25.6 Research clinic	3	295	Mean Difference (IV, Random, 95% CI)	-0.24 [-0.86, 0.37]
25.7 Mixed	3	285	Mean Difference (IV, Random, 95% CI)	-0.79 [-1.87, 0.30]
26 Change in BMI - post-intervention follow-up	24	2785	Mean Difference (IV, Random, 95% CI)	-0.53 [-0.82, -0.24]
26.1 No post-intervention follow-up	15	1573	Mean Difference (IV, Random, 95% CI)	-0.68 [-1.10, -0.27]
26.2 Post-intervention follow-up < 6 months	3	153	Mean Difference (IV, Random, 95% CI)	-1.49 [-2.93, -0.05]
26.3 Post-intervention follow-up 6 months to < 12 months	2	282	Mean Difference (IV, Random, 95% CI)	-0.59 [-2.34, 1.15]
26.4 Post-intervention follow-up 12 months or more	4	777	Mean Difference (IV, Random, 95% CI)	-0.07 [-0.34, 0.20]
27 Change in BMI z score - post-intervention follow-up	37	4019	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.10, -0.02]
27.1 No post-intervention follow-up	21	2278	Mean Difference (IV, Random, 95% CI)	-0.09 [-0.15, -0.04]
27.2 Post-intervention follow-up < 6 months	6	228	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.15, 0.04]
27.3 Post-intervention follow-up 6 months to < 12 months	3	168	Mean Difference (IV, Random, 95% CI)	0.04 [-0.09, 0.16]
27.4 Post-intervention follow-up 12 months or more	7	1345	Mean Difference (IV, Random, 95% CI)	-0.01 [-0.06, 0.03]
28 Change in weight - post-intervention follow-up	17	1774	Mean Difference (IV, Random, 95% CI)	-1.45 [-1.88, -1.02]
28.1 No post-intervention follow-up	12	1365	Mean Difference (IV, Random, 95% CI)	-1.49 [-1.94, -1.04]

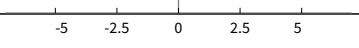
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
28.2 Post-intervention follow-up < 6 months	1	32	Mean Difference (IV, Random, 95% CI)	-0.50 [-9.28, 8.29]
28.3 Post-intervention follow-up 6 months to < 12 months	1	40	Mean Difference (IV, Random, 95% CI)	-4.60 [-17.49, 8.29]
28.4 Post-intervention follow-up 12 months or more	3	337	Mean Difference (IV, Random, 95% CI)	-1.01 [-2.49, 0.47]
29 Change in BMI - type of parental involvement	24	2785	Mean Difference (IV, Random, 95% CI)	-0.53 [-0.82, -0.24]
29.1 Parent involvement	20	2217	Mean Difference (IV, Random, 95% CI)	-0.65 [-1.04, -0.25]
29.2 No parental involvement	3	422	Mean Difference (IV, Random, 95% CI)	-0.29 [-0.50, -0.09]
29.3 Parent targeted	1	146	Mean Difference (IV, Random, 95% CI)	0.0 [-0.81, 0.81]
30 Change in BMI z score - type of parental involvement	37	4019	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.10, -0.02]
30.1 Parent involvement	32	2927	Mean Difference (IV, Random, 95% CI)	-0.07 [-0.11, -0.03]
30.2 No parental involvement	2	344	Mean Difference (IV, Random, 95% CI)	-0.03 [-0.24, 0.19]
30.3 Parent targeted	3	748	Mean Difference (IV, Random, 95% CI)	0.01 [-0.06, 0.08]
31 Change in weight - type of parental involvement	17	1774	Mean Difference (IV, Random, 95% CI)	-1.45 [-1.88, -1.02]
31.1 Parent involvement	13	1273	Mean Difference (IV, Random, 95% CI)	-1.32 [-2.09, -0.55]
31.2 No parental involvement	3	422	Mean Difference (IV, Random, 95% CI)	-1.34 [-1.94, -0.73]
31.3 Parent targeted	1	79	Mean Difference (IV, Random, 95% CI)	-2.0 [-3.02, -0.98]
32 Change in BMI z score - baseline BMI z score	37	4019	Mean Difference (IV, Random, 95% CI)	-0.06 [-0.10, -0.02]
32.1 Baseline BMI z score < 2.67 units	29	3549	Mean Difference (IV, Random, 95% CI)	-0.07 [-0.11, -0.03]
32.2 Baseline BMI z score ≥ 2.67 units	8	470	Mean Difference (IV, Random, 95% CI)	-0.03 [-0.11, 0.05]

Analysis 1.1. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 1 Change in BMI (all trials).

Study or subgroup	Intervention		Control		Mean Difference	Weight	Mean Difference
	N	Mean(SD)	N	Mean(SD)	Random, 95% CI		Random, 95% CI
Alves 2008	39	-0.3 (0.9)	39	0.3 (1.4)		7.13%	-0.53[-1.05,-0.01]
Boutelle 2014	21	-0.1 (4.7)	18	0.6 (4.7)		0.89%	-0.7[-3.65,2.25]
Croker 2012	33	-0.4 (1.1)	30	-0 (1.1)		7.1%	-0.33[-0.86,0.2]
Davoli 2013	186	1.5 (1.6)	185	1.6 (1.6)		8.3%	-0.04[-0.36,0.28]
Diaz 2010	33	-0.6 (2.3)	33	0.6 (2)		4.33%	-1.2[-2.22,-0.18]
Eddy Ives 2012	61	-0.2 (2.5)	64	-0.3 (3.2)		4.44%	0.07[-0.93,1.07]
Faude 2010	11	0.5 (3.1)	11	0.6 (3.8)		0.9%	-0.1[-3.02,2.82]
Ho 2016	37	0 (1.6)	36	0.1 (1.5)		5.89%	-0.12[-0.85,0.61]
Kalarchian 2009	97	1.5 (3)	95	1.7 (2)		5.93%	-0.22[-0.94,0.5]
Kalavainen 2007	34	2.1 (1.9)	34	2.3 (2.7)		3.96%	-0.2[-1.31,0.91]
Lison 2012	64	-0.8 (4.1)	20	1.6 (3.7)		1.87%	-2.4[-4.31,-0.49]
Maddison 2011	160	0.1 (1)	162	0.3 (1)		8.77%	-0.25[-0.47,-0.03]
Maddison 2014	117	0.1 (4.6)	113	0.1 (5.2)		3.35%	-0.01[-1.29,1.27]
McCallum 2007	70	1.2 (2.8)	76	1.2 (2.2)		5.41%	0[-0.81,0.81]
Nemet 2005	20	-1.6 (4.3)	20	0.6 (5.5)		0.83%	-2.2[-5.26,0.86]
Reinehr 2010	34	-0.8 (1)	32	0.8 (1)		7.36%	-1.61[-2.09,-1.13]
Sacher 2010	37	-1.5 (3.5)	45	0.6 (5.1)		1.95%	-2.1[-3.96,-0.24]
Siwik 2013	15	0.3 (3.7)	17	0.7 (6.4)		0.63%	-0.4[-3.95,3.15]
Taylor 2015	89	0.8 (3)	92	1.2 (2.3)		5.59%	-0.4[-1.18,0.38]
Wake 2009	127	0.6 (2.6)	115	0.7 (2.2)		6.62%	-0.1[-0.7,0.5]
Wake 2013	56	0.9 (3.4)	49	0.8 (4.2)		2.76%	0.1[-1.37,1.57]
Waling 2012	36	0.3 (2.9)	35	0.6 (2.6)		3.34%	-0.3[-1.58,0.98]
Weigel 2008	36	-1.5 (3)	30	2.8 (3.9)		2.24%	-4.3[-6,-2.6]
Weintraub 2008	9	0.2 (5.2)	12	0.8 (4.8)		0.43%	-0.57[-4.94,3.8]
Total ***	**1422**		**1363**			**100%**	**-0.53[-0.82,-0.24]**

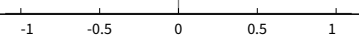
Heterogeneity: Tau²=0.24; Chi²=66.49, df=23(P<0.0001); I²=65.41%

Test for overall effect: Z=3.56(P=0)



Analysis 1.2. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 2 Change in BMI z score (all trials).

Study or subgroup	Intervention		Control		Mean Difference	Weight	Mean Difference
	N	Mean(SD)	N	Mean(SD)	Random, 95% CI		Random, 95% CI
Arauz Boudreau 2013	13	-0 (0.1)	10	-0 (0.1)		4.51%	0.02[-0.07,0.11]
Boutelle 2014	21	-0.1 (0.4)	18	-0 (0.4)		1.53%	-0.05[-0.31,0.21]
Bryant 2011	27	0 (0.2)	26	-0 (0.2)		3.89%	0.06[-0.05,0.17]
Coppins 2011	28	-0.1 (0.3)	27	-0.1 (0.4)		2.48%	0.01[-0.17,0.19]
Croker 2012	33	-0.1 (0.2)	30	-0.1 (0.2)		4.83%	-0.01[-0.09,0.07]
Davis 2013	20	-0.1 (0.5)	22	-0.1 (0.5)		1.11%	0.03[-0.29,0.35]
Davoli 2013	186	-0 (0.5)	185	-0 (0.4)		4.49%	-0.02[-0.11,0.07]
Diaz 2010	21	-0.3 (0.2)	22	-0.1 (0.2)		3.28%	-0.2[-0.34,-0.06]
Eddy Ives 2012	61	-0.3 (0.5)	64	-0.3 (0.6)		2.17%	0.04[-0.16,0.24]
Epstein 2000a	35	-0.7 (1)	17	-1.1 (0.9)		0.44%	0.39[-0.15,0.93]



Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Faude 2010	11	0.1 (0.5)	11	0 (0.7)		0.53%	0.1[-0.39,0.59]
Gillis 2007	11	-0 (0.2)	7	0.1 (0.1)		3.59%	-0.12[-0.25,0.01]
Gunnarsdottir 2011a	7	-0.3 (0.5)	6	0 (0.4)		0.55%	-0.37[-0.84,0.11]
Ho 2016	37	-0.1 (0.3)	36	-0.1 (0.2)		3.75%	-0.05[-0.17,0.07]
Kalavainen 2007	34	-0.3 (0.4)	34	-0.3 (0.6)		1.7%	0[-0.24,0.24]
Kirk 2012	71	-0.2 (0.4)	31	-0.3 (0.4)		3.07%	0.07[-0.08,0.22]
Lison 2012	64	-0.2 (0.4)	20	-0 (0.2)		3.7%	-0.18[-0.31,-0.06]
Looney 2014	14	-0.1 (0.4)	8	-0.1 (0.6)		0.57%	-0.05[-0.52,0.42]
Maddison 2011	162	0 (1.1)	160	0.1 (1.1)		1.71%	-0.06[-0.3,0.18]
Maddison 2014	117	0 (0.8)	113	0 (0.9)		1.84%	-0.03[-0.26,0.2]
Markert 2014	145	-0 (0.5)	144	0 (0.3)		4.58%	-0.03[-0.12,0.06]
McCallum 2007	70	0 (0.6)	76	0 (0.5)		2.38%	-0.02[-0.21,0.17]
Mirza 2013	57	-0.1 (0.3)	56	-0.1 (0.3)		4.15%	-0.07[-0.17,0.03]
O'Connor 2013	18	-0.1 (0.3)	16	-0.1 (0.3)		2.06%	0.05[-0.16,0.26]
Reinehr 2010	34	-0.3 (0.2)	32	0.1 (0.2)		4.29%	-0.31[-0.41,-0.21]
Rodearmel 2007	95	-0.1 (0.2)	89	-0 (0.2)		5.59%	-0.03[-0.08,0.02]
Sacher 2010	37	-0.3 (0.5)	45	-0 (0.6)		1.64%	-0.29[-0.54,-0.04]
Saelens 2013	35	-0.2 (0.4)	37	-0.1 (0.4)		2.22%	-0.07[-0.27,0.13]
Serra-Paya 2015	54	-0.1 (0.2)	59	-0.1 (0.2)		4.72%	-0.03[-0.11,0.05]
Siwik 2013	15	-0 (0.4)	17	0 (0.4)		1.23%	-0.04[-0.34,0.26]
Taylor 2015	89	-0.3 (0.5)	92	-0.1 (0.4)		3.27%	-0.15[-0.29,-0.01]
Wafa 2011	34	0 (0.7)	45	0.1 (0.5)		1.35%	-0.1[-0.38,0.18]
Wake 2013	56	-0.2 (0.5)	49	-0.1 (0.4)		2.76%	-0.1[-0.27,0.07]
Waling 2012	48	-0.2 (0.4)	45	-0.2 (0.5)		2.61%	0.01[-0.16,0.18]
Warschburger 2016	249	-0.2 (0.5)	274	-0.2 (0.4)		4.9%	0.02[-0.06,0.1]
Weigel 2008	36	-0.3 (0.5)	30	0.3 (0.6)		1.57%	-0.6[-0.86,-0.34]
Weintraub 2008	9	-0.1 (0.5)	12	0 (0.3)		0.92%	-0.09[-0.45,0.27]
Total * **	**2054**		**1965**			**100%**	**-0.06[-0.1,-0.02]**

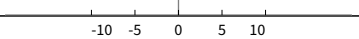
Heterogeneity: Tau²=0.01; Chi²=82.44, df=36(P<0.0001); I²=56.33%

Test for overall effect: Z=3.25(P=0)

Favours intervention — Favours control

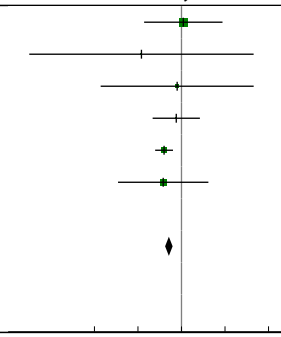
Analysis 1.3. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 3 Change in weight (all trials).

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Alves 2008	39	0.6 (1.3)	39	2 (1.5)		48.51%	-1.37[-1.99,-0.75]
Coppins 2011	28	3.9 (5.5)	27	5.1 (5.8)		2.07%	-1.2[-4.2,1.8]
Croker 2012	33	0.8 (2.8)	30	2.8 (2.9)		9.41%	-1.99[-3.4,-0.58]
Diaz 2010	33	2.1 (6.1)	33	5.6 (5.9)		2.22%	-3.5[-6.4,-0.6]
Eddy Ives 2012	61	3.2 (9.4)	64	3.4 (11.4)		1.39%	-0.15[-3.81,3.51]
Epstein 2000a	45	9 (13)	32	7.2 (17)		0.38%	1.78[-5.23,8.78]
Faude 2010	11	4.1 (13.5)	11	3.8 (11.7)		0.17%	0.3[-10.26,10.86]
Ho 2016	37	2.6 (5.2)	36	2.7 (5)		3.43%	-0.12[-2.45,2.21]
Kalarchian 2009	97	11.8 (6.9)	95	13.4 (5.4)		6.12%	-1.58[-3.32,0.16]
Kalavainen 2007	34	17.3 (5.2)	34	17.1 (7.4)		2.02%	0.2[-2.84,3.24]
Maddison 2011	162	2 (13.1)	160	2.8 (14.7)		2.01%	-0.72[-3.76,2.32]



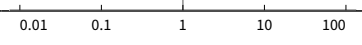
Favours intervention — Favours control

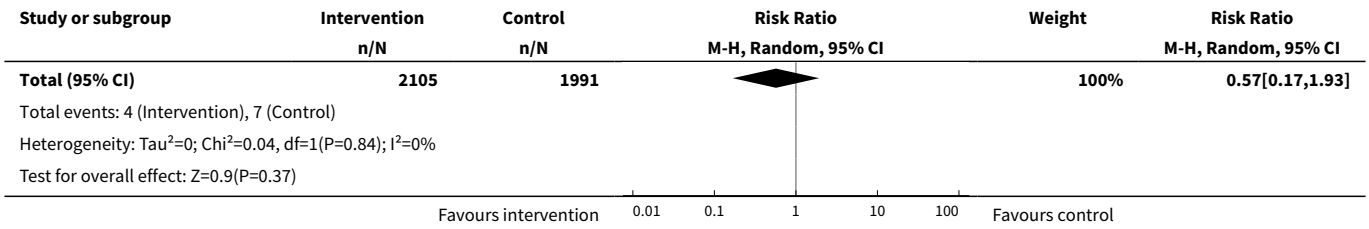
Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Maddison 2014	117	2.8 (16.3)	113	2.6 (18.4)		0.92%	0.21[-4.29,4.71]
Nemet 2005	20	0.6 (16.7)	20	5.2 (24.2)		0.11%	-4.6[-17.49,8.29]
Siwik 2013	15	3.4 (8.8)	17	3.9 (15.9)		0.24%	-0.5[-9.28,8.29]
Taylor 2015	89	7.5 (10.4)	92	8.1 (8)		2.53%	-0.6[-3.31,2.11]
Wafa 2011	34	1.5 (2.5)	45	3.5 (2)		17.78%	-2[-3.02,-0.98]
Waling 2012	36	6.7 (11.4)	35	8.8 (10.9)		0.69%	-2.1[-7.29,3.09]
Total ***	**891**		**883**			**100%**	**-1.45[-1.88,-1.02]**
Heterogeneity: Tau²=0; Chi²=8.95, df=16(P=0.92); I²=0%							
Test for overall effect: Z=6.59(P<0.0001)							



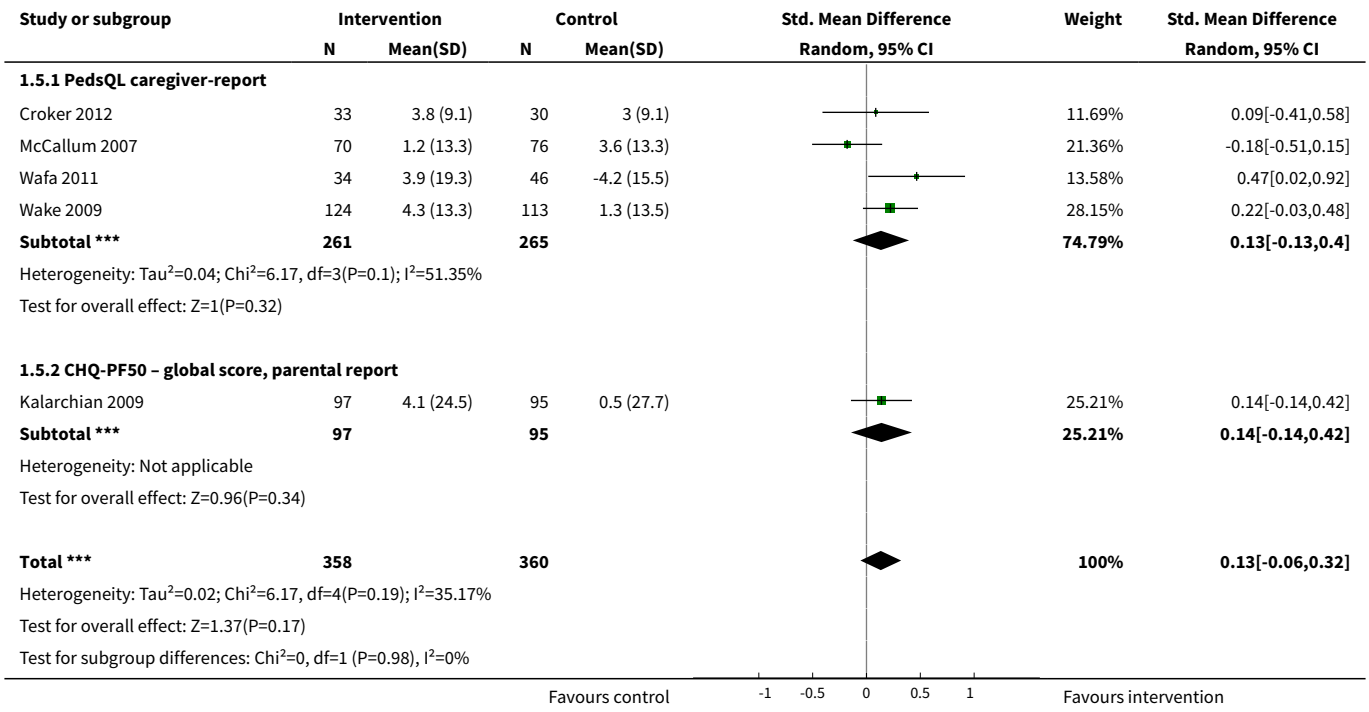
Analysis 1.4. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 4 Serious adverse events.

Study or subgroup	Intervention n/N	Control n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Alves 2008	0/39	0/39			Not estimable
Boutelle 2014	0/18	0/18			Not estimable
Bryant 2011	0/35	0/35			Not estimable
Coppins 2011	0/28	0/28			Not estimable
Croker 2012	0/37	0/35			Not estimable
Davis 2013	0/31	0/27			Not estimable
Davoli 2013	0/187	0/185			Not estimable
Diaz 2010	0/38	0/38			Not estimable
Eddy Ives 2012	0/87	0/87			Not estimable
Gillis 2007	0/14	0/13			Not estimable
Hamilton-Shield 2014	0/26	0/35			Not estimable
Ho 2016	0/48	0/51			Not estimable
Kalarchian 2009	0/97	0/95			Not estimable
Kalavainen 2007	0/35	0/35			Not estimable
Lison 2012	0/86	0/24			Not estimable
Looney 2014	0/14	0/8			Not estimable
Maddison 2011	2/160	4/162		52.57%	0.51[0.09,2.73]
Maddison 2014	2/127	3/124		47.43%	0.65[0.11,3.83]
Mirza 2013	0/57	0/56			Not estimable
Nemet 2005	0/30	0/24			Not estimable
Nowicka 2009	0/20	0/28			Not estimable
O'Connor 2013	0/20	0/20			Not estimable
Reinehr 2010	0/39	0/32			Not estimable
Sacher 2010	0/60	0/56			Not estimable
Taylor 2015	0/104	0/102			Not estimable
Vann 2013	0/21	0/7			Not estimable
Wafa 2011	0/52	0/55			Not estimable
Wake 2009	0/139	0/119			Not estimable
Wake 2013	0/62	0/56			Not estimable
Waling 2012	0/58	0/47			Not estimable
Warschburger 2016	0/336	0/350			Not estimable

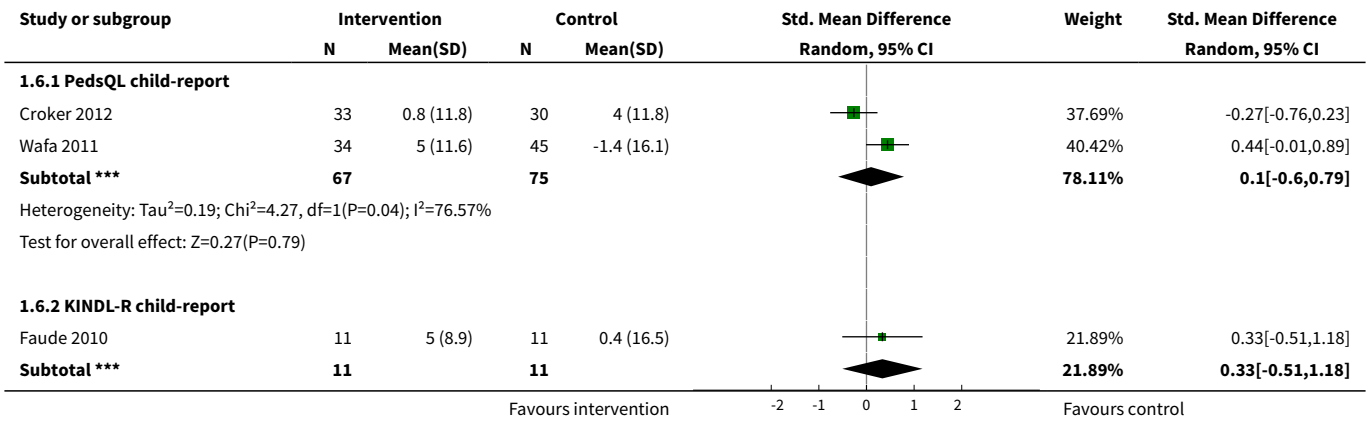


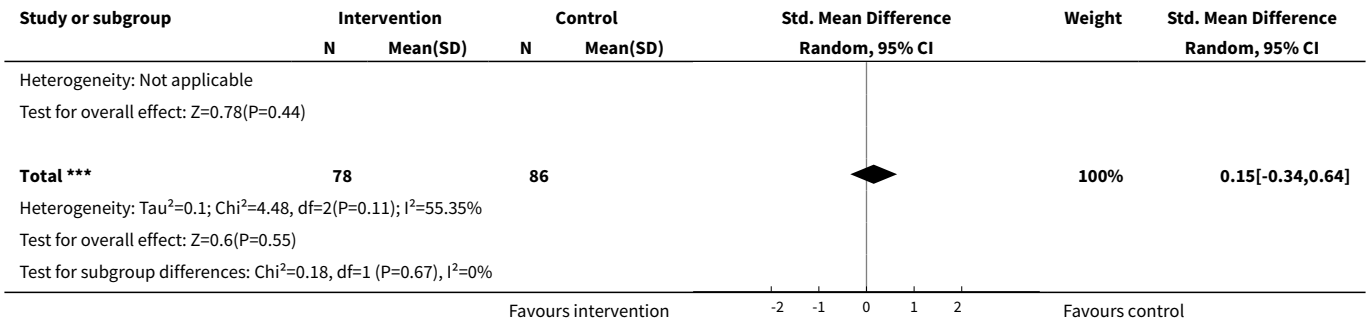


Analysis 1.5. Comparison 1 Behaviour-changing interventions versus no treatment/ usual care, Outcome 5 Health-related quality of life (parent-report measures).

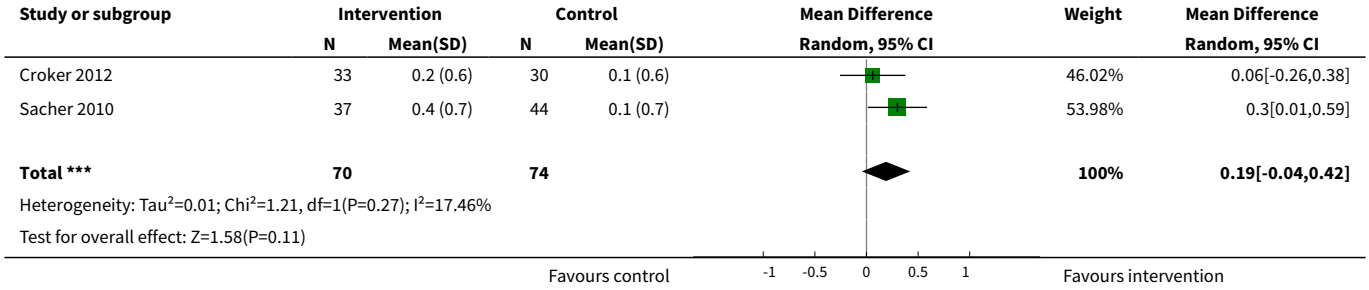


Analysis 1.6. Comparison 1 Behaviour-changing interventions versus no treatment/ usual care, Outcome 6 Health-related quality of life (child-report measures).

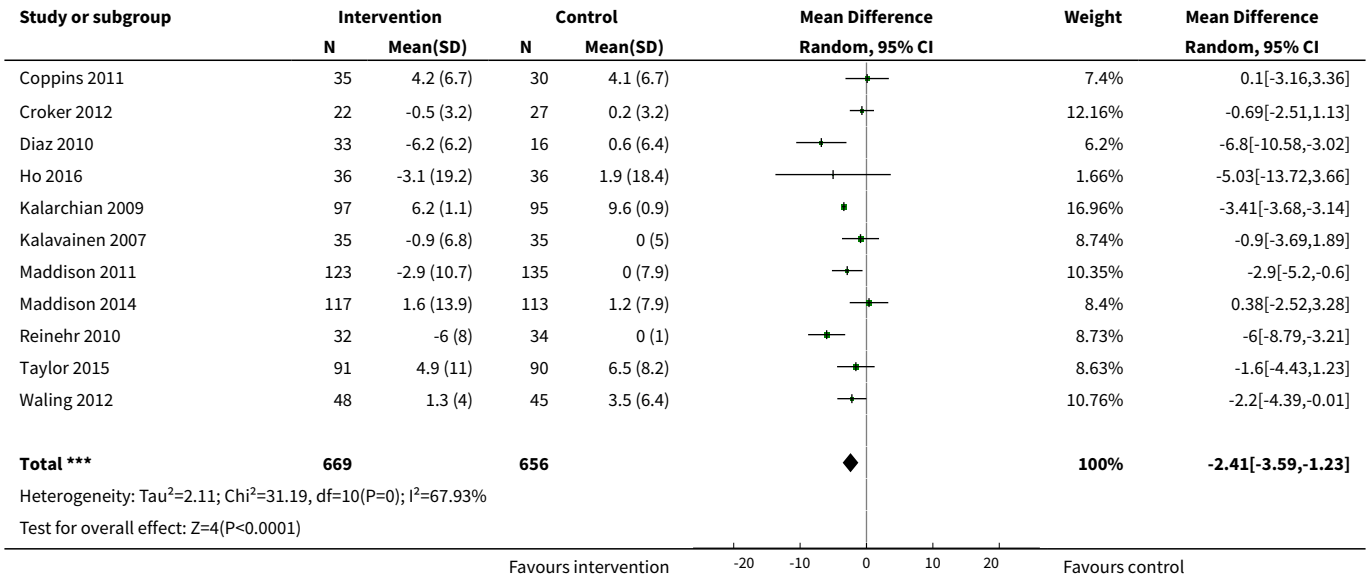




Analysis 1.7. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 7 Self-esteem (Harter global score).



Analysis 1.8. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 8 Waist circumference.



Analysis 1.9. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 9 Overweight.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Kalarchian 2009	97	-1.2 (1.7)	97	-0.2 (0.1)		54.75%	-0.99[-1.32,-0.66]
Nova 2001	50	-8.5 (9.7)	80	-2.9 (10.8)		39.2%	-5.58[-9.17,-1.99]
Satoh 2007	15	-8 (21.5)	8	1 (17.1)		6.05%	-9[-25.09,7.09]
Total ***	**162**		**185**			**100%**	**-3.27[-7.47,0.92]**
Heterogeneity: Tau^2=8.34; Chi^2=7.18, df=2(P=0.03); I^2=72.16%							
Test for overall effect: Z=1.53(P=0.13)							

Favours intervention — Favours control

Analysis 1.10. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 10 Body fat.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.10.1 Bioelectrical impedance							
Maddison 2011	160	-1.5 (7.2)	162	-0.5 (7.3)		19.88%	-1[-2.58,0.58]
Maddison 2014	127	-0.6 (6.4)	124	-0.5 (8.8)		17.7%	-0.12[-2.03,1.79]
Reinehr 2010	32	-2.7 (4.9)	34	1.8 (2)		18.26%	-4.5[-6.33,-2.67]
Rodearmel 2007	95	-0.3 (2.6)	89	0.2 (3.5)		24.19%	-0.45[-1.36,0.45]
Taylor 2015	89	1 (5.9)	92	1.5 (4.8)		19.97%	-0.5[-2.07,1.07]
Subtotal ***	**503**		**501**			**100%**	**-1.25[-2.62,0.12]**
Heterogeneity: Tau^2=1.8; Chi^2=16.72, df=4(P=0); I^2=76.07%							
Test for overall effect: Z=1.79(P=0.07)							
1.10.2 Dual energy X-ray absorptiometry							
Bryant 2011	35	1.4 (3.1)	35	0.2 (4.7)		18.05%	1.2[-0.67,3.07]
Diaz 2010	33	-5.2 (3.4)	33	-2.5 (3.8)		18.54%	-2.7[-4.44,-0.96]
Kalarchian 2009	97	-1.9 (3.9)	96	0.3 (4.4)		20.37%	-2.13[-3.31,-0.95]
Nowicka 2009	19	0.4 (4.7)	13	2.2 (4.5)		13.26%	-1.8[-5.01,1.41]
Woo 2004	22	-4.9 (4.5)	21	-1.3 (4)		15.62%	-3.6[-6.14,-1.06]
Woo 2004	19	2.1 (5.3)	20	-1.3 (4)		14.17%	3.4[0.46,6.34]
Subtotal ***	**225**		**218**			**100%**	**-1.04[-2.88,0.8]**
Heterogeneity: Tau^2=3.96; Chi^2=24.19, df=5(P=0); I^2=79.33%							
Test for overall effect: Z=1.1(P=0.27)							

Favours intervention — Favours control

Analysis 1.11. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 11 Diet.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Kirk 2012	71	-406 (505.5)	31	-465 (529.3)		48.83%	59[-161.3,279.3]
Reinehr 2010	34	-279 (395.1)	32	93 (344.4)		51.17%	-372[-550.55,-193.45]
Total ***	**105**		**63**			**100%**	**-161.53[-583.79,260.73]**

Favours intervention — Favours control

Study or subgroup	Intervention N	Mean(SD)	Control N	Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Heterogeneity: Tau²=82413.74; Chi²=8.87, df=1(P=0); I²=88.73%							
Test for overall effect: Z=0.75(P=0.45)							

Favours intervention -500 -250 0 250 500 Favours control

Analysis 1.12. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 12 Television viewing.

Study or subgroup	Intervention N	Mean(SD)	Control N	Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
O'Connor 2013	18	-5.2 (11.3)	16	1.8 (10.1)		76.47%	-7[-14.19,0.19]
Weintraub 2008	9	-6.3 (13.6)	12	-1 (16.7)		23.53%	-5.29[-18.25,7.67]
Total ***	**27**		**28**			**100%**	**-6.6[-12.88,-0.31]**
Heterogeneity: Tau²=0; Chi²=0.05, df=1(P=0.82); I²=0%							
Test for overall effect: Z=2.06(P=0.04)							

Favours intervention -100 -50 0 50 100 Favours control

Analysis 1.13. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 13 Physical activity (accelerometer MVPA).

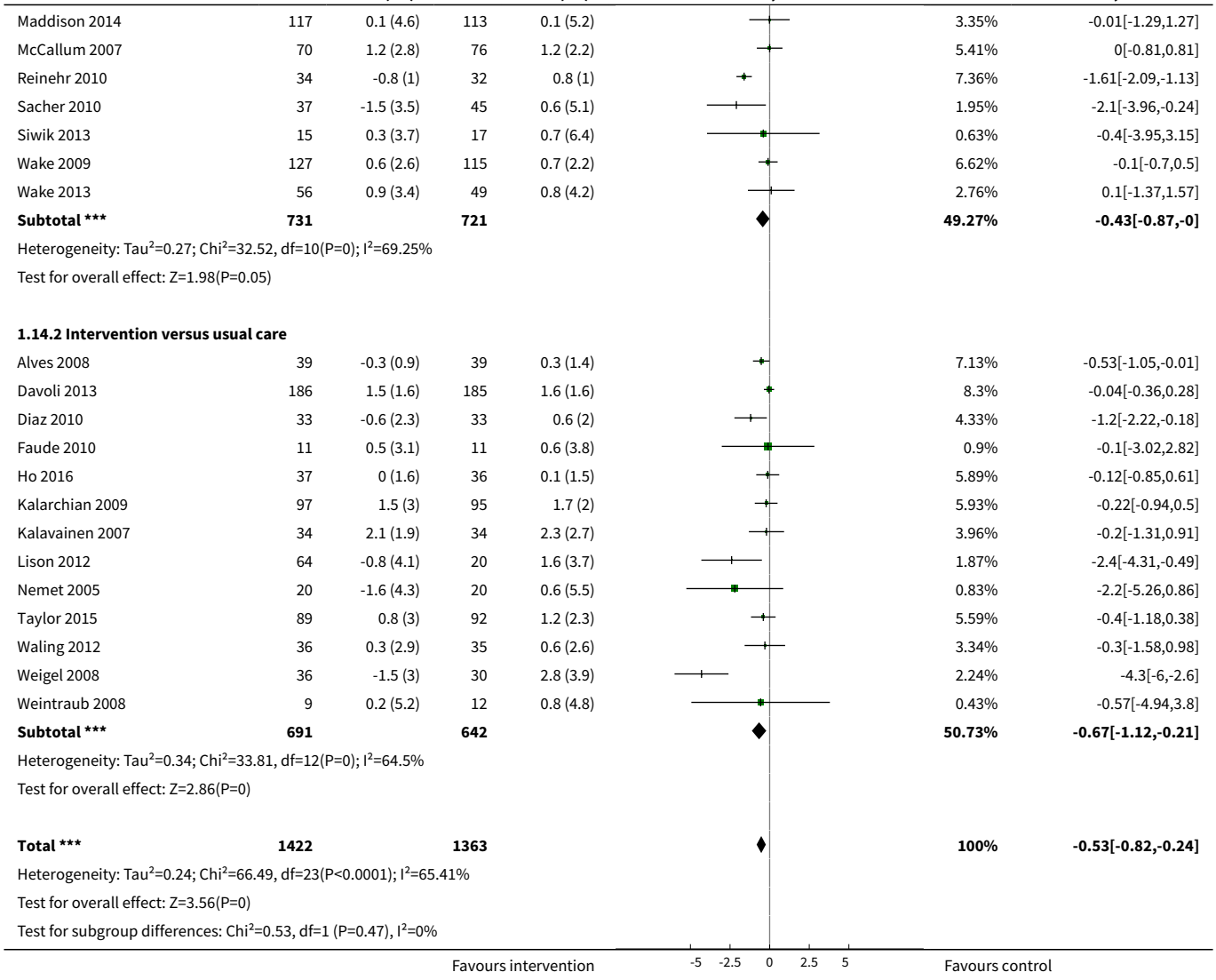
Study or subgroup	Intervention N	Mean(SD)	Control N	Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Arauz Boudreau 2013	14	-7.2 (19.5)	12	-1.6 (3.2)		13.94%	-5.6[-15.97,4.77]
Davis 2013	20	27.4 (120.9)	22	-26.2 (49.2)		0.63%	53.59[-3.25,110.43]
Hughes 2008	69	3.3 (35.2)	64	5 (20.4)		15.36%	-1.7[-11.39,7.99]
Maddison 2011	160	-6.6 (37.4)	162	-7.7 (36.7)		19.5%	1.1[-6.99,9.19]
O'Connor 2013	20	0.5 (10.6)	20	-3.8 (13.7)		21.12%	4.3[-3.27,11.87]
Taylor 2015	91	2 (17.1)	90	6 (20.2)		29.44%	-4[-9.45,1.45]
Total ***	**374**		**370**			**100%**	**-0.76[-5.3,3.78]**
Heterogeneity: Tau²=10.48; Chi²=7.62, df=5(P=0.18); I²=34.38%							
Test for overall effect: Z=0.33(P=0.74)							

Favours control -100 -50 0 50 100 Favours intervention

Analysis 1.14. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 14 Change in BMI - type of control.

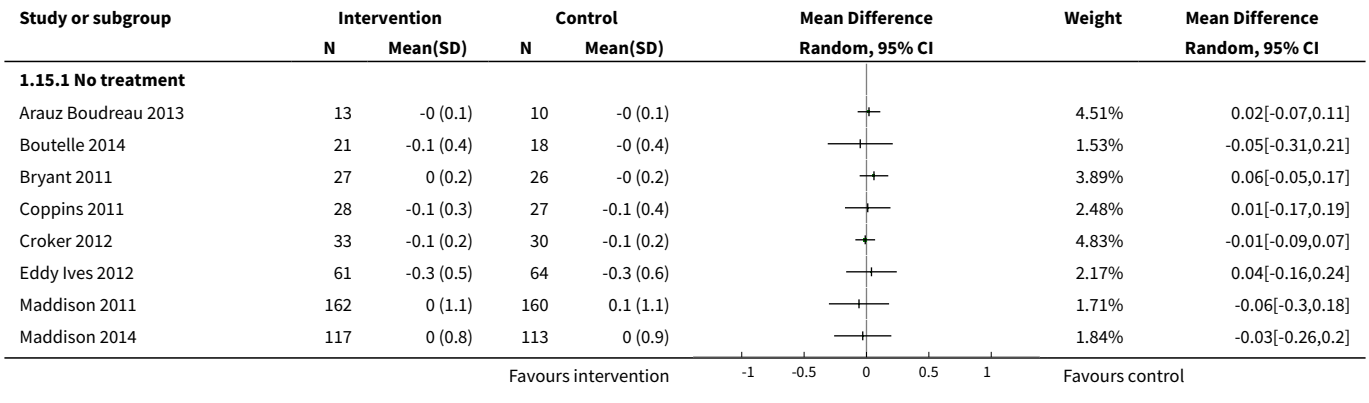
Study or subgroup	Intervention N	Mean(SD)	Control N	Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.14.1 Intervention versus no treatment							
Boutelle 2014	21	-0.1 (4.7)	18	0.6 (4.7)		0.89%	-0.7[-3.65,2.25]
Croker 2012	33	-0.4 (1.1)	30	-0 (1.1)		7.1%	-0.33[-0.86,0.2]
Eddy Ives 2012	61	-0.2 (2.5)	64	-0.3 (3.2)		4.44%	0.07[-0.93,1.07]
Maddison 2011	160	0.1 (1)	162	0.3 (1)		8.77%	-0.25[-0.47,-0.03]

Favours intervention -5 -2.5 0 2.5 5 Favours control

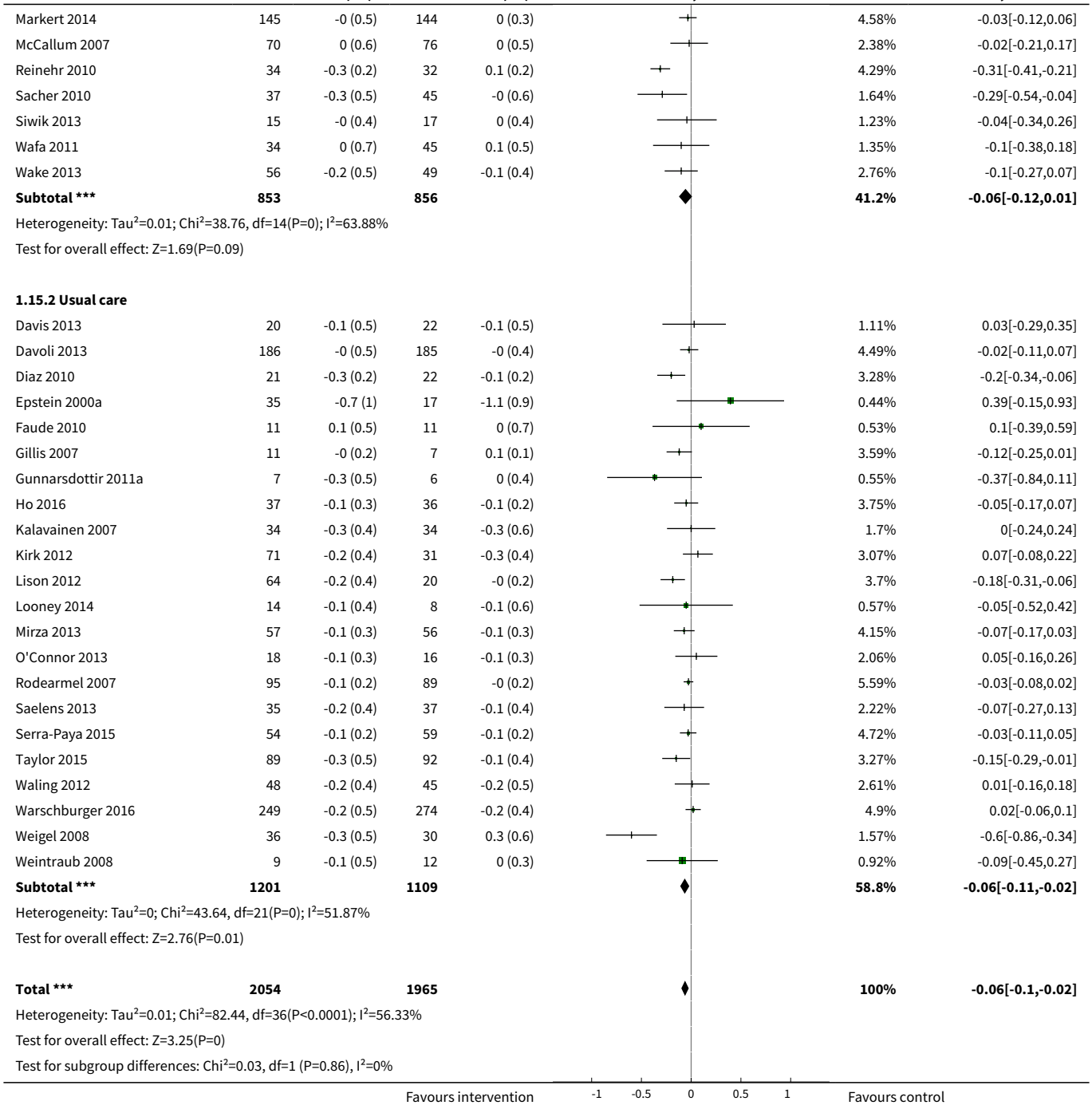


Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Maddison 2014	117	0.1 (4.6)	113	0.1 (5.2)		3.35%	-0.01[-1.29,1.27]
McCallum 2007	70	1.2 (2.8)	76	1.2 (2.2)		5.41%	0[-0.81,0.81]
Reinehr 2010	34	-0.8 (1)	32	0.8 (1)		7.36%	-1.61[-2.09,-1.13]
Sacher 2010	37	-1.5 (3.5)	45	0.6 (5.1)		1.95%	-2.1[-3.96,-0.24]
Siwik 2013	15	0.3 (3.7)	17	0.7 (6.4)		0.63%	-0.4[-3.95,3.15]
Wake 2009	127	0.6 (2.6)	115	0.7 (2.2)		6.62%	-0.1[-0.7,0.5]
Wake 2013	56	0.9 (3.4)	49	0.8 (4.2)		2.76%	0.1[-1.37,1.57]
Subtotal * **	**731**		**721**			**49.27%**	**-0.43[-0.87,-0]**
Heterogeneity: Tau²=0.27; Chi²=32.52, df=10(P=0); I²=69.25%							
Test for overall effect: Z=1.98(P=0.05)							
1.14.2 Intervention versus usual care							
Alves 2008	39	-0.3 (0.9)	39	0.3 (1.4)		7.13%	-0.53[-1.05,-0.01]
Davoli 2013	186	1.5 (1.6)	185	1.6 (1.6)		8.3%	-0.04[-0.36,0.28]
Diaz 2010	33	-0.6 (2.3)	33	0.6 (2)		4.33%	-1.2[-2.22,-0.18]
Faude 2010	11	0.5 (3.1)	11	0.6 (3.8)		0.9%	-0.1[-3.02,2.82]
Ho 2016	37	0 (1.6)	36	0.1 (1.5)		5.89%	-0.12[-0.85,0.61]
Kalarchian 2009	97	1.5 (3)	95	1.7 (2)		5.93%	-0.22[-0.94,0.5]
Kalavainen 2007	34	2.1 (1.9)	34	2.3 (2.7)		3.96%	-0.2[-1.31,0.91]
Lison 2012	64	-0.8 (4.1)	20	1.6 (3.7)		1.87%	-2.4[-4.31,-0.49]
Nemet 2005	20	-1.6 (4.3)	20	0.6 (5.5)		0.83%	-2.2[-5.26,0.86]
Taylor 2015	89	0.8 (3)	92	1.2 (2.3)		5.59%	-0.4[-1.18,0.38]
Waling 2012	36	0.3 (2.9)	35	0.6 (2.6)		3.34%	-0.3[-1.58,0.98]
Weigel 2008	36	-1.5 (3)	30	2.8 (3.9)		2.24%	-4.3[-6,-2.6]
Weintraub 2008	9	0.2 (5.2)	12	0.8 (4.8)		0.43%	-0.57[-4.94,3.8]
Subtotal * **	**691**		**642**			**50.73%**	**-0.67[-1.12,-0.21]**
Heterogeneity: Tau²=0.34; Chi²=33.81, df=12(P=0); I²=64.5%							
Test for overall effect: Z=2.86(P=0)							
Total * **	**1422**		**1363**			**100%**	**-0.53[-0.82,-0.24]**
Heterogeneity: Tau²=0.24; Chi²=66.49, df=23(P<0.0001); I²=65.41%							
Test for overall effect: Z=3.56(P=0)							
Test for subgroup differences: Chi²=0.53, df=1 (P=0.47), I²=0%							

Analysis 1.15. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 15 Change in BMI z score - type of control.



Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.15.1 No treatment							
Arauz Boudreau 2013	13	-0 (0.1)	10	-0 (0.1)		4.51%	0.02[-0.07,0.11]
Boutelle 2014	21	-0.1 (0.4)	18	-0 (0.4)		1.53%	-0.05[-0.31,0.21]
Bryant 2011	27	0 (0.2)	26	-0 (0.2)		3.89%	0.06[-0.05,0.17]
Coppins 2011	28	-0.1 (0.3)	27	-0.1 (0.4)		2.48%	0.01[-0.17,0.19]
Croker 2012	33	-0.1 (0.2)	30	-0.1 (0.2)		4.83%	-0.01[-0.09,0.07]
Eddy Ives 2012	61	-0.3 (0.5)	64	-0.3 (0.6)		2.17%	0.04[-0.16,0.24]
Maddison 2011	162	0 (1.1)	160	0.1 (1.1)		1.71%	-0.06[-0.3,0.18]
Maddison 2014	117	0 (0.8)	113	0 (0.9)		1.84%	-0.03[-0.26,0.2]



Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Markert 2014	145	-0 (0.5)	144	0 (0.3)		4.58%	-0.03[-0.12,0.06]
McCallum 2007	70	0 (0.6)	76	0 (0.5)		2.38%	-0.02[-0.21,0.17]
Reinehr 2010	34	-0.3 (0.2)	32	0.1 (0.2)		4.29%	-0.31[-0.41,-0.21]
Sacher 2010	37	-0.3 (0.5)	45	-0 (0.6)		1.64%	-0.29[-0.54,-0.04]
Siwik 2013	15	-0 (0.4)	17	0 (0.4)		1.23%	-0.04[-0.34,0.26]
Wafa 2011	34	0 (0.7)	45	0.1 (0.5)		1.35%	-0.1[-0.38,0.18]
Wake 2013	56	-0.2 (0.5)	49	-0.1 (0.4)		2.76%	-0.1[-0.27,0.07]
Subtotal ***	**853**		**856**			**41.2%**	**-0.06[-0.12,0.01]**
Heterogeneity: Tau²=0.01; Chi²=38.76, df=14(P=0); I²=63.88%							
Test for overall effect: Z=1.69(P=0.09)							
1.15.2 Usual care							
Davis 2013	20	-0.1 (0.5)	22	-0.1 (0.5)		1.11%	0.03[-0.29,0.35]
Davoli 2013	186	-0 (0.5)	185	-0 (0.4)		4.49%	-0.02[-0.11,0.07]
Diaz 2010	21	-0.3 (0.2)	22	-0.1 (0.2)		3.28%	-0.2[-0.34,-0.06]
Epstein 2000a	35	-0.7 (1)	17	-1.1 (0.9)		0.44%	0.39[-0.15,0.93]
Faude 2010	11	0.1 (0.5)	11	0 (0.7)		0.53%	0.1[-0.39,0.59]
Gillis 2007	11	-0 (0.2)	7	0.1 (0.1)		3.59%	-0.12[-0.25,0.01]
Gunnarsdottir 2011a	7	-0.3 (0.5)	6	0 (0.4)		0.55%	-0.37[-0.84,0.11]
Ho 2016	37	-0.1 (0.3)	36	-0.1 (0.2)		3.75%	-0.05[-0.17,0.07]
Kalavainen 2007	34	-0.3 (0.4)	34	-0.3 (0.6)		1.7%	0[-0.24,0.24]
Kirk 2012	71	-0.2 (0.4)	31	-0.3 (0.4)		3.07%	0.07[-0.08,0.22]
Lison 2012	64	-0.2 (0.4)	20	-0 (0.2)		3.7%	-0.18[-0.31,-0.06]
Looney 2014	14	-0.1 (0.4)	8	-0.1 (0.6)		0.57%	-0.05[-0.52,0.42]
Mirza 2013	57	-0.1 (0.3)	56	-0.1 (0.3)		4.15%	-0.07[-0.17,0.03]
O'Connor 2013	18	-0.1 (0.3)	16	-0.1 (0.3)		2.06%	0.05[-0.16,0.26]
Rodearmel 2007	95	-0.1 (0.2)	89	-0 (0.2)		5.59%	-0.03[-0.08,0.02]
Saelens 2013	35	-0.2 (0.4)	37	-0.1 (0.4)		2.22%	-0.07[-0.27,0.13]
Serra-Paya 2015	54	-0.1 (0.2)	59	-0.1 (0.2)		4.72%	-0.03[-0.11,0.05]
Taylor 2015	89	-0.3 (0.5)	92	-0.1 (0.4)		3.27%	-0.15[-0.29,-0.01]
Waling 2012	48	-0.2 (0.4)	45	-0.2 (0.5)		2.61%	0.01[-0.16,0.18]
Warschburger 2016	249	-0.2 (0.5)	274	-0.2 (0.4)		4.9%	0.02[-0.06,0.1]
Weigel 2008	36	-0.3 (0.5)	30	0.3 (0.6)		1.57%	-0.6[-0.86,-0.34]
Weintraub 2008	9	-0.1 (0.5)	12	0 (0.3)		0.92%	-0.09[-0.45,0.27]
Subtotal ***	**1201**		**1109**			**58.8%**	**-0.06[-0.11,-0.02]**
Heterogeneity: Tau²=0; Chi²=43.64, df=21(P=0); I²=51.87%							
Test for overall effect: Z=2.76(P=0.01)							
Total ***	**2054**		**1965**			**100%**	**-0.06[-0.1,-0.02]**
Heterogeneity: Tau²=0.01; Chi²=82.44, df=36(P<0.0001); I²=56.33%							
Test for overall effect: Z=3.25(P=0)							
Test for subgroup differences: Chi²=0.03, df=1 (P=0.86), I²=0%							

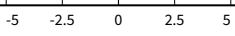
Analysis 1.16. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 16 Change in weight - type of control.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.16.1 No treatment							
Coppins 2011	28	3.9 (5.5)	27	5.1 (5.8)		2.07%	-1.2[-4.2,1.8]
Croker 2012	33	0.8 (2.8)	30	2.8 (2.9)		9.41%	-1.99[-3.4,-0.58]
Eddy Ives 2012	61	3.2 (9.4)	64	3.4 (11.4)		1.39%	-0.15[-3.81,3.51]
Maddison 2011	162	2 (13.1)	160	2.8 (14.7)		2.01%	-0.72[-3.76,2.32]
Maddison 2014	117	2.8 (16.3)	113	2.6 (18.4)		0.92%	0.21[-4.29,4.71]
Siwik 2013	15	3.4 (8.8)	17	3.9 (15.9)		0.24%	-0.5[-9.28,8.29]
Wafa 2011	34	1.5 (2.5)	45	3.5 (2)		17.78%	-2[-3.02,-0.98]
Subtotal ***	**450**		**456**			**33.83%**	**-1.73[-2.47,-0.98]**
Heterogeneity: Tau^2=0; Chi^2=2.45, df=6(P=0.87); I^2=0%							
Test for overall effect: Z=4.56(P<0.0001)							
1.16.2 Usual care							
Alves 2008	39	0.6 (1.3)	39	2 (1.5)		48.51%	-1.37[-1.99,-0.75]
Diaz 2010	33	2.1 (6.1)	33	5.6 (5.9)		2.22%	-3.5[-6.4,-0.6]
Epstein 2000a	45	9 (13)	32	7.2 (17)		0.38%	1.78[-5.23,8.78]
Faude 2010	11	4.1 (13.5)	11	3.8 (11.7)		0.17%	0.3[-10.26,10.86]
Ho 2016	37	2.6 (5.2)	36	2.7 (5)		3.43%	-0.12[-2.45,2.21]
Kalarchian 2009	97	11.8 (6.9)	95	13.4 (5.4)		6.12%	-1.58[-3.32,0.16]
Kalavainen 2007	34	17.3 (5.2)	34	17.1 (7.4)		2.02%	0.2[-2.84,3.24]
Nemet 2005	20	0.6 (16.7)	20	5.2 (24.2)		0.11%	-4.6[-17.49,8.29]
Taylor 2015	89	7.5 (10.4)	92	8.1 (8)		2.53%	-0.6[-3.31,2.11]
Waling 2012	36	6.7 (11.4)	35	8.8 (10.9)		0.69%	-2.1[-7.29,3.09]
Subtotal ***	**441**		**427**			**66.17%**	**-1.31[-1.84,-0.78]**
Heterogeneity: Tau^2=0; Chi^2=5.71, df=9(P=0.77); I^2=0%							
Test for overall effect: Z=4.84(P<0.0001)							
Total ***	**891**		**883**			**100%**	**-1.45[-1.88,-1.02]**
Heterogeneity: Tau^2=0; Chi^2=8.95, df=16(P=0.92); I^2=0%							
Test for overall effect: Z=6.59(P<0.0001)							
Test for subgroup differences: Chi^2=0.8, df=1 (P=0.37), I^2=0%							

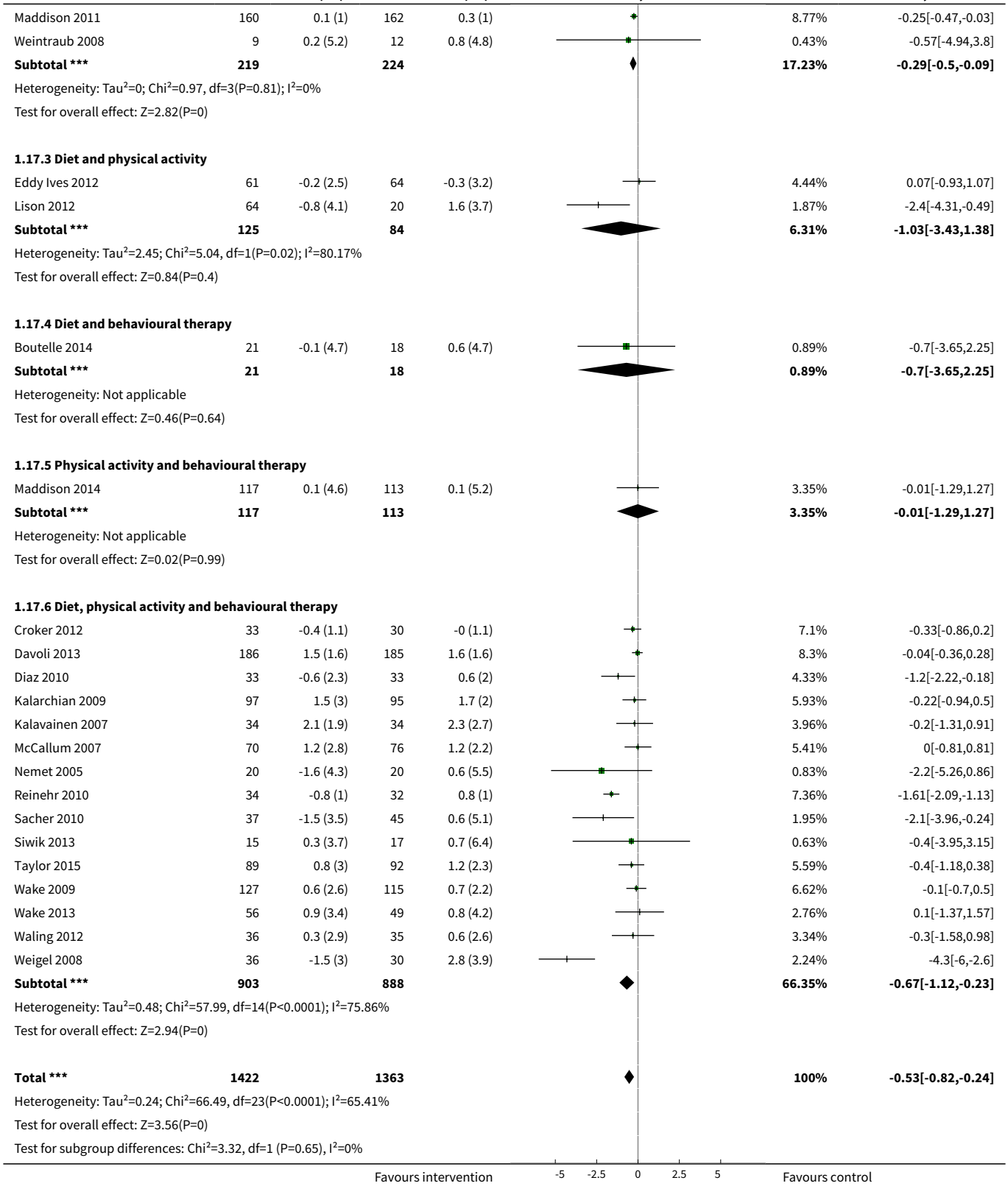
Favours intervention — Favours control

Analysis 1.17. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 17 Change in BMI - type of intervention.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.17.1 Diet only							
Ho 2016	37	0 (1.6)	36	0.1 (1.5)		5.89%	-0.12[-0.85,0.61]
Subtotal ***	**37**		**36**			**5.89%**	**-0.12[-0.85,0.61]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.32(P=0.75)							
1.17.2 Physical activity only							
Alves 2008	39	-0.3 (0.9)	39	0.3 (1.4)		7.13%	-0.53[-1.05,-0.01]
Faude 2010	11	0.5 (3.1)	11	0.6 (3.8)		0.9%	-0.1[-3.02,2.82]



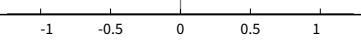
Favours intervention — Favours control



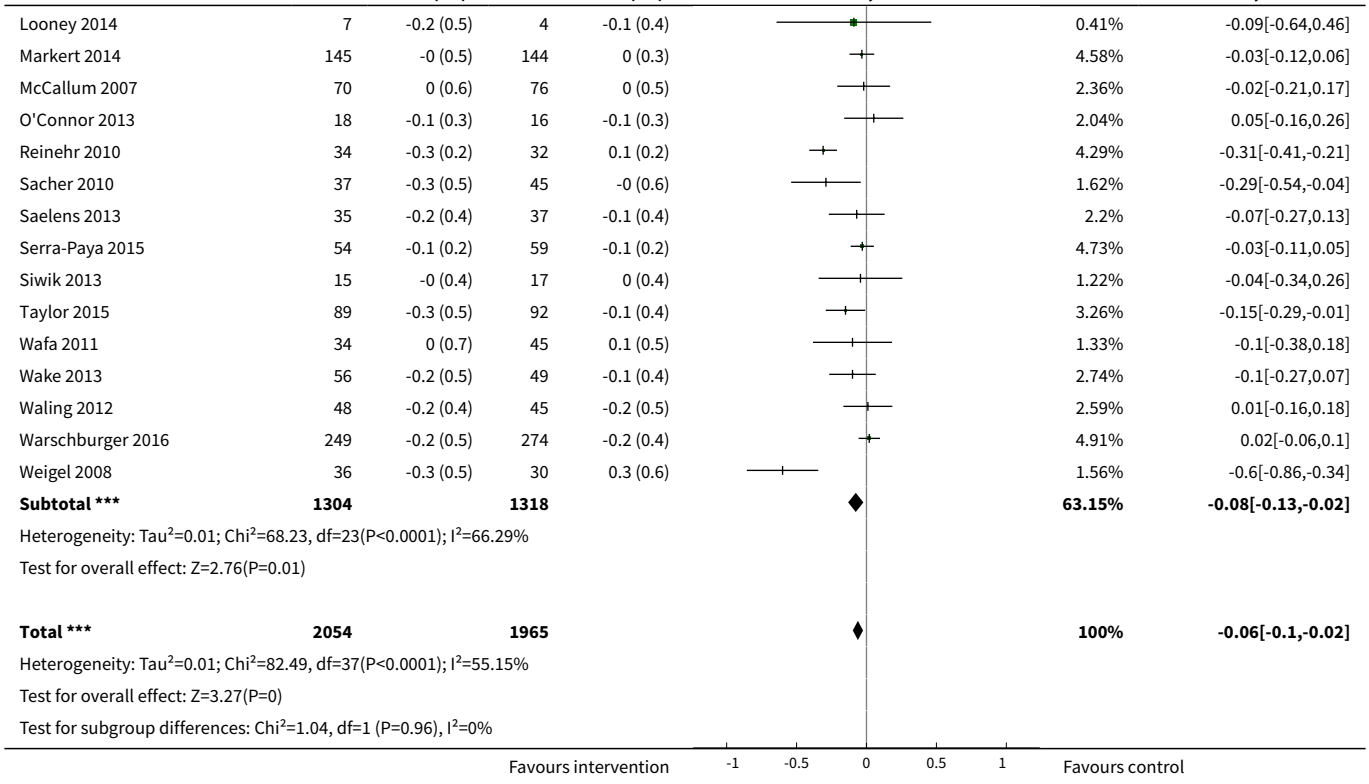
Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Maddison 2011	160	0.1 (1)	162	0.3 (1)		8.77%	-0.25[-0.47,-0.03]
Weintraub 2008	9	0.2 (5.2)	12	0.8 (4.8)		0.43%	-0.57[-4.94,3.8]
Subtotal ***	**219**		**224**			**17.23%**	**-0.29[-0.5,-0.09]**
Heterogeneity: Tau²=0; Chi²=0.97, df=3(P=0.81); I²=0%							
Test for overall effect: Z=2.82(P=0)							
1.17.3 Diet and physical activity							
Eddy Ives 2012	61	-0.2 (2.5)	64	-0.3 (3.2)		4.44%	0.07[-0.93,1.07]
Lison 2012	64	-0.8 (4.1)	20	1.6 (3.7)		1.87%	-2.4[-4.31,-0.49]
Subtotal ***	**125**		**84**			**6.31%**	**-1.03[-3.43,1.38]**
Heterogeneity: Tau²=2.45; Chi²=5.04, df=1(P=0.02); I²=80.17%							
Test for overall effect: Z=0.84(P=0.4)							
1.17.4 Diet and behavioural therapy							
Boutelle 2014	21	-0.1 (4.7)	18	0.6 (4.7)		0.89%	-0.7[-3.65,2.25]
Subtotal ***	**21**		**18**			**0.89%**	**-0.7[-3.65,2.25]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.46(P=0.64)							
1.17.5 Physical activity and behavioural therapy							
Maddison 2014	117	0.1 (4.6)	113	0.1 (5.2)		3.35%	-0.01[-1.29,1.27]
Subtotal ***	**117**		**113**			**3.35%**	**-0.01[-1.29,1.27]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.02(P=0.99)							
1.17.6 Diet, physical activity and behavioural therapy							
Croker 2012	33	-0.4 (1.1)	30	-0 (1.1)		7.1%	-0.33[-0.86,0.2]
Davoli 2013	186	1.5 (1.6)	185	1.6 (1.6)		8.3%	-0.04[-0.36,0.28]
Diaz 2010	33	-0.6 (2.3)	33	0.6 (2)		4.33%	-1.2[-2.22,-0.18]
Kalarchian 2009	97	1.5 (3)	95	1.7 (2)		5.93%	-0.22[-0.94,0.5]
Kalavainen 2007	34	2.1 (1.9)	34	2.3 (2.7)		3.96%	-0.2[-1.31,0.91]
McCallum 2007	70	1.2 (2.8)	76	1.2 (2.2)		5.41%	0[-0.81,0.81]
Nemet 2005	20	-1.6 (4.3)	20	0.6 (5.5)		0.83%	-2.2[-5.26,0.86]
Reinehr 2010	34	-0.8 (1)	32	0.8 (1)		7.36%	-1.61[-2.09,-1.13]
Sacher 2010	37	-1.5 (3.5)	45	0.6 (5.1)		1.95%	-2.1[-3.96,-0.24]
Siwik 2013	15	0.3 (3.7)	17	0.7 (6.4)		0.63%	-0.4[-3.95,3.15]
Taylor 2015	89	0.8 (3)	92	1.2 (2.3)		5.59%	-0.4[-1.18,0.38]
Wake 2009	127	0.6 (2.6)	115	0.7 (2.2)		6.62%	-0.1[-0.7,0.5]
Wake 2013	56	0.9 (3.4)	49	0.8 (4.2)		2.76%	0.1[-1.37,1.57]
Waling 2012	36	0.3 (2.9)	35	0.6 (2.6)		3.34%	-0.3[-1.58,0.98]
Weigel 2008	36	-1.5 (3)	30	2.8 (3.9)		2.24%	-4.3[-6,-2.6]
Subtotal ***	**903**		**888**			**66.35%**	**-0.67[-1.12,-0.23]**
Heterogeneity: Tau²=0.48; Chi²=57.99, df=14(P<0.0001); I²=75.86%							
Test for overall effect: Z=2.94(P=0)							
Total ***	**1422**		**1363**			**100%**	**-0.53[-0.82,-0.24]**
Heterogeneity: Tau²=0.24; Chi²=66.49, df=23(P<0.0001); I²=65.41%							
Test for overall effect: Z=3.56(P=0)							
Test for subgroup differences: Chi²=3.32, df=1 (P=0.65), I²=0%							

Analysis 1.18. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 18 Change in BMI z score - type of intervention.

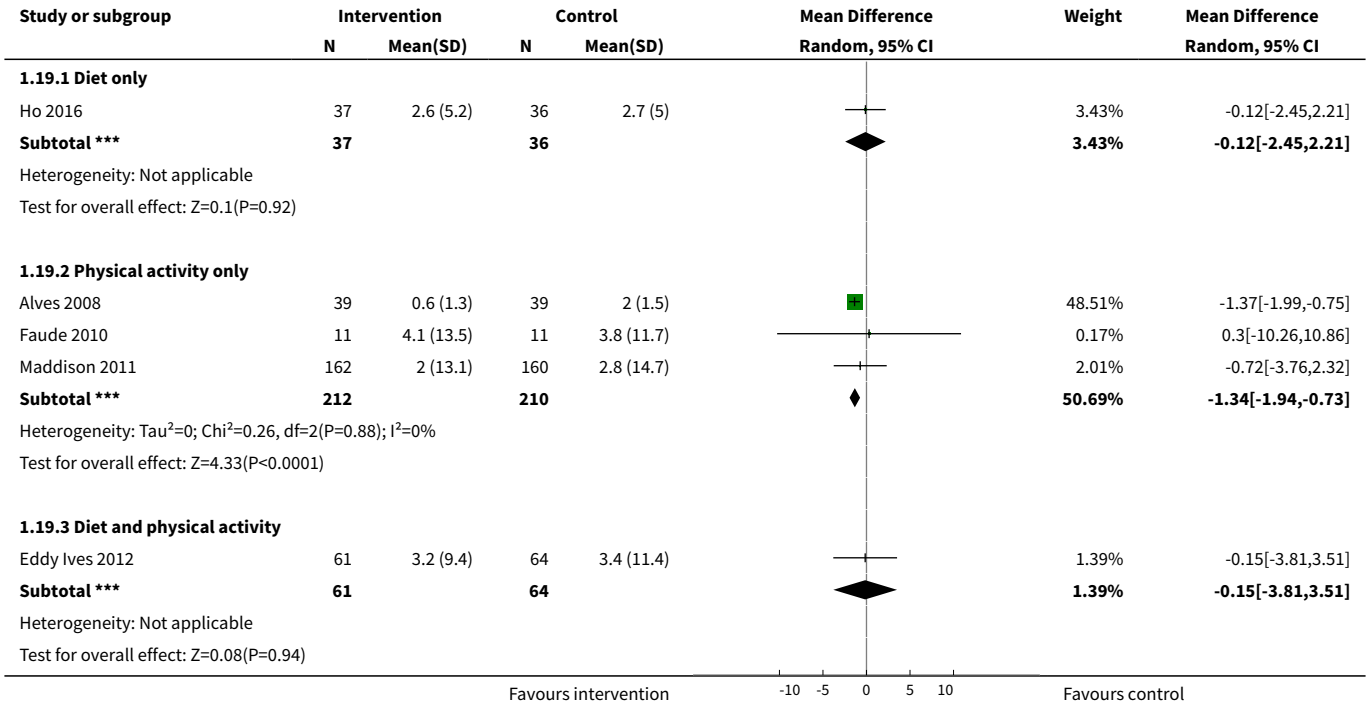
Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.18.1 Diet only							
Ho 2016	37	-0.1 (0.3)	36	-0.1 (0.2)		3.73%	-0.05[-0.17,0.07]
Subtotal ***	**37**		**36**			**3.73%**	**-0.05[-0.17,0.07]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.81(P=0.42)							
1.18.2 Physical activity only							
Faude 2010	11	0.1 (0.5)	11	0 (0.7)		0.52%	0.1[-0.39,0.59]
Maddison 2011	162	0 (1.1)	160	0.1 (1.1)		1.7%	-0.06[-0.3,0.18]
Weintraub 2008	9	-0.1 (0.5)	12	0 (0.3)		0.91%	-0.09[-0.45,0.27]
Subtotal ***	**182**		**183**			**3.13%**	**-0.05[-0.23,0.14]**
Heterogeneity: Tau^2=0; Chi^2=0.41, df=2(P=0.81); I^2=0%							
Test for overall effect: Z=0.48(P=0.63)							
1.18.3 Diet and physical activity							
Bryant 2011	27	0 (0.2)	26	-0 (0.2)		3.88%	0.06[-0.05,0.17]
Eddy Ives 2012	61	-0.3 (0.5)	64	-0.3 (0.6)		2.16%	0.04[-0.16,0.24]
Gillis 2007	11	-0 (0.2)	7	0.1 (0.1)		3.58%	-0.12[-0.25,0.01]
Kirk 2012	71	-0.2 (0.4)	31	-0.3 (0.4)		3.05%	0.07[-0.08,0.22]
Lison 2012	64	-0.2 (0.4)	20	-0 (0.2)		3.68%	-0.18[-0.31,-0.06]
Looney 2014	7	-0.1 (0.3)	4	-0.1 (0.4)		0.54%	-0.01[-0.49,0.47]
Rodearmel 2007	95	-0.1 (0.2)	89	-0 (0.2)		5.61%	-0.03[-0.08,0.02]
Subtotal ***	**336**		**241**			**22.5%**	**-0.03[-0.1,0.04]**
Heterogeneity: Tau^2=0; Chi^2=12.52, df=6(P=0.05); I^2=52.1%							
Test for overall effect: Z=0.94(P=0.35)							
1.18.4 Diet and behavioural therapy							
Boutelle 2014	21	-0.1 (0.4)	18	-0 (0.4)		1.51%	-0.05[-0.31,0.21]
Mirza 2013	57	-0.1 (0.3)	56	-0.1 (0.3)		4.15%	-0.07[-0.17,0.03]
Subtotal ***	**78**		**74**			**5.66%**	**-0.07[-0.16,0.03]**
Heterogeneity: Tau^2=0; Chi^2=0.02, df=1(P=0.89); I^2=0%							
Test for overall effect: Z=1.36(P=0.17)							
1.18.5 Physical activity and behavioural therapy							
Maddison 2014	117	0 (0.8)	113	0 (0.9)		1.82%	-0.03[-0.26,0.2]
Subtotal ***	**117**		**113**			**1.82%**	**-0.03[-0.26,0.2]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.26(P=0.8)							
1.18.6 Diet, physical activity and behavioural therapy							
Arauz Boudreau 2013	13	-0 (0.1)	10	-0 (0.1)		4.51%	0.02[-0.07,0.11]
Coppins 2011	28	-0.1 (0.3)	27	-0.1 (0.4)		2.46%	0.01[-0.17,0.19]
Croker 2012	33	-0.1 (0.2)	30	-0.1 (0.2)		4.83%	-0.01[-0.09,0.07]
Davis 2013	20	-0.1 (0.5)	22	-0.1 (0.5)		1.1%	0.03[-0.29,0.35]
Davoli 2013	186	-0 (0.5)	185	-0 (0.4)		4.49%	-0.02[-0.11,0.07]
Diaz 2010	21	-0.3 (0.2)	22	-0.1 (0.2)		3.26%	-0.2[-0.34,-0.06]
Epstein 2000a	35	-0.7 (1)	17	-1.1 (0.9)		0.43%	0.39[-0.15,0.93]
Gunnarsdottir 2011a	7	-0.3 (0.5)	6	0 (0.4)		0.55%	-0.37[-0.84,0.11]
Kalavainen 2007	34	-0.3 (0.4)	34	-0.3 (0.6)		1.68%	0[-0.24,0.24]



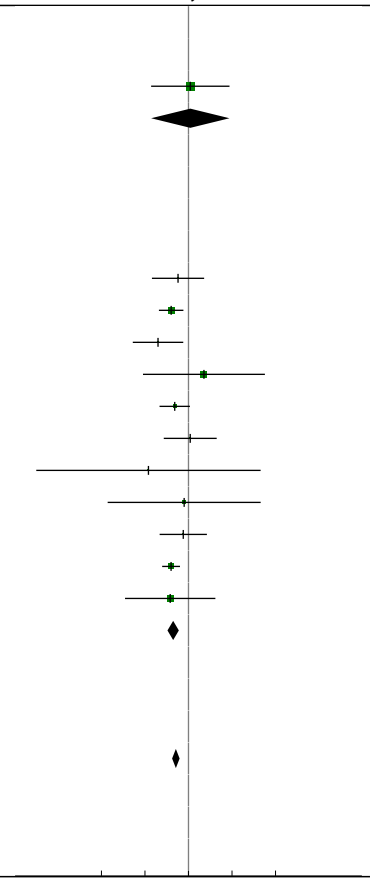
Favours intervention — Favours control



Analysis 1.19. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 19 Change in weight - type of intervention.

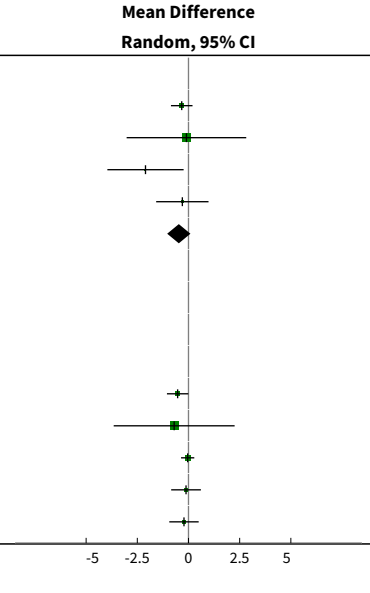


Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.19.4 Physical activity and behavioural therapy							
Maddison 2014	117	2.8 (16.3)	113	2.6 (18.4)		0.92%	0.21[-4.29,4.71]
Subtotal ***	**117**		**113**			**0.92%**	**0.21[-4.29,4.71]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.09(P=0.93)							
1.19.5 Diet, physical activity and behavioural therapy							
Coppins 2011	28	3.9 (5.5)	27	5.1 (5.8)		2.07%	-1.2[-4.2,1.8]
Croker 2012	33	0.8 (2.8)	30	2.8 (2.9)		9.41%	-1.99[-3.4,-0.58]
Diaz 2010	33	2.1 (6.1)	33	5.6 (5.9)		2.22%	-3.5[-6.4,-0.6]
Epstein 2000a	45	9 (13)	32	7.2 (17)		0.38%	1.78[-5.23,8.78]
Kalarchian 2009	97	11.8 (6.9)	95	13.4 (5.4)		6.12%	-1.58[-3.32,0.16]
Kalavainen 2007	34	17.3 (5.2)	34	17.1 (7.4)		2.02%	0.2[-2.84,3.24]
Nemet 2005	20	0.6 (16.7)	20	5.2 (24.2)		0.11%	-4.6[-17.49,8.29]
Siwik 2013	15	3.4 (8.8)	17	3.9 (15.9)		0.24%	-0.5[-9.28,8.29]
Taylor 2015	89	7.5 (10.4)	92	8.1 (8)		2.53%	-0.6[-3.31,2.11]
Wafa 2011	34	1.5 (2.5)	45	3.5 (2)		17.78%	-2[-3.02,-0.98]
Waling 2012	36	6.7 (11.4)	35	8.8 (10.9)		0.69%	-2.1[-7.29,3.09]
Subtotal ***	**464**		**460**			**43.57%**	**-1.76[-2.41,-1.11]**
Heterogeneity: Tau^2=0; Chi^2=5.43, df=10(P=0.86); I^2=0%							
Test for overall effect: Z=5.28(P<0.0001)							
Total ***	**891**		**883**			**100%**	**-1.45[-1.88,-1.02]**
Heterogeneity: Tau^2=0; Chi^2=8.95, df=16(P=0.92); I^2=0%							
Test for overall effect: Z=6.59(P<0.0001)							
Test for subgroup differences: Chi^2=3.26, df=1 (P=0.52), I^2=0%							

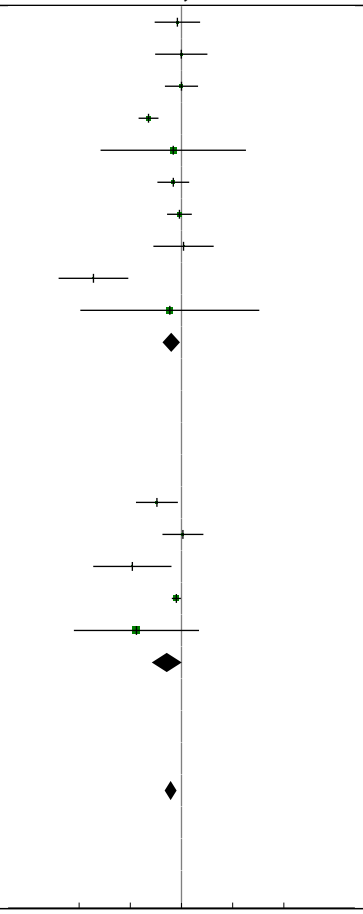


Analysis 1.20. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 20 Change in BMI - attrition bias.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.20.1 High							
Croker 2012	33	-0.4 (1.1)	30	-0 (1.1)		7.1%	-0.33[-0.86,0.2]
Faude 2010	11	0.5 (3.1)	11	0.6 (3.8)		0.9%	-0.1[-3.02,2.82]
Sacher 2010	37	-1.5 (3.5)	45	0.6 (5.1)		1.95%	-2.1[-3.96,-0.24]
Waling 2012	36	0.3 (2.9)	35	0.6 (2.6)		3.34%	-0.3[-1.58,0.98]
Subtotal ***	**117**		**121**			**13.29%**	**-0.47[-1.04,0.1]**
Heterogeneity: Tau^2=0.05; Chi^2=3.32, df=3(P=0.35); I^2=9.56%							
Test for overall effect: Z=1.63(P=0.1)							
1.20.2 Low							
Alves 2008	39	-0.3 (0.9)	39	0.3 (1.4)		7.13%	-0.53[-1.05,-0.01]
Boutelle 2014	21	-0.1 (4.7)	18	0.6 (4.7)		0.89%	-0.7[-3.65,2.25]
Davoli 2013	186	1.5 (1.6)	185	1.6 (1.6)		8.3%	-0.04[-0.36,0.28]
Ho 2016	37	0 (1.6)	36	0.1 (1.5)		5.89%	-0.12[-0.85,0.61]
Kalarchian 2009	97	1.5 (3)	95	1.7 (2)		5.93%	-0.22[-0.94,0.5]

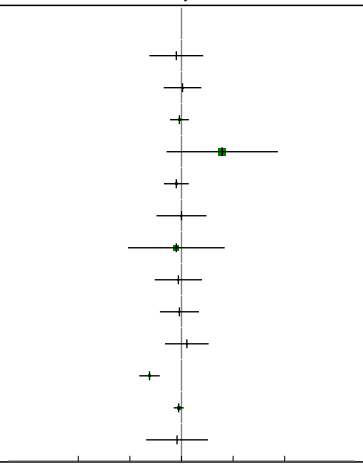


Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Kalavainen 2007	34	2.1 (1.9)	34	2.3 (2.7)		3.96%	-0.2[-1.31,0.91]
Maddison 2014	117	0.1 (4.6)	113	0.1 (5.2)		3.35%	-0.01[-1.29,1.27]
McCallum 2007	70	1.2 (2.8)	76	1.2 (2.2)		5.41%	0[-0.81,0.81]
Reinehr 2010	34	-0.8 (1)	32	0.8 (1)		7.36%	-1.61[-2.09,-1.13]
Siwik 2013	15	0.3 (3.7)	17	0.7 (6.4)		0.63%	-0.4[-3.95,3.15]
Taylor 2015	89	0.8 (3)	92	1.2 (2.3)		5.59%	-0.4[-1.18,0.38]
Wake 2009	127	0.6 (2.6)	115	0.7 (2.2)		6.62%	-0.1[-0.7,0.5]
Wake 2013	56	0.9 (3.4)	49	0.8 (4.2)		2.76%	0.1[-1.37,1.57]
Weigel 2008	36	-1.5 (3)	30	2.8 (3.9)		2.24%	-4.3[-6,-2.6]
Weintraub 2008	9	0.2 (5.2)	12	0.8 (4.8)		0.43%	-0.57[-4.94,3.8]
Subtotal * **	**967**		**943**			**66.47%**	**-0.5[-0.93,-0.07]**
Heterogeneity: Tau²=0.41; Chi²=52.71, df=14(P<0.0001); I²=73.44%							
Test for overall effect: Z=2.3(P=0.02)							
1.20.3 Unclear							
Diaz 2010	33	-0.6 (2.3)	33	0.6 (2)		4.33%	-1.2[-2.22,-0.18]
Eddy Ives 2012	61	-0.2 (2.5)	64	-0.3 (3.2)		4.44%	0.07[-0.93,1.07]
Lison 2012	64	-0.8 (4.1)	20	1.6 (3.7)		1.87%	-2.4[-4.31,-0.49]
Maddison 2011	160	0.1 (1)	162	0.3 (1)		8.77%	-0.25[-0.47,-0.03]
Nemet 2005	20	-1.6 (4.3)	20	0.6 (5.5)		0.83%	-2.2[-5.26,0.86]
Subtotal * **	**338**		**299**			**20.24%**	**-0.72[-1.45,0.01]**
Heterogeneity: Tau²=0.35; Chi²=9.81, df=4(P=0.04); I²=59.23%							
Test for overall effect: Z=1.93(P=0.05)							
Total * **	**1422**		**1363**			**100%**	**-0.53[-0.82,-0.24]**
Heterogeneity: Tau²=0.24; Chi²=66.49, df=23(P<0.0001); I²=65.41%							
Test for overall effect: Z=3.56(P=0)							
Test for subgroup differences: Chi²=0.31, df=1 (P=0.85), I²=0%							

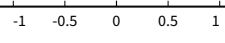


Analysis 1.21. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 21 Change in BMI z score - attrition bias.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.21.1 Low							
Boutelle 2014	21	-0.1 (0.4)	18	-0 (0.4)		1.53%	-0.05[-0.31,0.21]
Coppins 2011	28	-0.1 (0.3)	27	-0.1 (0.4)		2.48%	0.01[-0.17,0.19]
Davoli 2013	186	-0 (0.5)	185	-0 (0.4)		4.49%	-0.02[-0.11,0.07]
Epstein 2000a	35	-0.7 (1)	17	-1.1 (0.9)		0.44%	0.39[-0.15,0.93]
Ho 2016	37	-0.1 (0.3)	36	-0.1 (0.2)		3.75%	-0.05[-0.17,0.07]
Kalavainen 2007	34	-0.3 (0.4)	34	-0.3 (0.6)		1.7%	0[-0.24,0.24]
Looney 2014	14	-0.1 (0.4)	8	-0.1 (0.6)		0.57%	-0.05[-0.52,0.42]
Maddison 2014	117	0 (0.8)	113	0 (0.9)		1.84%	-0.03[-0.26,0.2]
McCallum 2007	70	0 (0.6)	76	0 (0.5)		2.38%	-0.02[-0.21,0.17]
O'Connor 2013	18	-0.1 (0.3)	16	-0.1 (0.3)		2.06%	0.05[-0.16,0.26]
Reinehr 2010	34	-0.3 (0.2)	32	0.1 (0.2)		4.29%	-0.31[-0.41,-0.21]
Rodearmel 2007	95	-0.1 (0.2)	89	-0 (0.2)		5.59%	-0.03[-0.08,0.02]
Siwik 2013	15	-0 (0.4)	17	0 (0.4)		1.23%	-0.04[-0.34,0.26]

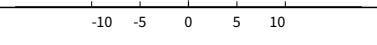


Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Taylor 2015	89	-0.3 (0.5)	92	-0.1 (0.4)		3.27%	-0.15[-0.29,-0.01]
Wake 2013	56	-0.2 (0.5)	49	-0.1 (0.4)		2.76%	-0.1[-0.27,0.07]
Weigel 2008	36	-0.3 (0.5)	30	0.3 (0.6)		1.57%	-0.6[-0.86,-0.34]
Weintraub 2008	9	-0.1 (0.5)	12	0 (0.3)		0.92%	-0.09[-0.45,0.27]
Subtotal * **	**894**		**851**			**40.88%**	**-0.08[-0.16,-0.01]**
Heterogeneity: Tau²=0.01; Chi²=50.36, df=16(P<0.0001); I²=68.23%							
Test for overall effect: Z=2.32(P=0.02)							
1.21.2 Unclear							
Bryant 2011	27	0 (0.2)	26	-0 (0.2)		3.89%	0.06[-0.05,0.17]
Davis 2013	20	-0.1 (0.5)	22	-0.1 (0.5)		1.11%	0.03[-0.29,0.35]
Diaz 2010	21	-0.3 (0.2)	22	-0.1 (0.2)		3.28%	-0.2[-0.34,-0.06]
Eddy Ives 2012	61	-0.3 (0.5)	64	-0.3 (0.6)		2.17%	0.04[-0.16,0.24]
Gunnarsdottir 2011a	7	-0.3 (0.5)	6	0 (0.4)		0.55%	-0.37[-0.84,0.11]
Kirk 2012	71	-0.2 (0.4)	31	-0.3 (0.4)		3.07%	0.07[-0.08,0.22]
Lison 2012	64	-0.2 (0.4)	20	-0 (0.2)		3.7%	-0.18[-0.31,-0.06]
Maddison 2011	162	0 (1.1)	160	0.1 (1.1)		1.71%	-0.06[-0.3,0.18]
Serra-Paya 2015	54	-0.1 (0.2)	59	-0.1 (0.2)		4.72%	-0.03[-0.11,0.05]
Subtotal * **	**487**		**410**			**24.21%**	**-0.05[-0.13,0.03]**
Heterogeneity: Tau²=0.01; Chi²=17.84, df=8(P=0.02); I²=55.17%							
Test for overall effect: Z=1.25(P=0.21)							
1.21.3 High							
Arauz Boudreau 2013	13	-0 (0.1)	10	-0 (0.1)		4.51%	0.02[-0.07,0.11]
Croker 2012	33	-0.1 (0.2)	30	-0.1 (0.2)		4.83%	-0.01[-0.09,0.07]
Faude 2010	11	0.1 (0.5)	11	0 (0.7)		0.53%	0.1[-0.39,0.59]
Gillis 2007	11	-0 (0.2)	7	0.1 (0.1)		3.59%	-0.12[-0.25,0.01]
Markert 2014	145	-0 (0.5)	144	0 (0.3)		4.58%	-0.03[-0.12,0.06]
Mirza 2013	57	-0.1 (0.3)	56	-0.1 (0.3)		4.15%	-0.07[-0.17,0.03]
Sacher 2010	37	-0.3 (0.5)	45	-0 (0.6)		1.64%	-0.29[-0.54,-0.04]
Saelens 2013	35	-0.2 (0.4)	37	-0.1 (0.4)		2.22%	-0.07[-0.27,0.13]
Wafa 2011	34	0 (0.7)	45	0.1 (0.5)		1.35%	-0.1[-0.38,0.18]
Waling 2012	48	-0.2 (0.4)	45	-0.2 (0.5)		2.61%	0.01[-0.16,0.18]
Warschburger 2016	249	-0.2 (0.5)	274	-0.2 (0.4)		4.9%	0.02[-0.06,0.1]
Subtotal * **	**673**		**704**			**34.91%**	**-0.03[-0.06,0.01]**
Heterogeneity: Tau²=0; Chi²=10.54, df=10(P=0.39); I²=5.15%							
Test for overall effect: Z=1.43(P=0.15)							
Total * **	**2054**		**1965**			**100%**	**-0.06[-0.1,-0.02]**
Heterogeneity: Tau²=0.01; Chi²=82.44, df=36(P<0.0001); I²=56.33%							
Test for overall effect: Z=3.25(P=0)							
Test for subgroup differences: Chi²=2.09, df=1 (P=0.35), I²=4.08%							



Analysis 1.22. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 22 Change in weight - attrition bias.

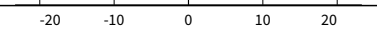
Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.22.1 Low							
Alves 2008	39	0.6 (1.3)	39	2 (1.5)		48.51%	-1.37[-1.99,-0.75]
Coppins 2011	28	3.9 (5.5)	27	5.1 (5.8)		2.07%	-1.2[-4.2,1.8]
Epstein 2000a	45	9 (13)	32	7.2 (17)		0.38%	1.78[-5.23,8.78]
Ho 2016	37	2.6 (5.2)	36	2.7 (5)		3.43%	-0.12[-2.45,2.21]
Kalarchian 2009	97	11.8 (6.9)	95	13.4 (5.4)		6.12%	-1.58[-3.32,0.16]
Kalavainen 2007	34	17.3 (5.2)	34	17.1 (7.4)		2.02%	0.2[-2.84,3.24]
Maddison 2014	117	2.8 (16.3)	113	2.6 (18.4)		0.92%	0.21[-4.29,4.71]
Siwik 2013	15	3.4 (8.8)	17	3.9 (15.9)		0.24%	-0.5[-9.28,8.29]
Taylor 2015	89	7.5 (10.4)	92	8.1 (8)		2.53%	-0.6[-3.31,2.11]
Subtotal ***	**501**		**485**			**66.22%**	**-1.2[-1.73,-0.67]**
Heterogeneity: Tau^2=0; Chi^2=3.39, df=8(P=0.91); I^2=0%							
Test for overall effect: Z=4.43(P<0.0001)							
1.22.2 Unclear							
Diaz 2010	33	2.1 (6.1)	33	5.6 (5.9)		2.22%	-3.5[-6.4,-0.6]
Eddy Ives 2012	61	3.2 (9.4)	64	3.4 (11.4)		1.39%	-0.15[-3.81,3.51]
Maddison 2011	162	2 (13.1)	160	2.8 (14.7)		2.01%	-0.72[-3.76,2.32]
Nemet 2005	20	0.6 (16.7)	20	5.2 (24.2)		0.11%	-4.6[-17.49,8.29]
Subtotal ***	**276**		**277**			**5.73%**	**-1.73[-3.54,0.07]**
Heterogeneity: Tau^2=0; Chi^2=2.76, df=3(P=0.43); I^2=0%							
Test for overall effect: Z=1.88(P=0.06)							
1.22.3 High							
Croker 2012	33	0.8 (2.8)	30	2.8 (2.9)		9.41%	-1.99[-3.4,-0.58]
Faude 2010	11	4.1 (13.5)	11	3.8 (11.7)		0.17%	0.3[-10.26,10.86]
Wafa 2011	34	1.5 (2.5)	45	3.5 (2)		17.78%	-2[-3.02,-0.98]
Waling 2012	36	6.7 (11.4)	35	8.8 (10.9)		0.69%	-2.1[-7.29,3.09]
Subtotal ***	**114**		**121**			**28.05%**	**-1.99[-2.8,-1.17]**
Heterogeneity: Tau^2=0; Chi^2=0.18, df=3(P=0.98); I^2=0%							
Test for overall effect: Z=4.78(P<0.0001)							
Total ***	**891**		**883**			**100%**	**-1.45[-1.88,-1.02]**
Heterogeneity: Tau^2=0; Chi^2=8.95, df=16(P=0.92); I^2=0%							
Test for overall effect: Z=6.59(P<0.0001)							
Test for subgroup differences: Chi^2=2.61, df=1 (P=0.27), I^2=23.48%							



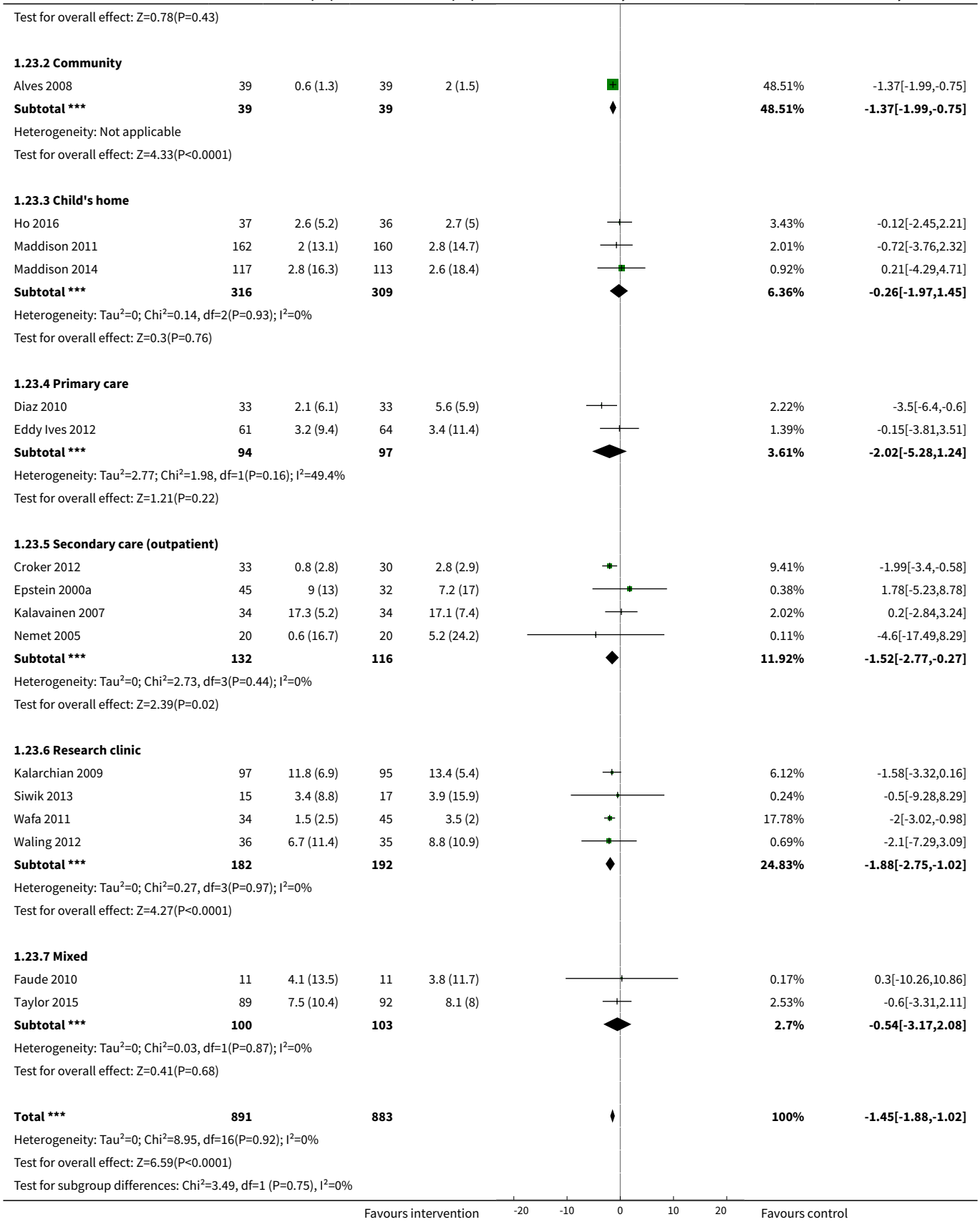
Favours intervention — Favours control

Analysis 1.23. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 23 Change in weight - setting.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.23.1 Schools							
Coppins 2011	28	3.9 (5.5)	27	5.1 (5.8)		2.07%	-1.2[-4.2,1.8]
Subtotal ***	**28**		**27**			**2.07%**	**-1.2[-4.2,1.8]**
Heterogeneity: Not applicable							

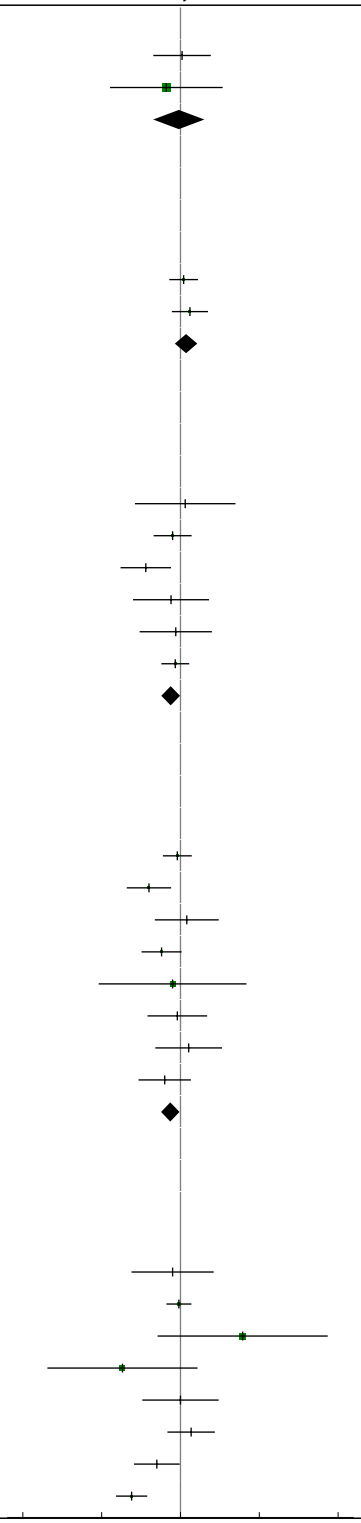


Favours intervention — Favours control

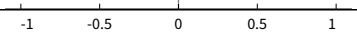


Analysis 1.24. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 24 Change in BMI z score - setting.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.24.1 Schools							
Coppins 2011	28	-0.1 (0.3)	27	-0.1 (0.4)		2.43%	0.01[-0.17,0.19]
Weintraub 2008	9	-0.1 (0.5)	12	0 (0.3)		0.9%	-0.09[-0.45,0.27]
Subtotal ***	**37**		**39**			**3.32%**	**-0.01[-0.17,0.15]**
Heterogeneity: Tau^2=0; Chi^2=0.24, df=1(P=0.63); I^2=0%							
Test for overall effect: Z=0.13(P=0.9)							
1.24.2 Community							
Arauz Boudreau 2013	13	-0 (0.1)	10	-0 (0.1)		4.41%	0.02[-0.07,0.11]
Bryant 2011	27	0 (0.2)	26	-0 (0.2)		3.8%	0.06[-0.05,0.17]
Subtotal ***	**40**		**36**			**8.21%**	**0.04[-0.04,0.11]**
Heterogeneity: Tau^2=0; Chi^2=0.29, df=1(P=0.59); I^2=0%							
Test for overall effect: Z=0.97(P=0.33)							
1.24.3 Child's home							
Davis 2013	20	-0.1 (0.5)	22	-0.1 (0.5)		1.09%	0.03[-0.29,0.35]
Ho 2016	37	-0.1 (0.3)	36	-0.1 (0.2)		3.66%	-0.05[-0.17,0.07]
Lison 2012	32	-0.2 (0.4)	10	-0 (0.1)		2.81%	-0.22[-0.38,-0.06]
Maddison 2011	162	0 (1.1)	160	0.1 (1.1)		1.67%	-0.06[-0.3,0.18]
Maddison 2014	117	0 (0.8)	113	0 (0.9)		1.8%	-0.03[-0.26,0.2]
Markert 2014	145	-0 (0.5)	144	0 (0.3)		4.47%	-0.03[-0.12,0.06]
Subtotal ***	**513**		**485**			**15.51%**	**-0.06[-0.12,-0]**
Heterogeneity: Tau^2=0; Chi^2=4.59, df=5(P=0.47); I^2=0%							
Test for overall effect: Z=2.05(P=0.04)							
1.24.4 Primary care							
Davoli 2013	186	-0 (0.5)	185	-0 (0.4)		4.39%	-0.02[-0.11,0.07]
Diaz 2010	21	-0.3 (0.2)	22	-0.1 (0.2)		3.2%	-0.2[-0.34,-0.06]
Eddy Ives 2012	61	-0.3 (0.5)	64	-0.3 (0.6)		2.12%	0.04[-0.16,0.24]
Gillis 2007	11	-0 (0.2)	7	0.1 (0.1)		3.51%	-0.12[-0.25,0.01]
Looney 2014	14	-0.1 (0.4)	8	-0.1 (0.6)		0.56%	-0.05[-0.52,0.42]
McCallum 2007	70	0 (0.6)	76	0 (0.5)		2.32%	-0.02[-0.21,0.17]
O'Connor 2013	18	-0.1 (0.3)	16	-0.1 (0.3)		2.01%	0.05[-0.16,0.26]
Wake 2013	56	-0.2 (0.5)	49	-0.1 (0.4)		2.7%	-0.1[-0.27,0.07]
Subtotal ***	**437**		**427**			**20.81%**	**-0.06[-0.12,-0.01]**
Heterogeneity: Tau^2=0; Chi^2=7.78, df=7(P=0.35); I^2=10.08%							
Test for overall effect: Z=2.17(P=0.03)							
1.24.5 Secondary care (outpatient)							
Boutelle 2014	21	-0.1 (0.4)	18	-0 (0.4)		1.49%	-0.05[-0.31,0.21]
Croker 2012	33	-0.1 (0.2)	30	-0.1 (0.2)		4.72%	-0.01[-0.09,0.07]
Epstein 2000a	35	-0.7 (1)	17	-1.1 (0.9)		0.43%	0.39[-0.15,0.93]
Gunnarsdottir 2011a	7	-0.3 (0.5)	6	0 (0.4)		0.54%	-0.37[-0.84,0.11]
Kalavainen 2007	34	-0.3 (0.4)	34	-0.3 (0.6)		1.66%	0[-0.24,0.24]
Kirk 2012	71	-0.2 (0.4)	31	-0.3 (0.4)		3%	0.07[-0.08,0.22]
Lison 2012	32	-0.2 (0.3)	10	-0 (0.1)		3.11%	-0.15[-0.3,-0]
Reinehr 2010	34	-0.3 (0.2)	32	0.1 (0.2)		4.2%	-0.31[-0.41,-0.21]



Study or subgroup	Intervention N	Mean(SD)	Control N	Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Saelens 2013	35	-0.2 (0.4)	37	-0.1 (0.4)		2.17%	-0.07[-0.27,0.13]
Weigel 2008	36	-0.3 (0.5)	30	0.3 (0.6)		1.54%	-0.6[-0.86,-0.34]
Subtotal ***	**338**		**245**			**22.85%**	**-0.12[-0.25,0.01]**
Heterogeneity: Tau^2=0.03; Chi^2=47.19, df=9(P<0.0001); I^2=80.93%							
Test for overall effect: Z=1.88(P=0.06)							
1.24.6 Hospital inpatient							
Warschburger 2016	249	-0.2 (0.5)	274	-0.2 (0.4)		4.79%	0.02[-0.06,0.1]
Subtotal ***	**249**		**274**			**4.79%**	**0.02[-0.06,0.1]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.51(P=0.61)							
1.24.7 Research clinic							
Rodearmel 2007	95	-0.1 (0.2)	89	-0 (0.2)		5.46%	-0.03[-0.08,0.02]
Siwik 2013	15	-0 (0.4)	17	0 (0.4)		1.2%	-0.04[-0.34,0.26]
Wafa 2011	34	0 (0.7)	45	0.1 (0.5)		1.32%	-0.1[-0.38,0.18]
Waling 2012	48	-0.2 (0.4)	45	-0.2 (0.5)		2.55%	0.01[-0.16,0.18]
Subtotal ***	**192**		**196**			**10.53%**	**-0.03[-0.07,0.02]**
Heterogeneity: Tau^2=0; Chi^2=0.44, df=3(P=0.93); I^2=0%							
Test for overall effect: Z=1.15(P=0.25)							
1.24.8 Mixed							
Faude 2010	11	0.1 (0.5)	11	0 (0.7)		0.52%	0.1[-0.39,0.59]
Mirza 2013	57	-0.1 (0.3)	56	-0.1 (0.3)		4.06%	-0.07[-0.17,0.03]
Sacher 2010	37	-0.3 (0.5)	45	-0 (0.6)		1.6%	-0.29[-0.54,-0.04]
Serra-Paya 2015	54	-0.1 (0.2)	59	-0.1 (0.2)		4.61%	-0.03[-0.11,0.05]
Taylor 2015	89	-0.3 (0.5)	92	-0.1 (0.4)		3.2%	-0.15[-0.29,-0.01]
Subtotal ***	**248**		**263**			**13.99%**	**-0.09[-0.16,-0.01]**
Heterogeneity: Tau^2=0; Chi^2=5.59, df=4(P=0.23); I^2=28.44%							
Test for overall effect: Z=2.21(P=0.03)							
Total ***	**2054**		**1965**			**100%**	**-0.06[-0.1,-0.03]**
Heterogeneity: Tau^2=0.01; Chi^2=83.94, df=37(P<0.0001); I^2=55.92%							
Test for overall effect: Z=3.43(P=0)							
Test for subgroup differences: Chi^2=11.25, df=1 (P=0.13), I^2=37.79%							



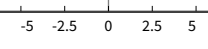
Favours intervention — Favours control

Analysis 1.25. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 25 Change in BMI - setting.

Study or subgroup	Intervention N	Mean(SD)	Control N	Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.25.1 Schools							
Weintraub 2008	9	0.2 (5.2)	12	0.8 (4.8)		0.43%	-0.57[-4.94,3.8]
Subtotal ***	**9**		**12**			**0.43%**	**-0.57[-4.94,3.8]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.26(P=0.8)							
1.25.2 Community							

Favours intervention — Favours control

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Alves 2008	39	-0.3 (0.9)	39	0.3 (1.4)		7.01%	-0.53[-1.05,-0.01]
Subtotal ***	**39**		**39**			**7.01%**	**-0.53[-1.05,-0.01]**
Heterogeneity: Not applicable							
Test for overall effect: Z=1.99(P=0.05)							
1.25.3 Child's home							
Ho 2016	37	0 (1.6)	36	0.1 (1.5)		5.81%	-0.12[-0.85,0.61]
Lison 2012	32	-1.2 (4.2)	10	1.6 (2.6)		1.5%	-2.8[-4.99,-0.61]
Maddison 2011	160	0.1 (1)	162	0.3 (1)		8.57%	-0.25[-0.47,-0.03]
Maddison 2014	117	0.1 (4.6)	113	0.1 (5.2)		3.33%	-0.01[-1.29,1.27]
Subtotal ***	**346**		**321**			**19.22%**	**-0.32[-0.86,0.22]**
Heterogeneity: Tau^2=0.13; Chi^2=5.48, df=3(P=0.14); I^2=45.22%							
Test for overall effect: Z=1.17(P=0.24)							
1.25.4 Primary care							
Davoli 2013	186	1.5 (1.6)	185	1.6 (1.6)		8.12%	-0.04[-0.36,0.28]
Diaz 2010	33	-0.6 (2.3)	33	0.6 (2)		4.3%	-1.2[-2.22,-0.18]
Eddy Ives 2012	61	-0.2 (2.5)	64	-0.3 (3.2)		4.41%	0.07[-0.93,1.07]
McCallum 2007	70	1.2 (2.8)	76	1.2 (2.2)		5.35%	0[-0.81,0.81]
Wake 2009	127	0.6 (2.6)	115	0.7 (2.2)		6.52%	-0.1[-0.7,0.5]
Wake 2013	56	0.9 (3.4)	49	0.8 (4.2)		2.76%	0.1[-1.37,1.57]
Subtotal ***	**533**		**522**			**31.46%**	**-0.1[-0.35,0.14]**
Heterogeneity: Tau^2=0; Chi^2=4.82, df=5(P=0.44); I^2=0%							
Test for overall effect: Z=0.82(P=0.41)							
1.25.5 Secondary care (outpatient)							
Boutelle 2014	21	-0.1 (4.7)	18	0.6 (4.7)		0.89%	-0.7[-3.65,2.25]
Croker 2012	33	-0.4 (1.1)	30	-0 (1.1)		6.98%	-0.33[-0.86,0.2]
Kalavainen 2007	34	2.1 (1.9)	34	2.3 (2.7)		3.94%	-0.2[-1.31,0.91]
Lison 2012	32	-0.4 (4)	10	1.6 (2.6)		1.57%	-2[-4.13,0.13]
Nemet 2005	20	-1.6 (4.3)	20	0.6 (5.5)		0.84%	-2.2[-5.26,0.86]
Reinehr 2010	34	-0.8 (1)	32	0.8 (1)		7.23%	-1.61[-2.09,-1.13]
Weigel 2008	36	-1.5 (3)	30	2.8 (3.9)		2.24%	-4.3[-6,-2.6]
Subtotal ***	**210**		**174**			**23.69%**	**-1.46[-2.42,-0.5]**
Heterogeneity: Tau^2=1.02; Chi^2=29.82, df=6(P<0.0001); I^2=79.88%							
Test for overall effect: Z=2.99(P=0)							
1.25.6 Research clinic							
Kalarchian 2009	97	1.5 (3)	95	1.7 (2)		5.86%	-0.22[-0.94,0.5]
Siwik 2013	15	0.3 (3.7)	17	0.7 (6.4)		0.64%	-0.4[-3.95,3.15]
Waling 2012	36	0.3 (2.9)	35	0.6 (2.6)		3.33%	-0.3[-1.58,0.98]
Subtotal ***	**148**		**147**			**9.82%**	**-0.24[-0.86,0.37]**
Heterogeneity: Tau^2=0; Chi^2=0.02, df=2(P=0.99); I^2=0%							
Test for overall effect: Z=0.78(P=0.44)							
1.25.7 Mixed							
Faude 2010	11	0.5 (3.1)	11	0.6 (3.8)		0.91%	-0.1[-3.02,2.82]
Sacher 2010	37	-1.5 (3.5)	45	0.6 (5.1)		1.95%	-2.1[-3.96,-0.24]
Taylor 2015	89	0.8 (3)	92	1.2 (2.3)		5.53%	-0.4[-1.18,0.38]
Subtotal ***	**137**		**148**			**8.38%**	**-0.79[-1.87,0.3]**
Heterogeneity: Tau^2=0.33; Chi^2=2.86, df=2(P=0.24); I^2=29.99%							
Test for overall effect: Z=1.42(P=0.15)							



Favours intervention

Favours control

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Total ***	**1422**		**1363**			**100%**	**-0.55[-0.85,-0.26]**
Heterogeneity: Tau²=0.25; Chi²=69.12, df=24(P<0.0001); I²=65.28%							
Test for overall effect: Z=3.7(P=0)							
Test for subgroup differences: Chi²=9.54, df=1 (P=0.15), I²=37.11%							

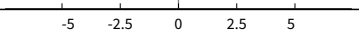
Favours intervention -5 -2.5 0 2.5 5 Favours control

Analysis 1.26. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 26 Change in BMI - post-intervention follow-up.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.26.1 No post-intervention follow-up							
Alves 2008	39	-0.3 (0.9)	39	0.3 (1.4)		7.13%	-0.53[-1.05,-0.01]
Croker 2012	33	-0.4 (1.1)	30	-0 (1.1)		7.1%	-0.33[-0.86,0.2]
Diaz 2010	33	-0.6 (2.3)	33	0.6 (2)		4.33%	-1.2[-2.22,-0.18]
Eddy Ives 2012	61	-0.2 (2.5)	64	-0.3 (3.2)		4.44%	0.07[-0.93,1.07]
Faude 2010	11	0.5 (3.1)	11	0.6 (3.8)		0.9%	-0.1[-3.02,2.82]
Ho 2016	37	0 (1.6)	36	0.1 (1.5)		5.89%	-0.12[-0.85,0.61]
Lison 2012	64	-0.8 (4.1)	20	1.6 (3.7)		1.87%	-2.4[-4.31,-0.49]
Maddison 2011	160	0.1 (1)	162	0.3 (1)		8.77%	-0.25[-0.47,-0.03]
Maddison 2014	117	0.1 (4.6)	113	0.1 (5.2)		3.35%	-0.01[-1.29,1.27]
Reinehr 2010	34	-0.8 (1)	32	0.8 (1)		7.36%	-1.61[-2.09,-1.13]
Taylor 2015	89	0.8 (3)	92	1.2 (2.3)		5.59%	-0.4[-1.18,0.38]
Wake 2013	56	0.9 (3.4)	49	0.8 (4.2)		2.76%	0.1[-1.37,1.57]
Waling 2012	36	0.3 (2.9)	35	0.6 (2.6)		3.34%	-0.3[-1.58,0.98]
Weigel 2008	36	-1.5 (3)	30	2.8 (3.9)		2.24%	-4.3[-6,-2.6]
Weintraub 2008	9	0.2 (5.2)	12	0.8 (4.8)		0.43%	-0.57[-4.94,3.8]
Subtotal ***	**815**		**758**			**65.49%**	**-0.68[-1.1,-0.27]**
Heterogeneity: Tau²=0.37; Chi²=53.88, df=14(P<0.0001); I²=74.01%							
Test for overall effect: Z=3.21(P=0)							
1.26.2 Post-intervention follow-up < 6 months							
Boutelle 2014	21	-0.1 (4.7)	18	0.6 (4.7)		0.89%	-0.7[-3.65,2.25]
Sacher 2010	37	-1.5 (3.5)	45	0.6 (5.1)		1.95%	-2.1[-3.96,-0.24]
Siwik 2013	15	0.3 (3.7)	17	0.7 (6.4)		0.63%	-0.4[-3.95,3.15]
Subtotal ***	**73**		**80**			**3.46%**	**-1.49[-2.93,-0.05]**
Heterogeneity: Tau²=0; Chi²=1.05, df=2(P=0.59); I²=0%							
Test for overall effect: Z=2.03(P=0.04)							
1.26.3 Post-intervention follow-up 6 months to < 12 months							
Nemet 2005	20	-1.6 (4.3)	20	0.6 (5.5)		0.83%	-2.2[-5.26,0.86]
Wake 2009	127	0.6 (2.6)	115	0.7 (2.2)		6.62%	-0.1[-0.7,0.5]
Subtotal ***	**147**		**135**			**7.45%**	**-0.59[-2.34,1.15]**
Heterogeneity: Tau²=0.94; Chi²=1.75, df=1(P=0.19); I²=42.71%							
Test for overall effect: Z=0.67(P=0.5)							
1.26.4 Post-intervention follow-up 12 months or more							
Davoli 2013	186	1.5 (1.6)	185	1.6 (1.6)		8.3%	-0.04[-0.36,0.28]

Favours intervention -5 -2.5 0 2.5 5 Favours control

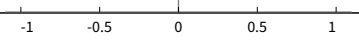
Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Kalarchian 2009	97	1.5 (3)	95	1.7 (2)		5.93%	-0.22[-0.94,0.5]
Kalavainen 2007	34	2.1 (1.9)	34	2.3 (2.7)		3.96%	-0.2[-1.31,0.91]
McCallum 2007	70	1.2 (2.8)	76	1.2 (2.2)		5.41%	0[-0.81,0.81]
Subtotal ***	**387**		**390**			**23.59%**	**-0.07[-0.34,0.2]**
Heterogeneity: Tau²=0; Chi²=0.28, df=3(P=0.96); I²=0%							
Test for overall effect: Z=0.51(P=0.61)							
Total ***	**1422**		**1363**			**100%**	**-0.53[-0.82,-0.24]**
Heterogeneity: Tau²=0.24; Chi²=66.49, df=23(P<0.0001); I²=65.41%							
Test for overall effect: Z=3.56(P=0)							
Test for subgroup differences: Chi²=8.74, df=1 (P=0.03), I²=65.69%							



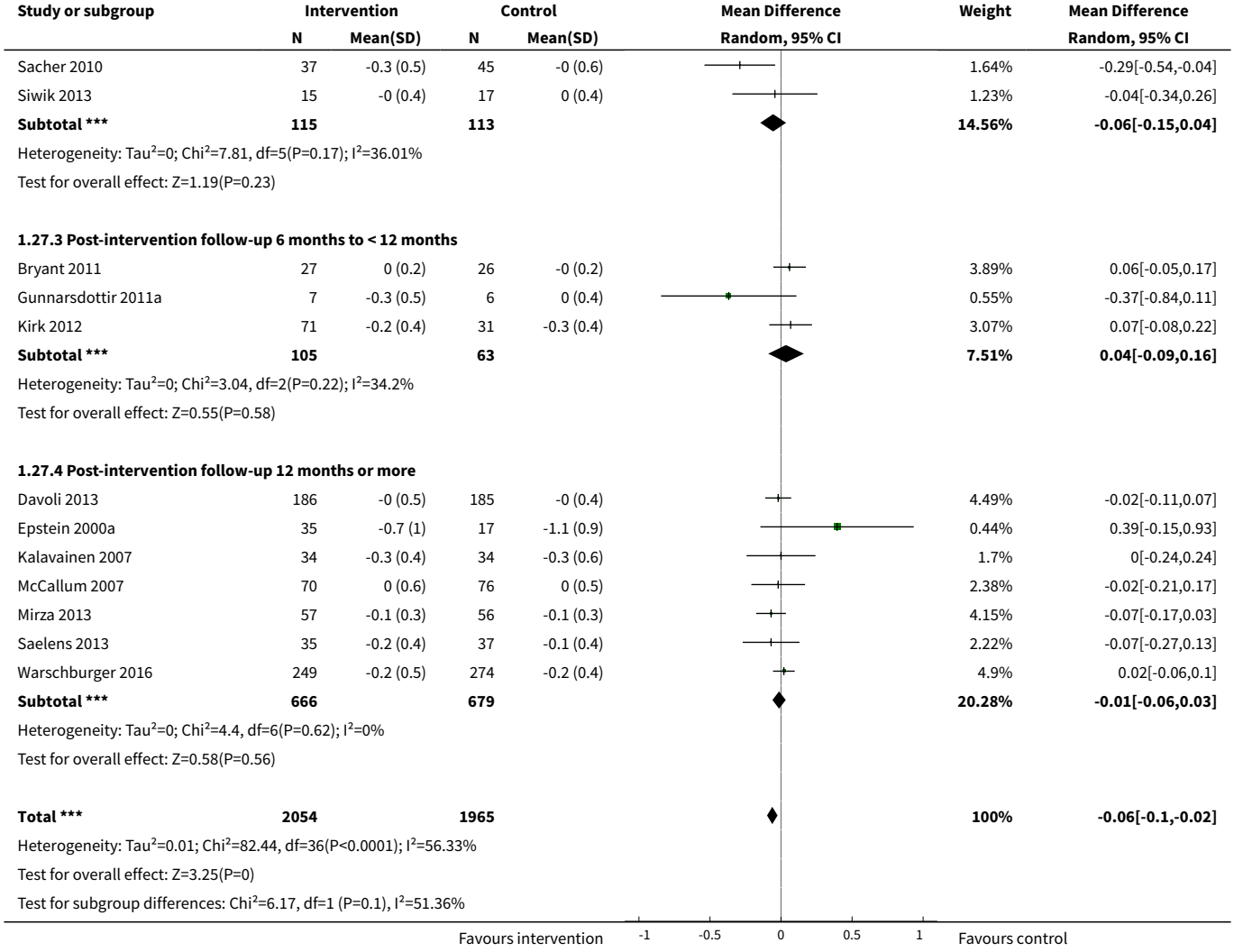
Favours intervention — Favours control

Analysis 1.27. Comparison 1 Behaviour-changing interventions versus no treatment/ usual care, Outcome 27 Change in BMI z score - post-intervention follow-up.

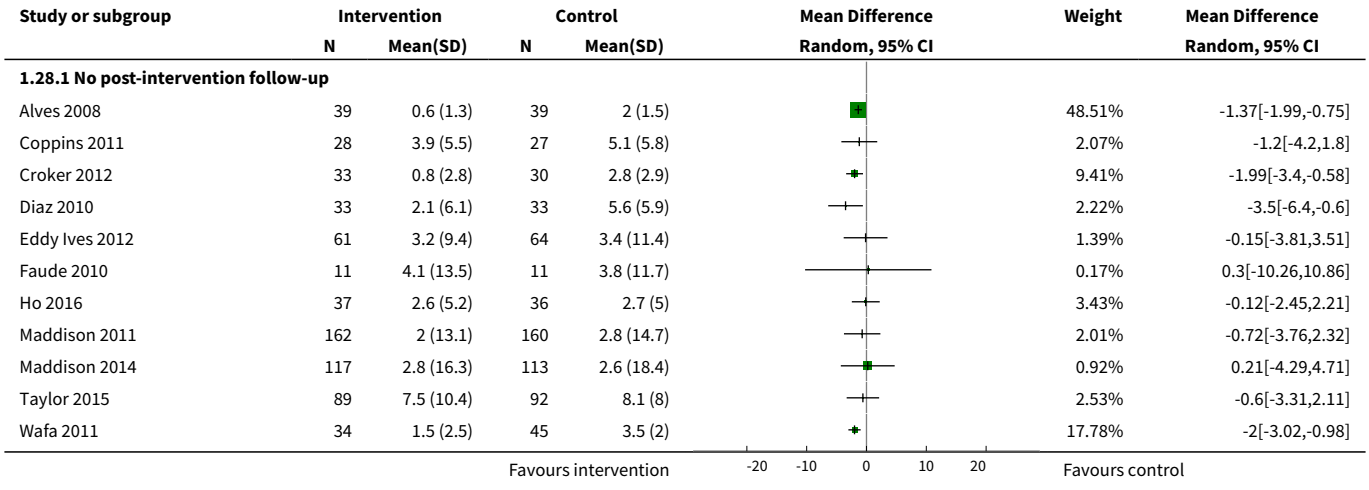
Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.27.1 No post-intervention follow-up							
Coppins 2011	28	-0.1 (0.3)	27	-0.1 (0.4)		2.48%	0.01[-0.17,0.19]
Croker 2012	33	-0.1 (0.2)	30	-0.1 (0.2)		4.83%	-0.01[-0.09,0.07]
Davis 2013	20	-0.1 (0.5)	22	-0.1 (0.5)		1.11%	0.03[-0.29,0.35]
Diaz 2010	21	-0.3 (0.2)	22	-0.1 (0.2)		3.28%	-0.2[-0.34,-0.06]
Eddy Ives 2012	61	-0.3 (0.5)	64	-0.3 (0.6)		2.17%	0.04[-0.16,0.24]
Faude 2010	11	0.1 (0.5)	11	0 (0.7)		0.53%	0.1[-0.39,0.59]
Ho 2016	37	-0.1 (0.3)	36	-0.1 (0.2)		3.75%	-0.05[-0.17,0.07]
Lison 2012	64	-0.2 (0.4)	20	-0 (0.2)		3.7%	-0.18[-0.31,-0.06]
Looney 2014	14	-0.1 (0.4)	8	-0.1 (0.6)		0.57%	-0.05[-0.52,0.42]
Maddison 2011	162	0 (1.1)	160	0.1 (1.1)		1.71%	-0.06[-0.3,0.18]
Maddison 2014	117	0 (0.8)	113	0 (0.9)		1.84%	-0.03[-0.26,0.2]
Markert 2014	145	-0 (0.5)	144	0 (0.3)		4.58%	-0.03[-0.12,0.06]
Reinehr 2010	34	-0.3 (0.2)	32	0.1 (0.2)		4.29%	-0.31[-0.41,-0.21]
Rodearmel 2007	95	-0.1 (0.2)	89	-0 (0.2)		5.59%	-0.03[-0.08,0.02]
Serra-Paya 2015	54	-0.1 (0.2)	59	-0.1 (0.2)		4.72%	-0.03[-0.11,0.05]
Taylor 2015	89	-0.3 (0.5)	92	-0.1 (0.4)		3.27%	-0.15[-0.29,-0.01]
Wafa 2011	34	0 (0.7)	45	0.1 (0.5)		1.35%	-0.1[-0.38,0.18]
Wake 2013	56	-0.2 (0.5)	49	-0.1 (0.4)		2.76%	-0.1[-0.27,0.07]
Waling 2012	48	-0.2 (0.4)	45	-0.2 (0.5)		2.61%	0.01[-0.16,0.18]
Weigel 2008	36	-0.3 (0.5)	30	0.3 (0.6)		1.57%	-0.6[-0.86,-0.34]
Weintraub 2008	9	-0.1 (0.5)	12	0 (0.3)		0.92%	-0.09[-0.45,0.27]
Subtotal ***	**1168**		**1110**			**57.64%**	**-0.09[-0.15,-0.04]**
Heterogeneity: Tau²=0.01; Chi²=57.72, df=20(P<0.0001); I²=65.35%							
Test for overall effect: Z=3.33(P=0)							
1.27.2 Post-intervention follow-up < 6 months							
Arauz Boudreau 2013	13	-0 (0.1)	10	-0 (0.1)		4.51%	0.02[-0.07,0.11]
Boutelle 2014	21	-0.1 (0.4)	18	-0 (0.4)		1.53%	-0.05[-0.31,0.21]
Gillis 2007	11	-0 (0.2)	7	0.1 (0.1)		3.59%	-0.12[-0.25,0.01]
O'Connor 2013	18	-0.1 (0.3)	16	-0.1 (0.3)		2.06%	0.05[-0.16,0.26]

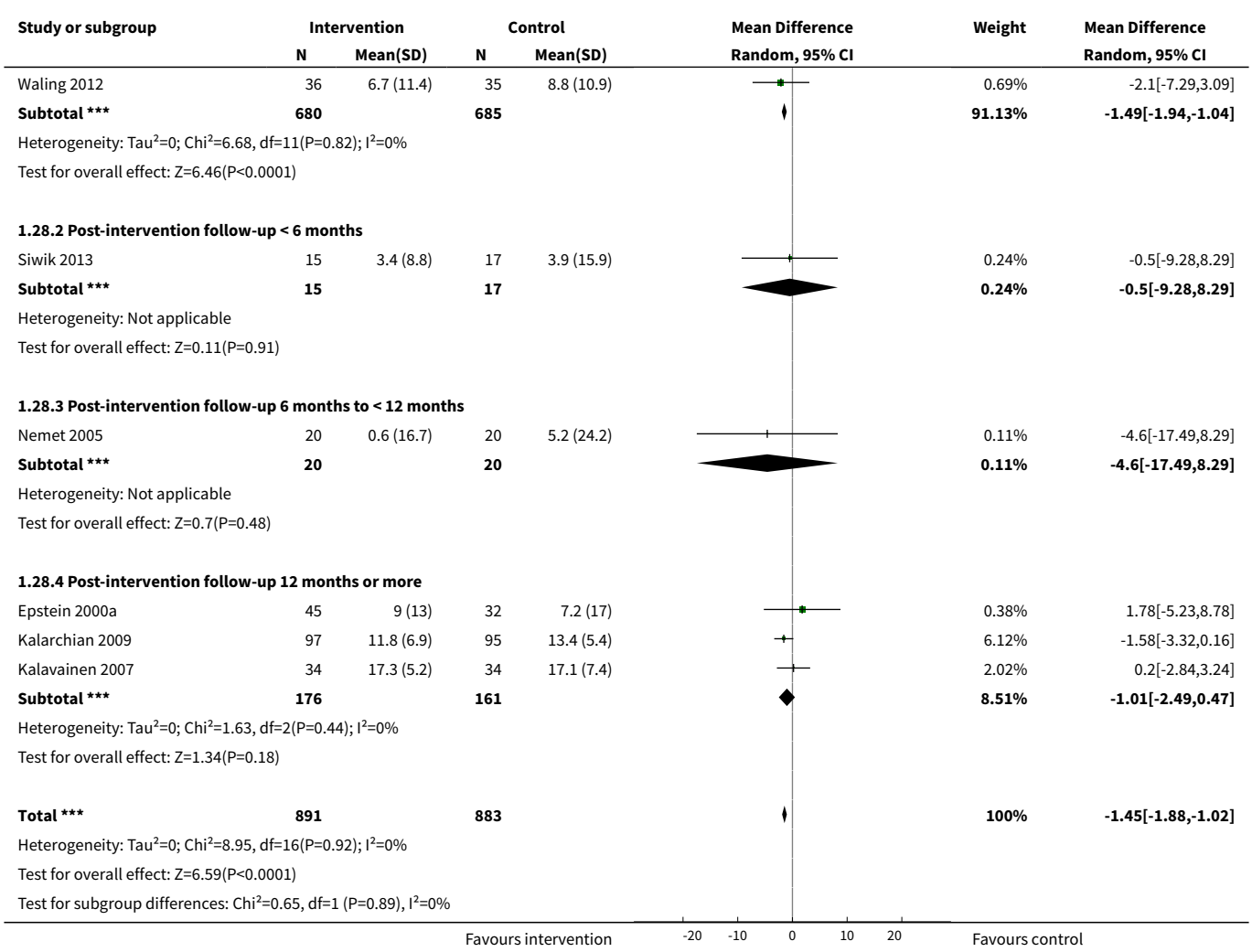


Favours intervention — Favours control

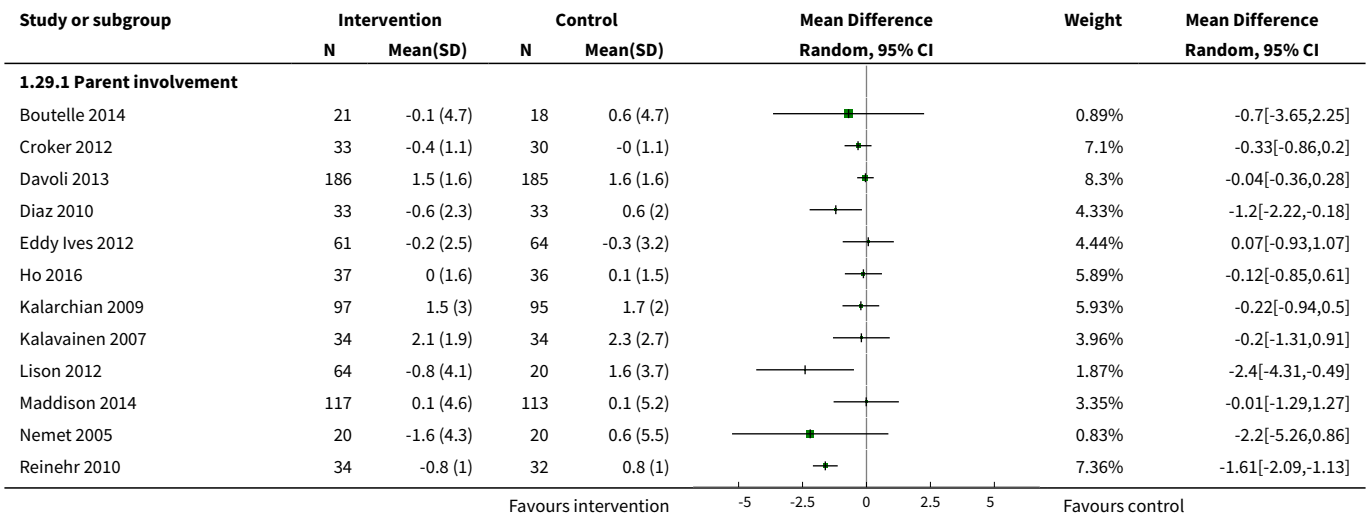


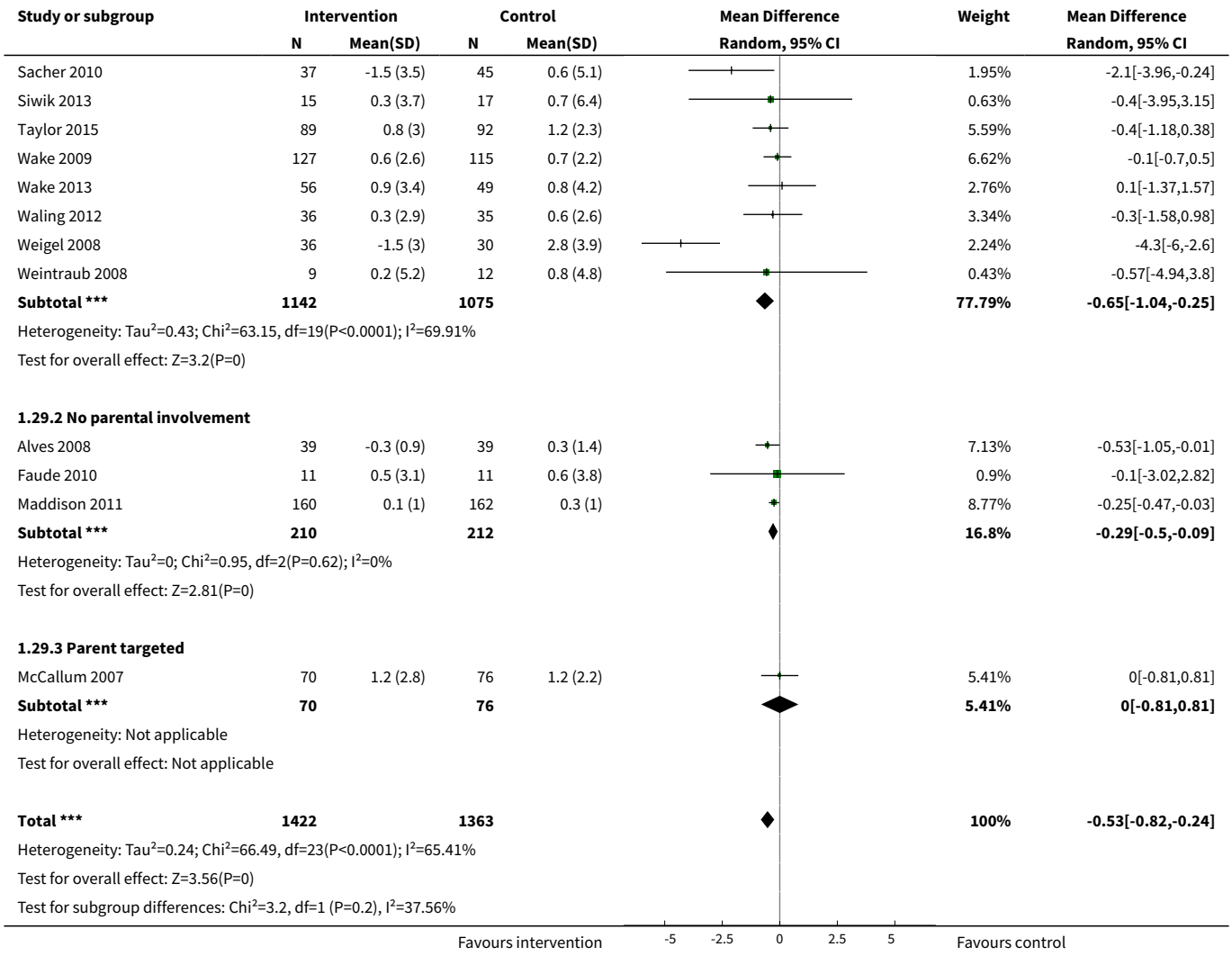
Analysis 1.28. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 28 Change in weight - post-intervention follow-up.





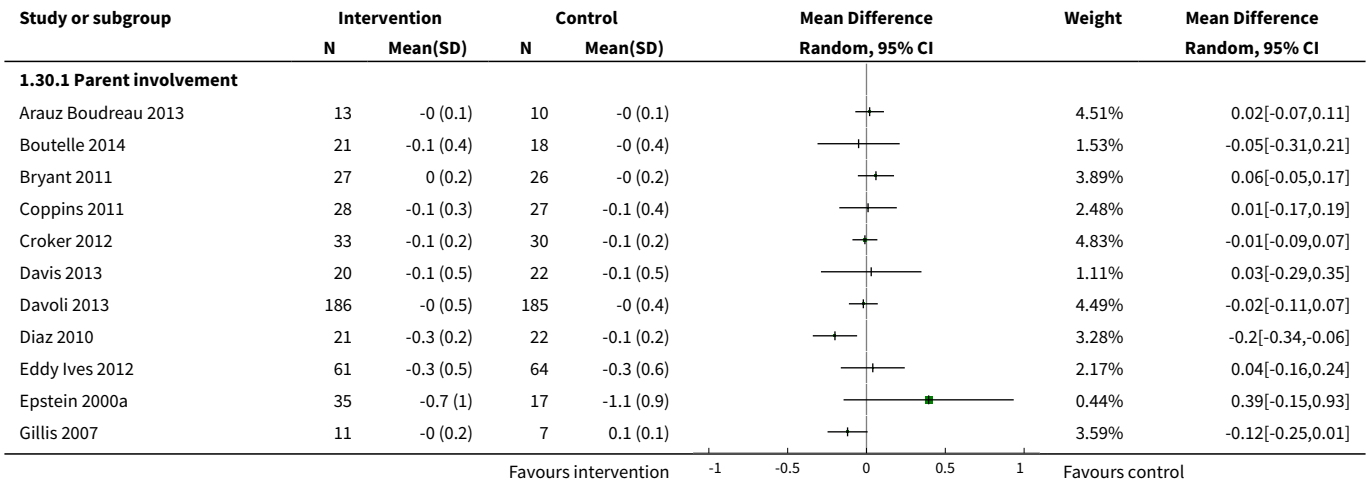
Analysis 1.29. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 29 Change in BMI - type of parental involvement.



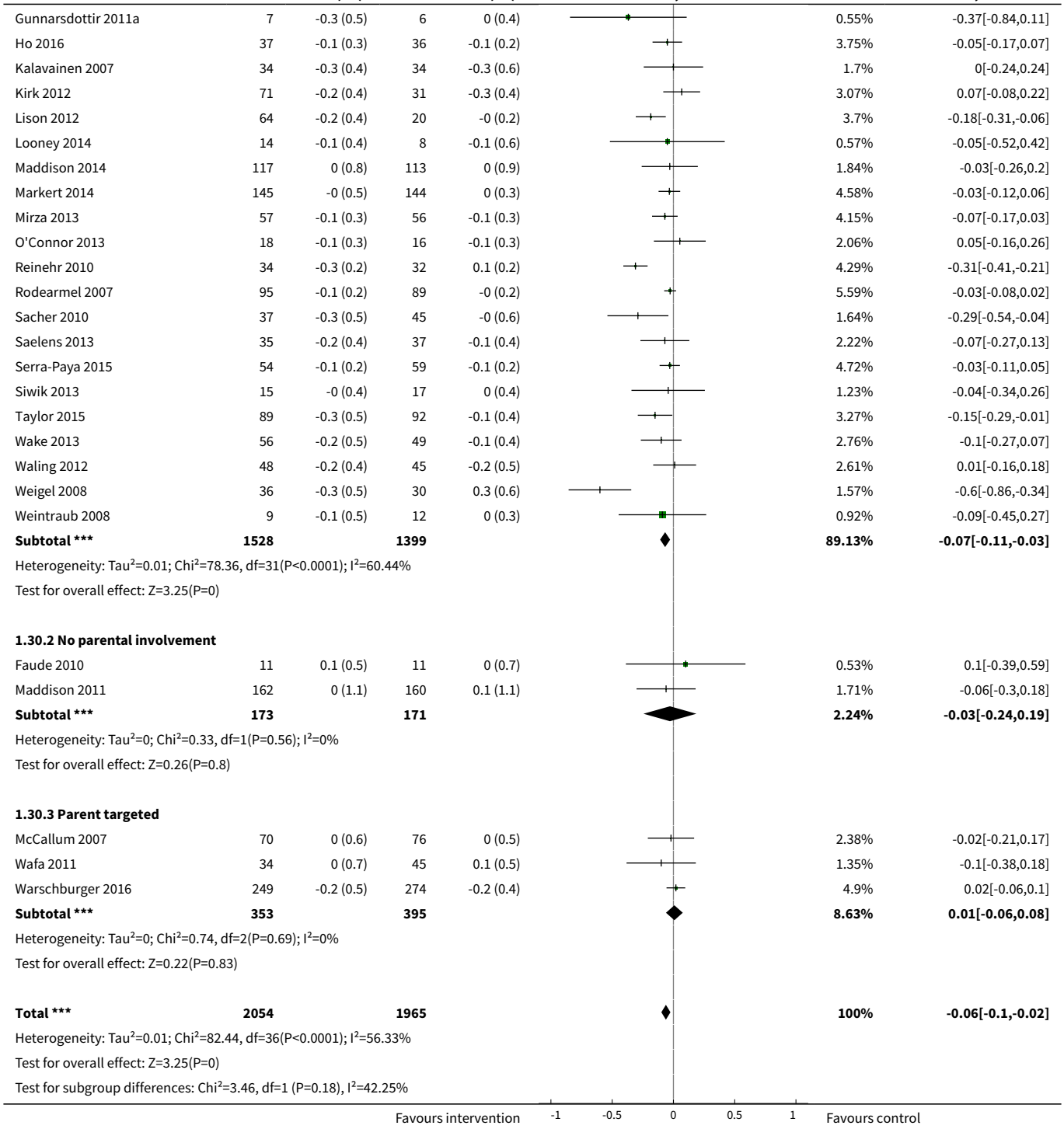


Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Sacher 2010	37	-1.5 (3.5)	45	0.6 (5.1)		1.95%	-2.1[-3.96,-0.24]
Siwik 2013	15	0.3 (3.7)	17	0.7 (6.4)		0.63%	-0.4[-3.95,3.15]
Taylor 2015	89	0.8 (3)	92	1.2 (2.3)		5.59%	-0.4[-1.18,0.38]
Wake 2009	127	0.6 (2.6)	115	0.7 (2.2)		6.62%	-0.1[-0.7,0.5]
Wake 2013	56	0.9 (3.4)	49	0.8 (4.2)		2.76%	0.1[-1.37,1.57]
Waling 2012	36	0.3 (2.9)	35	0.6 (2.6)		3.34%	-0.3[-1.58,0.98]
Weigel 2008	36	-1.5 (3)	30	2.8 (3.9)		2.24%	-4.3[-6,-2.6]
Weintraub 2008	9	0.2 (5.2)	12	0.8 (4.8)		0.43%	-0.57[-4.94,3.8]
Subtotal ***	**1142**		**1075**			**77.79%**	**-0.65[-1.04,-0.25]**
Heterogeneity: Tau²=0.43; Chi²=63.15, df=19(P<0.0001); I²=69.91%							
Test for overall effect: Z=3.2(P=0)							
1.29.2 No parental involvement							
Alves 2008	39	-0.3 (0.9)	39	0.3 (1.4)		7.13%	-0.53[-1.05,-0.01]
Faude 2010	11	0.5 (3.1)	11	0.6 (3.8)		0.9%	-0.1[-3.02,2.82]
Maddison 2011	160	0.1 (1)	162	0.3 (1)		8.77%	-0.25[-0.47,-0.03]
Subtotal ***	**210**		**212**			**16.8%**	**-0.29[-0.5,-0.09]**
Heterogeneity: Tau²=0; Chi²=0.95, df=2(P=0.62); I²=0%							
Test for overall effect: Z=2.81(P=0)							
1.29.3 Parent targeted							
McCallum 2007	70	1.2 (2.8)	76	1.2 (2.2)		5.41%	0[-0.81,0.81]
Subtotal ***	**70**		**76**			**5.41%**	**0[-0.81,0.81]**
Heterogeneity: Not applicable							
Test for overall effect: Not applicable							
Total ***	**1422**		**1363**			**100%**	**-0.53[-0.82,-0.24]**
Heterogeneity: Tau²=0.24; Chi²=66.49, df=23(P<0.0001); I²=65.41%							
Test for overall effect: Z=3.56(P=0)							
Test for subgroup differences: Chi²=3.2, df=1 (P=0.2), I²=37.56%							

Analysis 1.30. Comparison 1 Behaviour-changing interventions versus no treatment/ usual care, Outcome 30 Change in BMI z score - type of parental involvement.

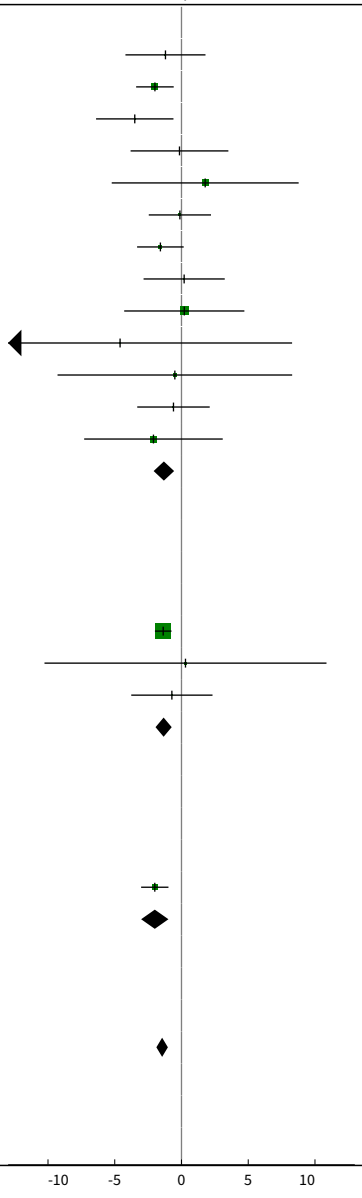


Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.30.1 Parent involvement							
Arauz Boudreau 2013	13	-0 (0.1)	10	-0 (0.1)		4.51%	0.02[-0.07,0.11]
Boutelle 2014	21	-0.1 (0.4)	18	-0 (0.4)		1.53%	-0.05[-0.31,0.21]
Bryant 2011	27	0 (0.2)	26	-0 (0.2)		3.89%	0.06[-0.05,0.17]
Coppins 2011	28	-0.1 (0.3)	27	-0.1 (0.4)		2.48%	0.01[-0.17,0.19]
Croker 2012	33	-0.1 (0.2)	30	-0.1 (0.2)		4.83%	-0.01[-0.09,0.07]
Davis 2013	20	-0.1 (0.5)	22	-0.1 (0.5)		1.11%	0.03[-0.29,0.35]
Davoli 2013	186	-0 (0.5)	185	-0 (0.4)		4.49%	-0.02[-0.11,0.07]
Diaz 2010	21	-0.3 (0.2)	22	-0.1 (0.2)		3.28%	-0.2[-0.34,-0.06]
Eddy Ives 2012	61	-0.3 (0.5)	64	-0.3 (0.6)		2.17%	0.04[-0.16,0.24]
Epstein 2000a	35	-0.7 (1)	17	-1.1 (0.9)		0.44%	0.39[-0.15,0.93]
Gillis 2007	11	-0 (0.2)	7	0.1 (0.1)		3.59%	-0.12[-0.25,0.01]



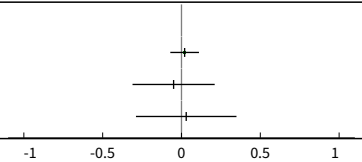
Analysis 1.31. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 31 Change in weight - type of parental involvement.

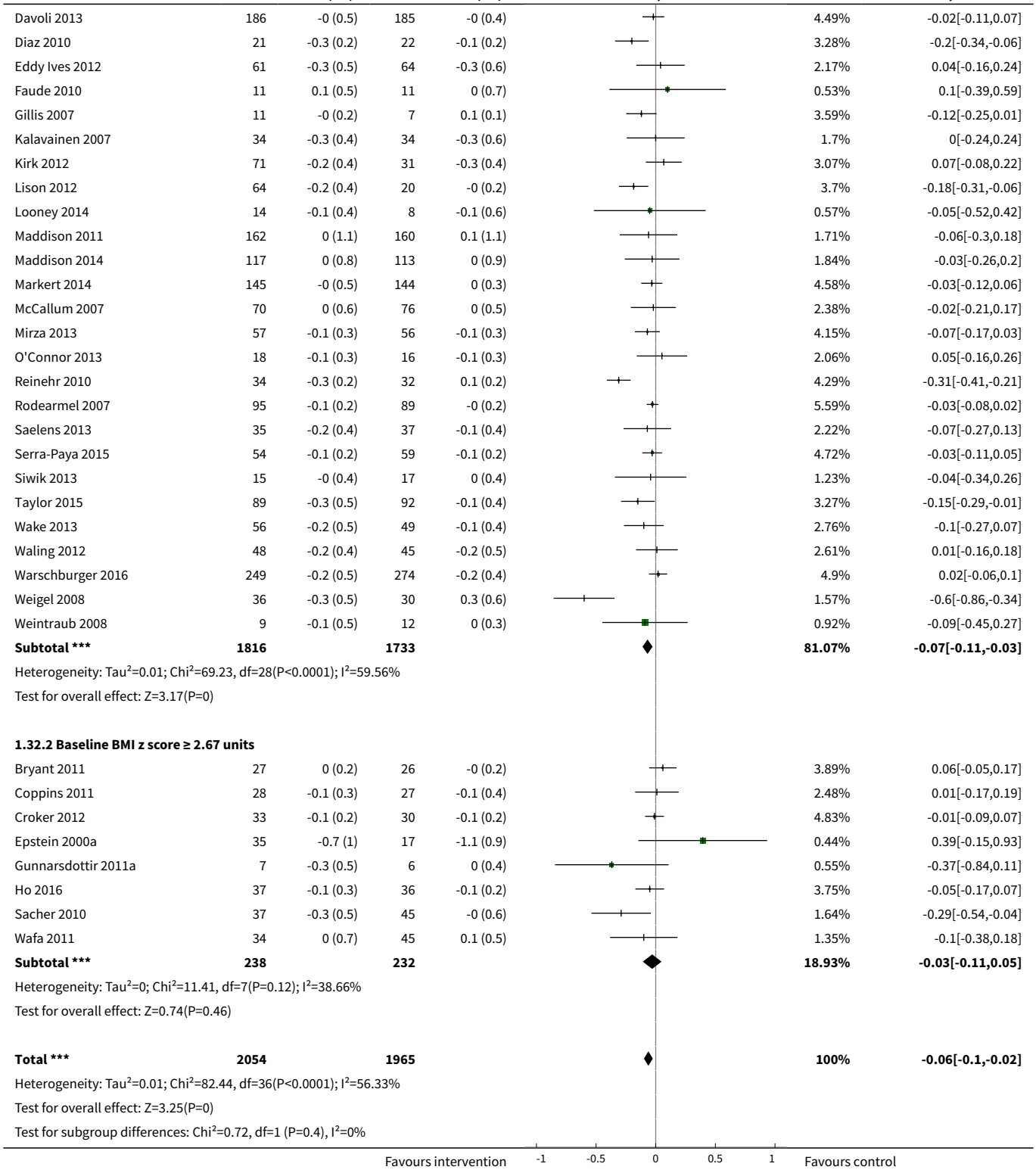
Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.31.1 Parent involvement							
Coppins 2011	28	3.9 (5.5)	27	5.1 (5.8)		2.07%	-1.2[-4.2,1.8]
Croker 2012	33	0.8 (2.8)	30	2.8 (2.9)		9.41%	-1.99[-3.4,-0.58]
Diaz 2010	33	2.1 (6.1)	33	5.6 (5.9)		2.22%	-3.5[-6.4,-0.6]
Eddy Ives 2012	61	3.2 (9.4)	64	3.4 (11.4)		1.39%	-0.15[-3.81,3.51]
Epstein 2000a	45	9 (13)	32	7.2 (17)		0.38%	1.78[-5.23,8.78]
Ho 2016	37	2.6 (5.2)	36	2.7 (5)		3.43%	-0.12[-2.45,2.21]
Kalarchian 2009	97	11.8 (6.9)	95	13.4 (5.4)		6.12%	-1.58[-3.32,0.16]
Kalavainen 2007	34	17.3 (5.2)	34	17.1 (7.4)		2.02%	0.2[-2.84,3.24]
Maddison 2014	117	2.8 (16.3)	113	2.6 (18.4)		0.92%	0.21[-4.29,4.71]
Nemet 2005	20	0.6 (16.7)	20	5.2 (24.2)		0.11%	-4.6[-17.49,8.29]
Siwik 2013	15	3.4 (8.8)	17	3.9 (15.9)		0.24%	-0.5[-9.28,8.29]
Taylor 2015	89	7.5 (10.4)	92	8.1 (8)		2.53%	-0.6[-3.31,2.11]
Waling 2012	36	6.7 (11.4)	35	8.8 (10.9)		0.69%	-2.1[-7.29,3.09]
Subtotal ***	**645**		**628**			**31.53%**	**-1.32[-2.09,-0.55]**
Heterogeneity: Tau^2=0; Chi^2=7.34, df=12(P=0.83); I^2=0%							
Test for overall effect: Z=3.36(P=0)							
1.31.2 No parental involvement							
Alves 2008	39	0.6 (1.3)	39	2 (1.5)		48.51%	-1.37[-1.99,-0.75]
Faude 2010	11	4.1 (13.5)	11	3.8 (11.7)		0.17%	0.3[-10.26,10.86]
Maddison 2011	162	2 (13.1)	160	2.8 (14.7)		2.01%	-0.72[-3.76,2.32]
Subtotal ***	**212**		**210**			**50.69%**	**-1.34[-1.94,-0.73]**
Heterogeneity: Tau^2=0; Chi^2=0.26, df=2(P=0.88); I^2=0%							
Test for overall effect: Z=4.33(P<0.0001)							
1.31.3 Parent targeted							
Wafa 2011	34	1.5 (2.5)	45	3.5 (2)		17.78%	-2[-3.02,-0.98]
Subtotal ***	**34**		**45**			**17.78%**	**-2[-3.02,-0.98]**
Heterogeneity: Not applicable							
Test for overall effect: Z=3.83(P=0)							
Total ***	**891**		**883**			**100%**	**-1.45[-1.88,-1.02]**
Heterogeneity: Tau^2=0; Chi^2=8.95, df=16(P=0.92); I^2=0%							
Test for overall effect: Z=6.59(P<0.0001)							
Test for subgroup differences: Chi^2=1.35, df=1 (P=0.51), I^2=0%							



Analysis 1.32. Comparison 1 Behaviour-changing interventions versus no treatment/usual care, Outcome 32 Change in BMI z score - baseline BMI z score.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.32.1 Baseline BMI z score < 2.67 units							
Arauz Boudreau 2013	13	-0 (0.1)	10	-0 (0.1)		4.51%	0.02[-0.07,0.11]
Boutelle 2014	21	-0.1 (0.4)	18	-0 (0.4)		1.53%	-0.05[-0.31,0.21]
Davis 2013	20	-0.1 (0.5)	22	-0.1 (0.5)		1.11%	0.03[-0.29,0.35]





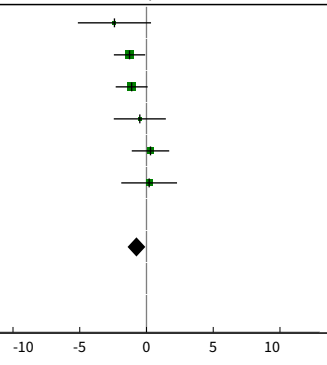
Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Davoli 2013	186	-0 (0.5)	185	-0 (0.4)		4.49%	-0.02[-0.11,0.07]
Diaz 2010	21	-0.3 (0.2)	22	-0.1 (0.2)		3.28%	-0.2[-0.34,-0.06]
Eddy Ives 2012	61	-0.3 (0.5)	64	-0.3 (0.6)		2.17%	0.04[-0.16,0.24]
Faude 2010	11	0.1 (0.5)	11	0 (0.7)		0.53%	0.1[-0.39,0.59]
Gillis 2007	11	-0 (0.2)	7	0.1 (0.1)		3.59%	-0.12[-0.25,0.01]
Kalavainen 2007	34	-0.3 (0.4)	34	-0.3 (0.6)		1.7%	0[-0.24,0.24]
Kirk 2012	71	-0.2 (0.4)	31	-0.3 (0.4)		3.07%	0.07[-0.08,0.22]
Lison 2012	64	-0.2 (0.4)	20	-0 (0.2)		3.7%	-0.18[-0.31,-0.06]
Looney 2014	14	-0.1 (0.4)	8	-0.1 (0.6)		0.57%	-0.05[-0.52,0.42]
Maddison 2011	162	0 (1.1)	160	0.1 (1.1)		1.71%	-0.06[-0.3,0.18]
Maddison 2014	117	0 (0.8)	113	0 (0.9)		1.84%	-0.03[-0.26,0.2]
Markert 2014	145	-0 (0.5)	144	0 (0.3)		4.58%	-0.03[-0.12,0.06]
McCallum 2007	70	0 (0.6)	76	0 (0.5)		2.38%	-0.02[-0.21,0.17]
Mirza 2013	57	-0.1 (0.3)	56	-0.1 (0.3)		4.15%	-0.07[-0.17,0.03]
O'Connor 2013	18	-0.1 (0.3)	16	-0.1 (0.3)		2.06%	0.05[-0.16,0.26]
Reinehr 2010	34	-0.3 (0.2)	32	0.1 (0.2)		4.29%	-0.31[-0.41,-0.21]
Rodearmel 2007	95	-0.1 (0.2)	89	-0 (0.2)		5.59%	-0.03[-0.08,0.02]
Saelens 2013	35	-0.2 (0.4)	37	-0.1 (0.4)		2.22%	-0.07[-0.27,0.13]
Serra-Paya 2015	54	-0.1 (0.2)	59	-0.1 (0.2)		4.72%	-0.03[-0.11,0.05]
Siwik 2013	15	-0 (0.4)	17	0 (0.4)		1.23%	-0.04[-0.34,0.26]
Taylor 2015	89	-0.3 (0.5)	92	-0.1 (0.4)		3.27%	-0.15[-0.29,-0.01]
Wake 2013	56	-0.2 (0.5)	49	-0.1 (0.4)		2.76%	-0.1[-0.27,0.07]
Waling 2012	48	-0.2 (0.4)	45	-0.2 (0.5)		2.61%	0.01[-0.16,0.18]
Warschburger 2016	249	-0.2 (0.5)	274	-0.2 (0.4)		4.9%	0.02[-0.06,0.1]
Weigel 2008	36	-0.3 (0.5)	30	0.3 (0.6)		1.57%	-0.6[-0.86,-0.34]
Weintraub 2008	9	-0.1 (0.5)	12	0 (0.3)		0.92%	-0.09[-0.45,0.27]
Subtotal * **	**1816**		**1733**			**81.07%**	**-0.07[-0.11,-0.03]**
Heterogeneity: Tau^2=0.01; Chi^2=69.23, df=28(P<0.0001); I^2=59.56%							
Test for overall effect: Z=3.17(P=0)							
1.32.2 Baseline BMI z score ≥ 2.67 units							
Bryant 2011	27	0 (0.2)	26	-0 (0.2)		3.89%	0.06[-0.05,0.17]
Coppins 2011	28	-0.1 (0.3)	27	-0.1 (0.4)		2.48%	0.01[-0.17,0.19]
Croker 2012	33	-0.1 (0.2)	30	-0.1 (0.2)		4.83%	-0.01[-0.09,0.07]
Epstein 2000a	35	-0.7 (1)	17	-1.1 (0.9)		0.44%	0.39[-0.15,0.93]
Gunnarsdottir 2011a	7	-0.3 (0.5)	6	0 (0.4)		0.55%	-0.37[-0.84,0.11]
Ho 2016	37	-0.1 (0.3)	36	-0.1 (0.2)		3.75%	-0.05[-0.17,0.07]
Sacher 2010	37	-0.3 (0.5)	45	-0 (0.6)		1.64%	-0.29[-0.54,-0.04]
Wafa 2011	34	0 (0.7)	45	0.1 (0.5)		1.35%	-0.1[-0.38,0.18]
Subtotal * **	**238**		**232**			**18.93%**	**-0.03[-0.11,0.05]**
Heterogeneity: Tau^2=0; Chi^2=11.41, df=7(P=0.12); I^2=38.66%							
Test for overall effect: Z=0.74(P=0.46)							
Total * **	**2054**		**1965**			**100%**	**-0.06[-0.1,-0.02]**
Heterogeneity: Tau^2=0.01; Chi^2=82.44, df=36(P<0.0001); I^2=56.33%							
Test for overall effect: Z=3.25(P=0)							
Test for subgroup differences: Chi^2=0.72, df=1 (P=0.4), I^2=0%							

Comparison 2. Behaviour-changing interventions plus component versus behaviour-changing intervention without component

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Change in BMI	4	195	Mean Difference (IV, Random, 95% CI)	-0.75 [-1.42, -0.09]
2 Change in BMI z score	5	212	Mean Difference (IV, Random, 95% CI)	-0.03 [-0.10, 0.04]
3 Change in weight	4	106	Mean Difference (IV, Random, 95% CI)	1.59 [-4.58, 7.77]

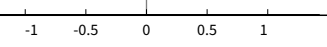
Analysis 2.1. Comparison 2 Behaviour-changing interventions plus component versus behaviour-changing intervention without component, Outcome 1 Change in BMI.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Epstein 1985c	7	-3.7 (2.7)	11	-1.3 (3.2)		5.72%	-2.4[-5.14,0.34]
Epstein 2001	13	-0.3 (1.4)	14	1 (1.7)		27.28%	-1.27[-2.44,-0.1]
Epstein 2001	14	-1.8 (1.9)	15	-0.6 (1.4)		26.4%	-1.11[-2.31,0.09]
Flodmark 1993	20	1.1 (2.8)	19	1.6 (3.3)		10.96%	-0.5[-2.45,1.45]
Woo 2004	22	0.1 (2.4)	21	-0.2 (2.3)		20.01%	0.3[-1.1,1.7]
Woo 2004	19	0 (4.1)	20	-0.2 (2.2)		9.62%	0.2[-1.89,2.29]
Total ***	**95**		**100**			**100%**	**-0.75[-1.42,-0.09]**
Heterogeneity: Tau^2=0.07; Chi^2=5.51, df=5(P=0.36); I^2=9.17%							
Test for overall effect: Z=2.21(P=0.03)							



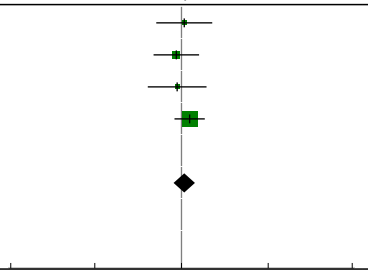
Analysis 2.2. Comparison 2 Behaviour-changing interventions plus component versus behaviour-changing intervention without component, Outcome 2 Change in BMI z score.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Epstein 2000a	17	-0.5 (1)	18	-0.9 (0.9)		1.06%	0.4[-0.24,1.04]
Epstein 2005	22	-0.9 (0.2)	19	-0.9 (0.2)		24.11%	0.05[-0.07,0.17]
Larsen 2015	40	-0.3 (0.6)	34	-0.2 (0.5)		6.88%	-0.06[-0.31,0.19]
Looney 2014	7	-0.2 (0.5)	7	-0.1 (0.3)		2.37%	-0.08[-0.5,0.34]
NCT02436330	35	-0.1 (0.1)	13	0 (0.1)		65.58%	-0.06[-0.13,0]
Total ***	**121**		**91**			**100%**	**-0.03[-0.1,0.04]**
Heterogeneity: Tau^2=0; Chi^2=4.37, df=4(P=0.36); I^2=8.46%							
Test for overall effect: Z=0.9(P=0.37)							



Analysis 2.3. Comparison 2 Behaviour-changing interventions plus component versus behaviour-changing intervention without component, Outcome 3 Change in weight.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Duffy 1993	9	3.2 (20.3)	8	1.6 (13.2)		14.63%	1.6[-14.54,17.74]
Epstein 1985a	25	8.3 (12.9)	10	11.2 (19.6)		22.11%	-2.98[-16.1,10.15]
Epstein 1985b	9	-3.9 (18.4)	10	-1.4 (19.3)		13.28%	-2.5[-19.44,14.44]
Epstein 2000a	17	11.9 (14.1)	18	7.2 (12.2)		49.98%	4.7[-4.03,13.43]
Total ***	**60**		**46**			**100%**	**1.59[-4.58,7.77]**
Heterogeneity: Tau^2=0; Chi^2=1.18, df=3(P=0.76); I^2=0%							
Test for overall effect: Z=0.51(P=0.61)							

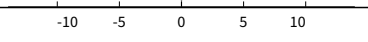


Comparison 3. Cluster RCTs versus comparator

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Change in BMI	2	629	Mean Difference (IV, Random, 95% CI)	-0.49 [-1.24, 0.27]

Analysis 3.1. Comparison 3 Cluster RCTs versus comparator, Outcome 1 Change in BMI.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Berry 2007	40	-1.2 (6.4)	40	-0.3 (5.9)		7.89%	-0.9[-3.59,1.79]
Taveras 2015	365	0.7 (4.5)	184	1.2 (4.4)		92.11%	-0.45[-1.24,0.33]
Total ***	**405**		**224**			**100%**	**-0.49[-1.24,0.27]**
Heterogeneity: Tau^2=0; Chi^2=0.1, df=1(P=0.75); I^2=0%							
Test for overall effect: Z=1.27(P=0.2)							

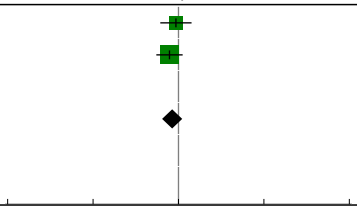


Comparison 4. Maintenance intervention versus no treatment/usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Change in BMI z score	2	263	Mean Difference (IV, Random, 95% CI)	-0.07 [-0.19, 0.04]

Analysis 4.1. Comparison 4 Maintenance intervention versus no treatment/usual care, Outcome 1 Change in BMI z score.

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
de Niet 2012	73	-0.1 (0.6)	68	-0 (0.5)		41.48%	-0.03[-0.21,0.15]
Wilfley 2007	85	0 (0.4)	37	0.1 (0.4)		58.52%	-0.11[-0.26,0.05]
Total ***	**158**		**105**			**100%**	**-0.07[-0.19,0.04]**
Heterogeneity: Tau^2=0; Chi^2=0.38, df=1(P=0.54); I^2=0%							
Test for overall effect: Z=1.23(P=0.22)							



ADDITIONAL TABLES

Table 1. Overview of study populations

Trial (trial design)	Intervention(s) and comparator(s)	Sample size[a]	Screened/ eligible (N)	Randomised (N)	ITT (N)	Analysed (N)	Finishing trial (N)	Randomised finishing trial (%)	Follow-up (extended follow-up)[b]
NCT02436330 (parallel RCT)	I: exergaming and didactic healthy teaching	-	-	60	-	35	35	58.3	6 months
	C: didactic healthy teaching	-		24	-	13	13	54.2	
	total:			**84**	**-**	**48**	**48**	**57.1**	
Ho 2016 (parallel RCT)	I: standard nutrition counselling plus portion control equipment	44	185	48	48	37	37	77.1	6 months
	C: standard nutrition counselling	44		51	51	36	36	70.6	
	total:			**99**	**99**	**73**	**73**	**73.7**	
Warschburger 2016 (parallel RCT)	I: parental CBT training group plus child inpatient intervention	250	1595	336	249	249	168	50.0	13 months
	C: parental information-only group plus child inpatient intervention	250		350	274	274	268	76.6	
	total:			**686**	**523**	**523**	**436**	**63.6**	
Epstein 2015 (parallel RCT)	I: family-based treatment + variety of high energy-dense foods	-	-	13	13	13	-	-	25 weeks
	C: family-based treatment only	-		11	11	11	-	-	
	total:			**24**	**24**	**24**	**-**	**-**	
Larsen 2015 (parallel RCT)	I: education programme in addition to health consultations	20	99	45	40	40	16	36	2 years
	C: health consultations only	20		35	34	34	10	29	
	total:			**80**	**74**	**74**	**26**	**33**	

Table 1. Overview of study populations *(Continued)*

Serra-Paya 2015 **(parallel RCT)**	I: Nereu group	50	123	54	54	54	44	81.5	8 months
	C: counselling group	50		59	59	59	45	76.3	
	total:			**113**	**113**	**113**	**89**	**78.8**	
Taveras 2015 **(cluster RCT)**	I1: computerised point-of-care alerts plus direct-to-parent outreach and support	680	2242	171	171	171	170	99.4	1 year
	I2: computerised point-of-care alerts only			194	194	194	194	100	
	C: usual care			184	184	184	183	99.5	
	total:			**549**	**549**	**549**	**547**	**99.6**	
Taylor 2015 **(parallel RCT)**	I: tailored package	125	1093	104	-	91	89	85.6	2 years
	C: usual care	125		102	-	90	92	90.2	
	total:			**206**	**-**	**181**	**181**	**87.9**	
Berry 2014 **(cluster RCT)**	I: nutrition and exercise education and coping skills intervention	179	2608	189	152	152	-	-	18 months
	C: waiting list control	179		169	145	145	-	-	
	total:			**358**	**297**	**297**	**-**	**-**	
Boutelle 2014 **(parallel RCT)**	I: Regulation of Cues (ROC) programme	-	96	22	-	21	21	95.5	6 months
	C: control group	-		22	-	18	18	81.8	
	total:			**44**	**-**	**39**	**39**	**88.6**	
Hamilton-Shield 2014 **(parallel RCT)**	I: standard care plus Mandolean training	36	10230	26	-	-	0	0	5 months (terminated before endpoint of 12 months)
	C: standard care only			35	-	-	0	0	
	total:			**61**	**-**	**-**	**0**	**0**	

Table 1. Overview of study populations *(Continued)*

Looney 2014 **(parallel RCT)**	I1: newsletter and growth monitoring plus behavioural counselling	-	65	7	7	7	6	85.7	6 months
	I2: newsletter and growth monitoring	-		7	7	7	7	100	
	C: newsletter only	-		8	8	8	7	87.5	
	total:			**22**	**22**	**22**	**20**	**90.9**	
Maddison 2014 **(parallel RCT)**	I: SWITCH intervention group	135	-	127	127	117	117	92.1	24 weeks
	C: control group	135		124	124	113	113	91.1	
	total:			**251**	**251**	**230**	**230**	**91.6**	
Markert 2014 **(parallel RCT)**	I: telephone-based adiposity prevention for families (TAFF)	112	4005	154	145	145	54	35.1	1 year
	C: control group	112		149	144	144	113	75.8	
	total:			**303**	**289**	**289**	**167**	**55.1**	
Arauz Boudreau 2013 **(parallel RCT)**	I: behaviour-changing intervention and coaching on behaviour-changing behaviours	21	63	23	-	14	14	60.9	6 months
	C: waiting-list control	21		18	-	12	12	66.7	
	total:			**41**	**-**	**26**	**26**	**63.4**	
Davis 2013 **(parallel RCT)**	I: telemedicine intervention	20	96	31	-	20	20	64.5	8 months
	C: physician-visit intervention	20		27	-	22	22	81.5	
	total:			**58**	**-**	**42**	**42**	**72.4**	
Davoli 2013 **(parallel RCT)**	I: family paediatrician-led motivational interviewing	85	795	187	186	186	167	89.3	2 years
	C: usual care plus a booklet on obesity prevention	85		185	185	185	170	91.9	

Table 1. Overview of study populations *(Continued)*

	total:			**372**	**371**	**371**	**337**	**90.6**	
Lochrie 2013 (parallel RCT)	I: family-based intervention	60	150	65	32	32	32	49.2	12 months
	C: education session	60		65	40	40	40	61.5	
	total:			**130**	**72**	**72**	**72**	**55.4**	
Mirza 2013 (parallel RCT)	I: low-glycaemic load dietary group	42	291	57	57	57	33	57.9	2 years
	C: conventional low-fat dietary group	42		56	56	56	31	55.4	
	total:			**113**	**113**	**113**	**64**	**56.6**	
O'Connor 2013 (parallel RCT)	I: 'Helping Hand' obesity intervention	40	302	20	-	18	18	90.0	7 months
	C: waiting list control			20	-	16	16	80.0	
	total:			**40**	**-**	**34**	**34**	**85.0**	
Saelens 2013 (parallel RCT)	I: self-directed approach	29	195	43	35	25	-	-	29 months
	C: prescribed treatment approach	29		46	37	34	-	-	
	total:			**89**	**72**	**59**	**46**	**51.7**	
Siwik 2013 (cross-over RCT, with first phase analysed only)	I: 'Choices' group office-visit intervention	40	75	-		15	15	-	6 months
	C: lagged control group			-		17	17	-	
	total:			**35**		**32**	**32**	**91.4**	
Vann 2013 (parallel RCT)	I1: pedometer + DVD group	-	-	7	-	4	4	57.1	6 months
	I2: pedometer group	-	-	7	-	4	4	57.1	
	I3: DVD group	-	-	7	-	3	3	42.9	
	C: control group	-	-	7	-	3	3	42.9	
	total:			**28**	**-**	**14**	**14**	**50.0**	

Table 1. Overview of study populations *(Continued)*

Wake 2013 **(parallel RCT)**	I: HopSCOTCH (the shared care obesity trial) intervention	172	199	62	62	56	56	90.3	15 months
	C: usual care			56	56	51	51	91.1	
	total:			**118**	**118**	**107**	**107**	**90.7**	
Croker 2012 **(parallel RCT)**	I: family-based behavioural treatment	48	99	37	37	33	22	59.5	6 months
	C: waiting list control			35	35	27	27	77.1	
	total:			**72**	**72**	**60**	**49**	**68.0**	
de Niet 2012 **(parallel RCT)**	I: short message service maintenance treatment and behaviour-changing treatment	64	144	73	73	73	63	86.3	9 months
	C: behaviour-changing treatment only	64		68	68	67	47	70.1	
	total:			**141**	**141**	**140**	**110**	**78.6**	
Eddy Ives 2012 **(parallel RCT)**	I: dietary and physical exercise recommendations during 6 sessions	110	211	87	61	61	61	70.1	12 months
	C: dietary and physical exercise recommendations at 2 sessions only	110		87	64	64	64	73.6	
	total:			**174**	**125**	**125**	**125**	**71.8**	
Kirk 2012 **(parallel RCT)**	I1: low carbohydrate diet plus group exercise/education sessions	-	-	35	35	35	25	71.4	12 months
	I2: reduced glycaemic load diet plus group exercise/education sessions	-	440	36	36	36	32	88.9	
	C: standard portion-controlled diet plus group exercise/education sessions	-		31	31	31	28	90.3	
	total:			**102**	**102**	**102**	**85**	**83.3**	
Lison 2012 **(parallel RCT)**	I1: hospital clinic group exercise-diet programme	20	120	45	32	32	32	71.1	6 months

Table 1. Overview of study populations *(Continued)*

	I2: home-based combined exercise-diet programme	20		41	32	32	32	78.0	
	C: control group	20		24	20	20	20	83.3	
	total:			**110**	**84**	**84**	**84**	**76.4**	
Waling 2012 **(parallel RCT)**	I: family-based intervention	82	112	58	48	48	26	44.8	2 years
	C: control group			47	45	45	22	46.8	
	total:			**105**	**93**	**93**	**48**	**45.7**	
Wright 2012 **(cluster RCT)**	I: Kids N Fitness (KNF) intervention	130	335	165	165	91	91	55.2	1 year
	C: general education (GE)			140	140	99	99	70.7	
	total:			**305**	**305**	**190**	**190**	**62.3**	
Barkin 2011 **(parallel RCT)**	I: group physical activity and goal setting	-	183	80	-	-	-	-	6 months
	C: standard care counselling and health education session			79	-	-	-	-	
	total:			**159**	**106**	**72**	**72**	**45.3**	
Bryant 2011 **(parallel RCT)**	I: WATCH IT intervention	-	180	35	-	27	27	77.1	12 months
	C: waiting-list control	-		35	-	26	26	74.3	
	total:			**70**	**-**	**53**	**53**	**75.7**	
Coppins 2011 **(cross-over RCT, with first phase analysed only)**	I: multi-component family-focused education package	-	-	35	35	35	28	80.0	12 months
	C: waiting list control			30	30	30	27	90.0	
	total:			**65**	**65**	**65**	**55**	**84.6**	
Gunnarsdottir 2011a	I: Epstein's family-based behavioural treatment (FBBT)	-	-	8	-	7	7	87.5	-

Table 1. Overview of study populations *(Continued)*

(parallel RCT)	C: standard care (waiting-list control)	-	-	8	-	6	6	75.0	
	total:			**16**	**-**	**13**	**13**	**81.3**	12 months
Maddison 2011	I: active video game package	165	1932	160	160	160	123	77.0	24 weeks
(parallel RCT)	C: control group	165		162	162	162	135	83.3	
	total:			**322**	**322**	**322**	**258**	**80.1**	
Wafa 2011	I: low intensity intervention	30	365	52	34	34	34	65.4	6 months
(parallel RCT)	C: waiting-list control	30		55	45	45	45	81.8	
	total:			**107**	**79**	**79**	**79**	**73.8**	
Bathrellou 2010	I: behavioural intervention with parental involvement	-	-	24	-	23	16	66.7	18 months
(parallel RCT)	C: behavioural intervention without parental involvement			23	-	19	16	69.6	
	total:			**47**	**-**	**42**	**32**	**68.1**	
Diaz 2010	I: behavioural curriculum plus registered dieticians and physician consultations	26	134	38	33	33 (primary outcomes ITT) 21 (secondary outcomes, completers' analysis)	21	55.3	12 months
(parallel RCT)	C: physician consultations only	26		38	33	33 (primary outcomes, ITT) 22 (secondary outcomes,	22	57.9	

Table 1. Overview of study populations *(Continued)*

						completers' analysis)			
	total:			**76**	**66**	**66 or 43**	**43**	**56.6**	
Duggins 2010 **(parallel RCT)**	I: nutrition classes and family YMCA membership	50	98	44	36	36	-	-	12 months
	C: nutrition classes only	50		39	30	30	-	-	
	total:			**83**	**66**	**66**	**-**	**-**	
Faude 2010 **(parallel RCT)**	I: football training programme (FB)	-	-	19	-	11	11	57.9	6 months
	C: established standard sports programme (STD)			20	-	11	11	55.0	
	total:			**39**	**-**	**22**	**22**	**56.4**	
Reinehr 2010 **(parallel RCT)**	I: behaviour-changing intervention	32	80	39	34	34	33	84.6	6 months
	C: waiting-list control	32		32	32	32	27	84.4	
	total:			**71**	**66**	**66**	**60**	**84.5**	
Sacher 2010 **(parallel RCT)**	I: MEND program	40	-	60		37	37	61.7	6 months
	C: control group	40	-	56		45	45	80.4	
	total:			**116**		**82**	**82**	**70.7**	
Kalarchian 2009 **(parallel RCT)**	I: family-based, behavioural weight-control group	100	650	97	97	97	81	83.5	18 months
	C: usual care	100		95	95	95	81	85.3	
	total:			**192**	**192**	**192**	**162**	**84.4**	
Nowicka 2009 **(parallel RCT)**	I: summer camp	-	-	20	-	20	20	100	12 months
	C: control group	-	-	28	-	15	15	53.6	

Table 1. Overview of study populations *(Continued)*

	total:			**48**	**-**	**35**	**35**	**72.9**	
Wake 2009 **(parallel RCT)**	I: LEAP2 behavioural intervention	190	947	139	129	129	115	82.7	12 months
	C: control group	190		119	116	116	115	96.6	
	total:			**258**	**245**	**245**	**230**	**89.1**	
Alves 2008 **(parallel RCT)**	I: exercise programme	32	638	39	39	39	30	76.9	6 months
	C: no care	32		39	39	39	38	97.4	
	total:			**78**	**78**	**78**	**68**	**87.1**	
Hughes 2008 **(parallel RCT)**	I: behavioural programme	34	237	69	45	45	45	65.2	12 months
	C: standard care	34		65	41	41	41	63.1	
	total:			**134**	**86**	**86**	**86**	**64.2**	
Weigel 2008 **(parallel RCT)**	I: active intervention group	-	-	37		36	36	97.3	12 months
	C: control group	-	-	36		30	30	83.3	
	total:			**73**		**66**	**66**	**90.4**	
Weintraub 2008 **(parallel RCT)**	I: after-school team sports programme	-	-	9	-	9	9	100	6 months
	C: "Active placebo" control	-	-	12	-	12	12	100	
	total:			**21**	**-**	**21**	**21**	**100**	
Berry 2007 **(cluster RCT)**	I: nutrition and exercise education programme plus coping-skills training	-	88	40	-	-	-	-	6 months
	C: nutrition and exercise education programme only			40	-	-	-	-	
	total:			**80**	**-**	**-**	**60**	**75**	
Gillis 2007 **(parallel RCT)**	I: exercise and diet education with weekly diaries and telephone calls	-	-	14	-	11	11	78.6	6 months

Table 1. Overview of study populations *(Continued)*

	C: exercise and diet education only	-	-	13	-	7	7	53.8	
	total:			**27**	**-**	**18**	**18**	**66.7**	
Kalavainen 2007 **(parallel RCT)**	I: family-centered group programme	37	83	35	-	34	34	97.1	3 years
	C: routine treatment	37		35	-	34	34	97.1	
	total:			**70**	**-**	**68**	**68**	**97.1**	
McCallum 2007 **(parallel RCT)**	I: LEAP intervention	63	505	81	70	70	70	85.4	15 months
	C: control group	63		82	76	76	76	93.8	
	total:			**163**	**146**	**146**	**146**	**89.6**	
Rodearmel 2007 **(parallel RCT)**	I: 'America on the Move' intervention group	-	-	149	-	95	95	63.8	6 months
	C: self-monitoring group	-	-	149	-	89	89	59.7	
	total:			**298**	**-**	**184**	**184**	**61.7**	
Satoh 2007 **(parallel RCT)**	I: dietary guidance using an easily handled model nutritional balance chart (MNBC)	-	-	29	-	15	15	51.7	6 months
	C: control group	-	-	14	-	8	8	57.1	
	total:			**43**	**-**	**23**	**23**	**53.5**	
Wilfley 2007 **(parallel RCT)**	I1: behavioural skills maintenance group	40	204	51	48	48	42	82.4	2 years
	I2: social facilitation maintenance group	40		50	49	49	43	86.0	
	C: control group	40		49	46	46	37	75.5	
	total:			**150**	**143**	**143**	**122**	**81.3**	
Epstein 2005 **(parallel RCT)**	I: standardised family-based behavioural weight control programme plus reinforcement	-	77	-	19	19	18	-	24 months

Table 1. Overview of study populations *(Continued)*

	for increasing alternatives to eating								
	C: standardised family-based behavioural weight control programme only			-	22	22	17	-	
	total:			**44**	**41**	**41**	**35**	**79.5**	
Nemet 2005 **(parallel RCT)**	I: combined dietary and exercise programme	18	-	30	-	20	20	66.7	1 year
	C: control group	18	-	24	-	20	20	83.3	
	total:			**54**	**-**	**40**	**40**	**74.1**	
Woo 2004 **(parallel RCT)**	I1: diet plus supervised structured exercise programme with continuing training	-	-	22	-	22	-	-	1 year
	I2: diet plus supervised structured exercise programme with detraining	-	-	19	-	19	-	-	
	C: diet modification only	-	-	41	-	41	-	-	
	total:			**82**	**-**	**82**	**-**	**-**	
Epstein 2001 **(parallel RCT)**	I: a combination of reducing sedentary behaviour and increasing physical activity	-	-	-	-	-	-	-	12 months
	C: targeting increasing physical activity only	-	-	-	-	-	-	-	
	total:			**67**	**-**	**56**	**56**	**83.6**	
Nova 2001 **(parallel RCT)**	I: enhanced approach	-	-	72	-	50	50	64.9	2 years
	C: routine approach	-	-	114	-	80	80	70.2	
	total:			**186**	**-**	**130**	**130**	**69.9**	
Epstein 2000a **(parallel RCT)**	I1: behavioural weight-control programme plus parent and child problem solving	-	162	-	-	17	17	-	24 months

Table 1. Overview of study populations *(Continued)*

	I2: behavioural weight-control programme plus child problem solving only			-	-	18	18	-	
	C: standard treatment with no additional problem solving			-	-	17	17	-	
	total:			**67**	**-**	**52**	**52**	**77.6**	
Schwingshandl 1999 **(parallel RCT)**	I: physical activity programme and dietary advice	-	-	14	-	10	10	71.4	1 year
	C: dietary advice only	-	-	16	-	10	10	62.5	
	total:			**30**	**-**	**20**	**20**	**66.7**	
Duffy 1993 **(parallel RCT)**	I: cognitive self-management training plus behaviour therapy	-	-	-	-	9	9	-	6 months
	C: behaviour therapy plus attention placebo control methods			-	-	8	8	-	
	total:			**27**	**-**	**17**	**17**	**63.0**	
Flodmark 1993 **(parallel RCT)**	I: family therapy	-	-	25	20	20	20	80	2 years
	C: conventional treatment	-	-	19	19	19	19	100	
	total:			**44**	**39**	**39**	**39**	**88.6**	
Epstein 1985c **(parallel RCT)**	I: behaviourally-oriented programme that emphasised parent management	-	-	-	-	-	-	-	12 months
	C: provided equal education and attention but not behavioural principles			-	-	-	-	-	
	total:			**24**	**-**	**-**	**18**	**75.0**	
Epstein 1985b **(parallel RCT)**	I: diet and exercise education	-	-	-	-	-	-	-	12 months
	C: diet education only			-	-	-	-	-	
	total:			**23**	**-**	**-**	**19**	**82.6**	

Table 1. Overview of study populations *(Continued)*

Epstein 1985a **(parallel RCT)**	I1: diet plus programmed aerobic exercise programme	-	-	-	-	13	13	-	24 months
	I2: diet plus exercise programme			-	-	12	12	-	
	C: diet plus low-intensity calisthenic exercise programme			-	-	10	10	-	
	total:			**41**	**-**	**35**	**35**	**85.4**	
Epstein 1984a **(parallel RCT)**	I1: diet-plus-exercise group	-	-	18	-	15	15	83.3	6 months
	I2: diet only	-	-	18	-	18	18	100	
	C: waiting-list control	-	-	17	-	14	14	82.4	
	total:			**53**	**-**	**47**	**47**	**88.7**	
Grand total	***All interventions***			***8461[c]***			***5887[d]***		
	All comparators								
	All interventions and comparators								

- denotes not reported

[a]According to power calculation in study publication or report.

[b]Follow-up under randomised conditions until end of trial or if not available, duration of intervention; extended follow-up refers to follow-up of participants once the original study was terminated as specified in the power calculation.

[c]8 studies did not report numbers of randomised participants per intervention/comparator group (Duffy 1993; Epstein 1985a; Epstein 1985b; Epstein 1985c; Epstein 2000a; Epstein 2001; Epstein 2005; Siwik 2013).

[d]10 Studies did not report numbers of participants finishing the trial (Barkin 2011; Berry 2007; Berry 2014; Duggins 2010; Epstein 1985b; Epstein 1985c; Epstein 2001; Epstein 2015; Saelens 2013; Woo 2004).

C: comparator; I: intervention; ITT: intention-to-treat; N/A: not applicable; RCT: randomised controlled trial; SWITCH: Screen-Time Weight-loss Intervention Targeting Children at Home

Table 2. Sensitivity analyses

Analysis	Number of studies	Number of participants	Mean difference (95% CI)	Chi² (P value)	I² statistic
Change in BMI (all trials) Analysis 1.1	24	Intervention: 1422 Comparator: 1363	-0.53 (-0.82 to -0.24)	66.49 (< 0.00001)	65%
Change in BMI (removing studies with imputed data)	9	Intervention: 653 Comparator: 646	-0.48 (-0.83 to -0.13)	33.87 (< 0.0001)	76%
Change in BMI z score (all trials) Analysis 1.2	37	Intervention: 2054 Comparator: 1965	-0.06 (-0.10 to -0.02)	82.44 (< 0.0001)	56%
Change in BMI z score (removing studies with imputed data)	15	Intervention: 800 Comparator: 791	-0.05 (-0.10 to 0.00)	41.49 (0.0001)	66%
Change in weight (all trials) Analysis 1.3	17	Intervention: 891 Comparator: 883	-1.45 (-1.88 to -1.02)	8.95 (0.92)	0%
Change in weight (removing studies with imputed data)	8	Intervention: 335 Comparator: 339	-1.54 (-1.99 to -1.09)	5.95 (0.55)	0%

BMI: body mass index
BMI z score: "A BMI z score or standard deviation score indicates how many units (of the standard deviation) a child's BMI is above or below the average BMI value for their age group and sex. For instance, a z score of 1.5 indicates that a child is 1.5 standard deviations above the average value, and a z score of -1.5 indicates a child is 1.5 standard deviations below the average value" (NOO NHS 2011)

APPENDICES

Appendix 1. Search strategies

Cochrane Central Register of Controlled Trials (CENTRAL; Cochrane Library)
Part I: Obesity
1. [mh ^Obesity]
2. [mh ^"Obesity, Morbid"]
3. [mh ^"Obesity, Abdominal"]
4. [mh ^"Pediatric Obesity"]
5. [mh ^Overweight]
6. [mh ^"Weight Loss"]
7. (adipos* or obes*):ti,ab
8. (overweight* or ("over" next weight*)):ti,ab

(Continued)

9. ("weight" near/1 (reduc* or los* or control* or manage*)):ti,ab

10. {or #1-#9}

Part II: Intervention

11. [mh "Behavior Therapy"]

12. [mh "Counseling"]

13. [mh ^"Family Therapy"]

14. [mh ^"Social Support"]

15. [mh ^"Program Evaluation"]

16. [mh "Exercise"]

17. [mh "Exercise Therapy"]

18. [mh "Physical Education and Training"]

19. [mh "Exercise Movement Techniques"]

20. [mh ^"Motor Activity"]

21. [mh Diet]

22. [mh "Diet Therapy"]

23. [mh ^"Patient Education as Topic"]

24. [mh ^"Health Education"]

25. [mh "Health Behavior"]

26. [mh "Health Promotion"]

27. [mh ^"School Health Services"]

28. [mh ^"School Nursing"]

29. [mh ^"Life style"]

30. (("obesity" near/4 "intervention") or "program" or "programme" or "camp" or "camps"):ti,ab

31. ("lifestyle" or "life style"):ti,ab

32. exercis*:ti,ab

33. (physic* next (activ* or fit*)):ti,ab

34. (walk* or jog* or swim* or ("weight" next lift*) or danc* or "aerobics"):ti,ab

35. ((physic* or strength* or resist* or "circuit" or "weight" or aerob* or "cross" or "endurance" or structur*) near/4 train*):ti,ab

36. ("behavioral" or "behavioural" or (("behavior" or "behaviour") next "modification") or psychoth* or "psychosocial"):ti,ab

37. (("group" or "family" or cognit* or behav*) next therap*):ti,ab

38. (counseling or counselling):ti,ab

39. educat*:ti,ab

40. (("parent" or "parents" or "family") next ("based" or "focused" or "directed" or "centered" or "only" or "led")):ti,ab

41. (diet* or "healthy nutrition" or (nutrition* next ("knowledge" or educat* or therap* or program* or intervention*))):ti,ab

(Continued)

42. {or #11-#41}

Part III: Part I + Part II and additional MeSH/subheading combination

43. #10 and #42

44. [mh ^Obesity] or [mh ^"Obesity, Morbid"] or [mh ^Overweight]

45. [mh /DH,PC,RH,TH,PX]*[diet therapy or prevention & control or rehabilitation or therapy or psychology]*

46. #44 and #45

47. #43 or #46

Part IV: Population [adapted from Leclercq 2013 *]*

48. [mh ^Adolescent]

49. [mh Child]

50. [mh ^Infant]

51. [mh ^Pediatrics]

52. "minors":ti,ab

53. ("boy" or "boys" or "boyhood"):ti,ab

54. girl*:ti,ab

55. ("kid" or "kids"):ti,ab

56. infant*:ti,ab

57. ("baby" or "babies"):ti,ab

58. ("toddler" or "toddlers"):ti,ab

59. ("child" or "childs" or children* or childhood* or childcare* or schoolchild*):ti,ab

60. adolescen*:ti,ab

61. juvenil*:ti,ab

62. youth*:ti,ab

63. (teen* or preteen*):ti,ab

64. (underage* or ("under" next age*)):ti,ab

65. pubescen*:ti,ab

66. (paediatric* or pediatric*):ti,ab

67. {or #48-#66}

Part V: Part III AND IV and additional MeSH/subheading combination

68. #47 and #67

69. [mh ^"Pediatric Obesity"]

70. [mh /DH,PC,RH,TH,PX]

71. #69 and #70

72. #68 or #71

(Continued)

MEDLINE (Ovid SP)

Part I: Obesity

1. Obesity/
2. Obesity, Morbid/
3. Obesity, Abdominal/
4. Pediatric Obesity/
5. Overweight/
6. Weight Loss/
7. (adipos* or obes*).tw.
8. (overweight* or over weight*).tw.
9. (weight adj1 (reduc* or los* or control* or manage*)).tw.
10. or/1-9

Part II: Intervention

11. exp Behavior Therapy/
12. exp Counseling/
13. Family Therapy/
14. Social Support/
15. Program Evaluation/
16. exp Exercise/
17. exp Exercise Therapy/
18. exp "Physical Education and Training"/
19. exp Exercise Movement Techniques/
20. Motor Activity/
21. exp Diet/
22. exp Diet Therapy/
23. Patient Education as Topic/
24. Health Education/
25. exp Health Behavior/
26. exp Health Promotion/
27. School Health Services/
28. School Nursing/
29. Life style/
30. ((obesity adj3 intervention) or program or programme or camp?).tw.
31. (lifestyle or life style).tw.

(Continued)

32. exercis*.tw.

33. (physic* adj (activ* or fit*)).tw.

34. (walk* or jog* or swim* or weight lift* or danc* or aerobics).tw.

35. ((physic* or strength* or resist* or circuit or weight or aerob* or cross or endurance or structur*) adj3 train*).tw.

36. (behavio?ral or behavio?r modification or psychoth* or psychosocial).tw.

37. ((group or family or cognit* or behav*) adj therap*).tw.

38. counsel?ing.tw.

39. educat*.tw.

40. ((parent? or family) adj (based or focused or directed or centered or only or led)).tw.

41. (diet* or healthy nutrition or (nutrition* adj (knowledge or educat* or therap* or program* or intervention*))).tw.

42. or/11-41

Part III: Part I + Part II and additional MeSH/subheading combination

43. 10 and 42

44. Obesity/ or Obesity, Morbid/ or Overweight/ or Weight Loss/

45. diet therapy.fs. or prevention & control.fs. or rehabilitation.fs. or therapy.fs. or psychology.fs.

46. 44 and 45

47. 43 or 46

Part IV: Population [adapted from Leclercq 2013 *]*

48. Adolescent/

49. exp Child/

50. Infant/

51. Pediatrics/

52. minors.tw.

53. (boy or boys or boyhood).tw.

54. girl*.tw.

55. infant*.tw.

56. (baby or babies).tw.

57. toddler?.tw.

58. (kid or kids).tw.

59. (child or childs or children* or childhood* or childcare* or schoolchild*).tw.

60. adolescen*.tw.

61. juvenil*.tw.

62. youth*.tw.

63. (teen* or preteen*).tw.

(Continued)

64. (underage* or under age*).tw.

65. pubescen*.tw.

66. p?ediatric*.tw.

67. or/48-66

Part V: Part III AND IV and additional MeSH/subheading combination

68. 47 and 67

69. Pediatric Obesity/

70. diet therapy.fs. or prevention & control.fs. or rehabilitation.fs. or therapy.fs. or psychology.fs.

71. 69 and 70

72. 68 or 71

Part VI: Study filter [Cochrane Handbook 2008 RCT filter - sensitivity and precision maximizing version]

73. randomized controlled trial.pt.

74. controlled clinical trial.pt.

75. randomi?ed.ab.

76. placebo.ab.

77. clinical trials as topic/

78. randomly.ab.

79. trial.ti.

80. or/73-79

81. exp animals/ not humans/

82. 80 not 81

Part VII: Part V + Part VI

83. 72 and 82

Embase (Ovid SP)

Part I: Obesity

1. obesity/

2. morbid obesity/

3. abdominal obesity/

4. childhood obesity/

5. weight reduction/

6. weight control/

7. (adipos* or obes*).tw.

8. (overweight* or over weight*).tw.

9. (weight adj1 (reduc* or los* or control* or manage*)).tw.

(Continued)

10. or/1-9

Part II: Intervention

11. behavior therapy/
12. cognitive therapy/
13. exp counseling/
14. family therapy/
15. social support/
16. exp program evaluation/
17. exp exercise/
18. exp physical education/
19. exp physical activity/
20. exp motor activity/
21. training/
22. exp diet/
23. exp diet therapy/
24. nutritional health/
25. child nutrition/
26. feeding behavior/
27. patient education/
28. health promotion/
29. health literacy/
30. nutrition education/
31. health education/
32. school health education/
33. school health service/
34. lifestyle/
35. lifestyle modification/
36. ((obesity adj3 intervention) or program or programme or camp?).tw.
37. (lifestyle or life style).tw.
38. exercis*.tw.
39. (physic* adj (activ* or fit*)).tw.
40. (walk* or jog* or swim* or weight lift* or danc* or aerobics).tw.
41. ((physic* or strength* or resist* or circuit or weight or aerob* or cross or endurance or structur*) adj3 train*).tw.
42. (behavio?ral or behavio?r modification or psychoth* or psychosocial).tw.

(Continued)

43. ((group or family or cognit* or behav*) adj therap*).tw.

44. counsel?ing.tw.

45. educat*.tw.

46. ((parent? or family) adj (based or focused or directed or centered or only or led)).tw.

47. (diet* or healthy nutrition or (nutrition* adj (knowledge or educat* or therap* or program* or intervention*))).tw.

48. or/11-47

Part III: Part I + Part II and additional MeSH/subheading combination

49. 10 and 48

50. obesity/ or morbid obesity/

51. pc.fs or rh.fs or th.fs. *[prevention.fs. or rehabilitation.fs. or therapy.fs.]*

52. 50 and 51

53. 49 or 52

Part IV: Population [adapted from Leclercq 2013 *]*

54. juvenile/

55. adolescent/

56. child/

57. infant/

58. baby/

59. toddler/

60. preschool child/

61. school child/

62. pediatrics/

63. minors.tw.

64. (boy or boys or boyhood).tw.

65. girl*.tw.

66. infant*.tw.

67. (baby or babies).tw.

68. toddler?.tw.

69. (kid or kids).tw.

70. (child or childs or children* or childhood* or childcare* or schoolchild*).tw.

71. adolescen*.tw.

72. juvenil*.tw.

73. youth*.tw.

74. (teen* or preteen*).tw.

(Continued)

75. (underage* or under age*).tw.

76. pubescen*.tw.

77. p?ediatric*.tw.

78. or/54-77

Part V: Part III AND IV and additional MeSH/subheading combination

79. 53 and 78

80. childhood obesity/

81. pc.fs or rh.fs or th.fs. *[prevention.fs. or rehabilitation.fs. or therapy.fs.]*

82. 80 and 81

83. 79 or 82

Part VI: Study filter [Wong 2006a *filter - SDSSGS version]*

84. random*.tw. or clinical trial*.mp. or exp treatment outcome/

Part VII: Part V + Part VI

85. 83 and 84

PsycINFO (Ovid SP)

Part I: Obesity

1. exp Overweight

2. (adipos* or obes*).tw.

3. (overweight* or over weight*).tw.

4. or/1-3

Part II: Intervention

5. Weight Control/

6. Weight Loss/

7. Aerobic Exercise/

8. Diets/

9. exp Exercise/

10. Movement Therapy/

11. Dance Therapy/

12. exp Physical Activity/

13. Physical Fitness/

14. Health Behavior/

15. Health Promotion/

16. Health Knowledge/

17. Health Literacy/

(Continued)

18. Health Education/

19. Client Education/

20. Lifestyle/

21. Physical Education/

22. exp Program Evaluation/

23. Educational Programs/

24. Educational Therapy/

25. exp Program Development/

26. School Based Intervention/

27. School Counseling/

28. Counseling/

29. Group Counseling/

30. Family Therapy/

31. Support Groups/

32. Social Support/

33. School Counselors/

34. exp Behavior Modification/

35. Cognitive Behavior Therapy/

36. Cognitive Therapy/

37. ((obesity adj3 intervention) or program or programme or camp?).tw.

38. (lifestyle or life style).tw.

39. exercis*.tw.

40. (physic* adj (activ* or fit*)).tw.

41. (walk* or jog* or swim* or weight lift* or danc* or aerobics).tw.

42. ((physic* or strength* or resist* or circuit or weight or aerob* or cross or endurance or structur*) adj3 train*).tw.

43. (behavio?ral or behavio?r modification or psychoth* or psychosocial).tw.

44. ((group or family or cognit* or behav*) adj therap*).tw.

45. counsel?ing.tw.

46. educat*.tw.

47. ((parent? or family) adj (based or focused or directed or centered or only or led)).tw.

48. (diet* or healthy nutrition or (nutrition* adj (knowledge or educat* or therap* or program* or intervention*))).tw.

49. or/5-48

Part III: Part I + Part II

50. 4 and 49

(Continued)

Part IV: Population [adapted from Leclercq 2013 *]*

51. minors.tw.

52. (boy or boys or boyhood).tw.

53. girl*.tw.

54. infant*.tw.

55. (baby or babies).tw.

56. toddler?.tw.

57. (kid or kids).tw.

58. (child or childs or children* or childhood* or childcare* or schoolchild*).tw.

59. adolescen*.tw.

60. juvenil*.tw.

61. youth*.tw.

62. (teen* or preteen*).tw.

63. (underage* or under age*).tw.

64. pubescen*.tw.

65. p?ediatric*.tw.

66. or/51-65

Part V: Part III AND IV and additional MeSH/subheading combination

67. 50 and 66

Part VI: Study filter [Eady 2008 *filter - BS version]*

68. control*.tw. OR random*.tw. OR exp Treatment/

Part VII: Part V + Part VI

69. 67 and 68

CINAHL (EBSCOhost)

Part I: Obesity

S1. MH "Obesity+"

S2. TX (adipos* or obes*)

S3. TX (overweight* or "over weight*")

S4. S1 OR S2 OR S3

Part II: Intervention

S5. MH "Weight Loss"

S6. MH "Behavior Modification+"

S7. MH "Counseling"

S8. MH "Family Therapy"

(Continued)

S9. MH "Support, Psychosocial"

S10.MH "Support Groups"

S11.MH "Program Evaluation"

S12.MH "Program Implementation"

S13.MH "Exercise+"

S14.MH "Sports+"

S15.MH "Therapeutic Exercise+"

S16.MH "Physical Fitness"

S17.MH "Physical Education and Training+"

S18.MH "Health Education+"

S19.MH "Diet+"

S20.MH "Diet Therapy+"

S21.MH "Health Behavior"

S22.MH "Eating Behavior"

S23.MH "Health Promotion"

S24.MH "School Health Services+"

S25.MH "Life style changes"

S26.MH "Life style"

S27.TX (weight N1 (reduc* or los* or control* or manage*))

S28.TX ((obesity N3 intervention) OR program OR programme OR camp#)

S29.TX (lifestyle or "life style")

S30.TX exercis*

S31.TX (physic* N1 (activ* or fit*))

S32.TX (walk* or jog* or swim* or weight lift* or danc* or aerobics)

S33.TX ((physic* or strength* or resist* or circuit or weight or aerob* or cross or endurance or structur*) N3 train*)

S34.TX (behavio#ral or behavio#r modification or psychoth* or psychosocial)

S35.TX ((group or family or cognit* or behav*) N1 therap*)

S36.TX counsel#ing

S37.TX educat*

S38.TX ((parent# or family) N1 (based or focused or directed or centered or only or led))

S39.TX (diet* or "healthy nutrition" or (nutrition* N1 (knowledge or educat* or therap* or program* or intervention*)))

S40.S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39

Part III: Part I + Part II and additional MeSH/subheading combination

S41.S4 AND S40

(Continued)

S42.(MH "Obesity+/DH/ED/PC/PF/RH/TH") [diet therapy or education or prevention & control or psychosocial factors or rehabilitation or therapy]

S43.S41 OR S42

Part IV: Population [based on Leclercq 2013 *]*

S44.MH "Adolescence"

S45.MH "Child+"

S46.MH "Infant"

S47.MH "Pediatrics"

S48.TX minors

S49.TX (boy OR boys OR boyhood)

S50.TX girl*

S51.TX infant*

S52.TX (baby OR babies)

S53.TX toddler#

S54.TX (kid OR kids)

S55.TX (child OR childs OR children* OR childhood* OR childcare* OR schoolchild*)

S56.TX adolescen*

S57.TX juvenil*

S58.TX youth*

S59.TX (teen* or preteen*)

S60.TX (underage* or under age*)

S61.TX pubescen*

S62.TX (paediatric* OR pediatric*)

S63.S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S62

Part V: Part III AND IV and additional MeSH/subheading combination

S64.S43 AND S63

S65.(MH "Pediatric Obesity/DH/ED/PC/PF/RH/TH") [diet therapy or education or prevention & control or psychosocial factors or rehabilitation or therapy]

S66.S64 OR S65

Part VI: Study filter [Wong 2006b *filter - SDSSGS version]*

S67.MH "treatment outcomes+" OR MH "experimental studies+" or random*

Part VII: Part V + Part VI

S68.S66 AND S67

LILACS (IAHx)

(Continued)

((((MH:"Obesity" OR MH:"Obesity, Morbid" OR MH:"Obesity, Abdominal" OR MH:"Pediatric Obesity" OR MH:"Overweight" OR adipos$ OR obes$ OR overweight$ OR "over weight" OR sobrepes$ OR "exceso de peso" OR "excesso de peso") AND (MH:"Weight Loss" OR MH:"Exercise" OR MH:"Exercise Therapy" OR MH:"Physical Education and Training" OR MH:"Exercise Movement Techniques" OR MH:"Weight Reduction Programs" OR MH:"Motor Activity" OR MH:"Behavior Therapy" OR MH:"Counseling" OR MH:"Family Therapy" OR MH:"Social Support" OR MH:"Program Evaluation" OR MH:"Diet" OR MH:"Diet Therapy" OR MH:"Patient Education as Topic" OR MH:"Health Education" OR MH:"Health Behavior" OR MH:"Health Promotion" OR MH:"Weight Reduction Programs" OR MH:"School Health Services" OR MH:"Life style" OR exerci$ OR ejerci$ OR ((physic$ OR fisic$) AND (activ$ OR atívid$ OR fit$ OR educac$ OR entrenam$ OR treinam$)) OR ((physic$ OR fisic$ OR strength$ OR forca OR fuerza OR resist$ OR circuit$ OR weight OR aerob$ OR endurance OR structur$ OR estructur$) AND train$ OR treina$ OR entrena$) OR program$ OR "estilo de vida" OR padres OR pais OR familia OR familias OR familiar OR terapia OR orienta$ OR educa$ OR diet$ OR nutric$ OR "weight reduction" OR "weight loss" OR "weight control" OR "control de peso")) OR (MH:"Obesity/diet therapy" OR MH:"Obesity, Morbid/diet therapy" OR MH:"Overweight/diet therapy" OR MH:"Obesity/prevention & control" OR MH:"Obesity, Morbid/prevention & control " OR MH:"Overweight/prevention & control" OR MH:"Obesity/rehabilitation" OR MH:"Obesity, Morbid/rehabilitation" OR MH:"Overweight/rehabilitation" OR MH:"Obesity/therapy" OR MH:"Obesity, Morbid/therapy" OR MH:"Overweight/therapy" OR MH:"Obesity/psychology" OR MH:"Obesity, Morbid/psychology" OR MH:"Overweight/psychology")) AND (MH:"Adolescent" OR MH:"Child" OR MH:"Pediatrics" OR MH:"Infant" OR minors OR boy OR boys OR girl$ OR kid OR kids OR child OR childs OR children$ OR childhood$ OR childcare$ OR schoolchild$ OR escolar$ OR adolescen$ OR preadolescen$ OR juvenil$ OR juventud$ OR youth$ OR teen$ OR preteen$ OR underage$ OR pubescen$ OR paediatri$ OR pediatri$ OR joven$ OR jovem$ OR niños OR niñas OR crianca$ OR menin$ OR "menor de edad" OR "menores de edad" OR "menor de idade" OR "menores de idade")) OR MH:"Pediatric Obesity/diet therapy" OR MH:"Pediatric Obesity/prevention & control" OR MH:"Pediatric Obesity/rehabilitation" OR MH:"Pediatric Obesity/therapy" OR MH:"Pediatric Obesity/psychology"

[activated filter "Controlled Clinical Trial"]

ICTRP Search Portal (advanced search)

[activated "Search for clinical trials in children"]:

in Title: obes* OR overweight*

OR

in Condition: obes* OR overweight*

Recruitment Status: ALL

ClinicalTrials.gov (advanced search)

Conditions: obese OR overweight OR obesity

Study type: Interventional Studies

Age Group: Child (birth-17)

Appendix 2. Description of interventions

	Intervention(s) (route, frequency, total dose/day)	Adequate[a] intervention (Yes/No)	Comparator(s) (route, frequency, total dose/day)	Adequate[a] comparator (Yes/No)
NCT02436330	Exergaming and didactic healthy teaching (6 months of 10 weekly 2- h sessions (1 h of exergaming and 1 h of didactic classes teaching behavioural and dietary curricula). Followed by monthly 1-h maintenance didactic teaching for 6-month period)	N/A	Didactic healthy teaching (6 months of 10 weekly 1-h sessions of didactic classes teaching behavioural and dietary curricula.	Yes

(Continued)

			Followed by monthly 1-h didactic health for 6-month period)	
Ho 2016	Standard nutrition counselling plus portion control equipment (1 x 1 h nutrition counselling with dietician plus 10-15 counselling on using a calibrated dinner plate and breakfast cereal bowl to assist with portion control. 6 monthly phone calls to assess compliance and dietician recommendations)	N/A	Standard nutrition counselling (1 x1 h nutrition counselling with dietician. 6 monthly phone calls to assess dietician recommendations)	Yes
Warschburger 2016	Parental CBT training group plus child in-patient intervention (Inpatient treatment for children only for 3-6 weeks Involved behaviour-changing intervention: nutrition education, diet modification, CBT Parental group – 2 d CBT training e.g. self-monitoring, stimulus control Telephone booster sessions 1 and 3 months after child completed intervention)	N/A	Parental information-only group plus child in-patient intervention (Inpatient treatment for children Parents only received brief written guide after child completed inpatient stay Follow-up telephone interview 3 months later)	Yes
Epstein 2015	Family-based treatment + variety of high energy-dense foods (12 weekly meetings, 2 biweekly then 1 monthly (25 weeks in total). Separate large group meetings for parents and children (50-60 min) then small group counselling (20-30 min). Traffic light diet, ≤ 2 red foods/ d (chose 2 red foods to target monthly). Given activity advice (60 min/d MVPA). Behavioural treatment (self-monitoring, positive reinforcement))	N/A	Family-based treatment only (Same intervention but not required to participate in the variety meal plan choosing 2 red foods monthly)	Yes
Larsen 2015	An education programme in addition to health consultations (Monthly consultations in general practice (year 1), every two months in year 2. Also received 3 educational programmes (3 h each) in groups. Led by dietitian, physical exercise instructor and psychologist Promote healthy lifestyles and inspire enjoyable activities + healthy diet Aimed at families – no behavioural component)	N/A	Health consultations only (Families received health consultations in general practices but did not receive the 3 educational sessions)	Yes
Serra-Paya 2015	Nereu programme	N/A	Counselling group	Yes

(Continued)

	(Supervised PA sessions for children (3 per week, 8 months). Family theoretical and practical sessions for parents (once per week, 60 min each) – families could share experiences and commitments. Behaviour strategy sessions for family: increase PA, improve eating habits. Weekend activities – e.g. ski/water park party, 3 weekends)		(8 monthly, 10 min sessions with family. Delivered by child's paediatrician. Aim to increase PA and learn healthy behaviours)	
Taveras 2015	I1: computerised point-of-care alerts plus direct-to-parent outreach and support. (Visits with paediatrician focusing on individual and family-level behaviours. Include decrease sugar, increase MVPA, improve sleep, reduce screen time. Computerised CDS system alerts included growth charts, guidelines, documenting BMI percentile + behaviours, referrals. Also families assigned to health coach who used motivational interviewing by telephone at 1, 3, 6 and 9 months – also took part in text message service)	N/A	Usual care (received the current standard of care offered by their paediatric office. This included well child visits and follow-up appointments for weight checks with their primary care provider, subspecialist, or a nutritionist. They also received generic health-related materials in the mail from the study team. Clinicians in the usual care arm did not have access to the computerised point-of-care alerts for the duration of the intervention.)	Yes
	I2: computerised point-of-care alerts only (Same as above but did not receive the motivational interviewing or texts)	N/A		
Taylor 2015	Tailored package family-based intervention (families attended for a single multidisciplinary session with a consultant for 1-2 h to develop specific goals suitable for each family. This initial session was followed by regular sessions with a mentor to discuss progress and provide support. Mentor meetings were monthly in year 1 and every 3 months in year 2 (alternating between face-to-face at University/or at home (30-40 min) or phone calls (5-10 min)). Individual goals were negotiated and resources provided to families. Behavioural targets included parenting, dietary intake and PA. Length = 2 years)	N/A	Usual care (met with trained researcher at baseline and 6 months – first appointment (30-45 min) the parent received individualised feedback about their child's diet and activity habits. Generalised guidance was then provided. At the second appointment the progress was reviewed and additional support provided (15-30 min))	Yes
Berry 2014	Nutrition and exercise education and coping skills intervention (Phase 1 - 60 min education + 45 min exercise once per week, 12 weeks. Phase 2 – sessions once per month for 9 months. Behavioural component – coping skills, cognitive restructuring, problem solving.	N/A	Waiting-list control, usual care (Usual care for 18 months then given intervention)	Yes

(Continued)

	Diet + exercise advice – moderate intensity exercise, portion control, calories. Aimed at child and parent, led by dietitian/nurse practitioner + exercise trainer)			
Boutelle 2014	Regulation of Cues (ROC) programme (12 sessions over 12 weeks then 2 biweekly visits (45 min each) Child + parent sessions by psychologists, co-therapists and undergraduates. Psychoeducation, parenting skills, self-monitoring of hunger, overeating. No PA component)	N/A	Usual care control group (No care for 4 months then received a binder with treatment materials included)	Yes
Hamilton-Shield 2014	Standard care plus Mandolean training (5 standard care sessions (every 3 months for 12 months), 3 supportive telephone calls were provided to help participants to engage in behaviours discussed in the face-to-face sessions. Eatwell plate, nutrition goals, activity 60 min/d, motivational interviewing techniques. Families were encouraged to set their own dietary goals and targets, with practical advice and guidance from the practice nurse. Mandolean therapy - 4 sessions with the nurse therapist over the first 2 months, in addition to standard care appointments. Mandolean portable weighing scales measure portion size + eating speed)	N/A	Standard care only (No Mandolean training given)	Yes
Looney 2014	I1: newsletter and growth-monitoring plus behavioural counselling (Newsletter monthly (6 months) – PA and nutrition advice. Received growth monitoring materials (e.g. diary, BMI wheel, scale) Behavioural counselling 3 x 30 min + 3 x 20 min (2 ½ h) Self-monitoring, modelling, stimulus control, positive reinforcement MVPA > 60 min, reduce TV < 2 h/d, reduce sugar, increase fruit + vegetables)	N/A	Newsletter only (No contact – only received monthly newsletter)	Yes
	I2: newsletter and growth monitoring (Monthly contact (3 x 15 min in person and 3 x 10 phone calls – 1 h 15 total). No behavioural counselling)	N/A		Yes
Maddison 2014	SWITCH intervention group (Face-to-face meetings over 20 weeks and monthly newsletter + website. Based on social cognitive theory: praise, positive reinforcement etc. Decrease sedentary behaviours – TV monitoring device (30 token for 30 min). Children given activity pack for non-screen activities e.g.	N/A	Usual care control group (Given access to the website but no other contact)	Yes

(Continued)

	tennis ball, cards. Child and parent involved – no nutritional component)			
Markert 2014	Telephone based adiposity prevention for families (TAFF) (14 calls every 3-4 weeks (plus 2 optional coaching sessions), 20-30 min each, Newsletter (14 issues) over 1 year. Based on family therapy approaches + solution focused systematic therapy. Newsletter – psychological support, stress, diet behaviour, PA)	N/A	No-care control	Yes
Arauz Boudreau 2013	Behaviour-changing intervention and coaching on behaviour changing (5 power-up sessions over 5 weeks (1.5 h each) – 1 session 3 months later. Children and parents involved in sessions. Interactive games and activities (e.g. indoor jump rope). Topics included portion control, healthy snacking, TV viewing. Led by health educator, physical therapist, nutritionist, paediatrician. Health coaching at least once, then follow-ups during 6 months. Focus on social barriers and goal setting Behavioural, diet and PA components)	N/A	Waiting-list control (No care provided during 6 months Received intervention after 6 months)	Yes
Davis 2013	Telemedicine intervention (8 weekly groups over Telemedicine (1 h each) then monthly for 6 months. Parents and children taught separately and met at end for goal setting. Topics included behaviour modification (e.g. goal setting), activity monitoring, Stop Light Diet, nutritional recommendations Led by psychologists or graduate students/postdoctoral fellows)	N/A	Physician-visit intervention (One visit with a primary care physician to talk about a list of topics e.g. exercise)	Yes
Davoli 2013	Family paediatrician-led motivational interviewing (5 individual meetings over 12 months for child and parent. Family paediatrician-led motivational interviewing based on the transtheoretical model of addiction and behaviour change. The child and parents agreed on 2 objectives at each meeting (1 concerning dietary improvements and 1 concerning PA improvements) that were clearly defined and achievable. During each subsequent meeting, the degree of achievement of the objectives set at the previous meeting was assessed; the objectives were then reinforced or redefined and recorded accordingly.)	N/A	Usual care plus a booklet on obesity prevention (Received a booklet about obesity prevention and usual care from a paediatrician)	Yes
Lochrie 2013	Family-based intervention (8 weekly sessions, 4 bimonthly then 2 monthly (60-90 min) - 6 months	N/A	Education session (One 1-h group session led by a dietit-	Yes

(Continued)

	Outpatient group sessions by a psychologist and dietitian (child + parent). Nutrition, behaviour modification, psychosocial intervention, exercise. Applied maintenance sessions integrated participants in the community. Goal setting and nutrition topics reinforced at each session)		ian. General recommendations on PA and nutrition No behaviour change or psychosocial strategies or techniques)	
Mirza 2013	Low-glycemic load dietary group (Nutrition sessions: 12 weekly group sessions, separate for parents + children. Plus weekly family session - met with child + parent individually. Behaviour changes – self-monitoring, social reinforcement, contingency. Parents given parenting classes to target diet + activity behaviours. Increase PA, reduce sedentary behaviour. Lower glycaemic load, replace carbohydrates with protein + fat – given recipes)	N/A	Conventional low-fat dietary group (Diet advice based on low fat diet instead. Limit fat and increase grains. Other components were the same)	Yes
O'Connor 2013	"Helping Hand" obesity intervention (6 sessions, once per month (follow-up 2 weeks after each session) Behaviour selected each month (e.g. be more active, eat more fruit) Goals set and behaviour monitored – parents completed worksheets)	N/A	Waiting-list control (Instructed to see doctor (usual paediatric care). Offered intervention at 7 months)	Yes
Saelens 2013	Self-directed approach (20 sessions over 21/22 weeks (20-30 min individual family, 40-50 min separate child + parents groups). Skills: Food monitoring, contingency management, environmental control etc. Given more autonomy in making choices about skills to use, self-efficacy. Develop tailored realistic and meaningful goals. Increase exercise, decrease sedentary activities, Stoplight Eating Plan	N/A	Prescribed approach (Received the same intervention for 5 weeks then the remaining sessions focused on prescribed approach Interventionist set up goals with little input from families)	Yes
Siwik 2013	"Choices" group office-visit intervention (12 weekly individual and group check-ins (child and parent). Reunions at 3-4 and 6-8 months after. Motivational interviewing, received certificate of accomplishment if goals met. Set goals to increase PA – promoted activities (e.g. dance, soccer). Increase water, decrease sugar, portion control, decrease fast foods)	N/A	C: lagged control group (Given intervention at 6 months)	Yes
Vann 2013	I1: pedometer + DVD group (Given a pedometer (goal of 10,000 steps daily) + age-appropriate fitness DVD. Involved in a	N/A	Usual care (Not given a fitness DVD or pedometer	Yes

(Continued)

	weight-management programme – no behavioural component. Nutrition advice given and also encouraged to use a Xbox-Kinect in the clinic)		but still involved in weight-management programme)	
	I2: pedometer group (As above but no fitness DVD)	N/A		
	I3: fitness DVD group (As above but no pedometer)	N/A		
Wake 2013	HopSCOTCH (the shared care obesity trial) intervention (One initial appointment with obesity specialist consultant. Then 11 GP consultations over 15 months (15-30 min each). Weight management counselling, goal setting, tracking progress. Advice on healthy eating by a dietitian, followed up by GP. PA and sedentary behaviour advice followed up by GP)	N/A	Usual care (No support given but told to visit GP for usual care)	Yes
Croker 2012	Family-based behavioural treatment (FBBT) (12 sessions (1.5 h each) plus 3 maintenance sessions – over 6 months. Child sessions run by dietitian and parent sessions by a clinician. Based on learning theory and behaviour-modification techniques. Encouraged to reduce sedentary behaviours, increase activity. Used the traffic light system and Eatwell Plate)	N/A	Waiting-list control (No care, then given intervention after 6 months)	Yes
de Niet 2012	Short message service maintenance treatment and behaviour-changing treatment (3 months of behaviour-changing treatment (8 sessions) before randomisation. Then sessions at 6, 9 and 12 months - behavioural-modification techniques. SMSMT – self-monitoring and feedback weekly Nutrition and PA self-monitoring and advice given)	N/A	Behaviour-changing treatment only (Received behaviour changing treatment but no SMSMT)	Yes
Eddy Ives 2012	Dietary and physical exercise recommendations during 6 sessions (At baseline the child and parents/tutor received dietary and physical exercise recommendations which were then also provided at 1, 3, 6, 9 and 12 months. Included increasing exercise to 45 min daily, reducing TV and computer use, eating three meals/d, eating slowly and using small plates, eating fruit and vegetables and monitoring sugar consumption. Sessions led by paediatricians and were 30-45 min long)	N/A	Dietary and physical exercise recommendations at 2 sessions only (Received the same recommendations as the intervention group but only at baseline and 12 months. Offered the intervention after 12 months)	Yes

(Continued)

Kirk 2012	I1: low carbohydrate diet + group exercise/education sessions (Biweekly 1-h exercise sessions, 12 weekly parent-child sessions (30-min individual counselling or 90-min group sessions) – over 3 months. Exercise led by exercise specialist, encourage to be active for ≥ 30 min/d. Limit carbohydrate intake and increase high protein foods (measure ketones). No behavioural component)	N/A	Standard portion-controlled diet + group exercise/education sessions (Same PA sessions. Diet – consume age-appropriate amount of grains, vegetables, fruit etc. Calorie target re-evaluated frequency)	Yes
	I2: reduced glycaemic load diet + group exercise/education sessions (Same PA sessions but told to limit high-glycaemic index foods)	N/A		
Lison 2012	I1: hospital clinic group exercise-diet programme (5 x 60 min exercise sessions per week (120 sessions, 6 months). Moderate aerobic activity + resistance training, increase intensity each session. Two 1-h educational sessions conducted by paediatricians at the hospital. Promote Mediterranean diet, additional support (e.g. food labels). No behavioural component)	N/A	Usual care control group (At the two hospital visits they were instructed about diet and behaviour changes but never received any exercise sessions)	Yes
	I2: home-based combined exercise-diet programme (performed exercise at home and completed log book. Same nutrition information as above)	N/A		
Waling 2012	Family-based intervention (14 sessions 1-2 times per month (90-120 min) over 12 months + assignments. 2nd year: Internet-based email system for counselling, chat rooms, assignments. Formulate goals – cravings, hunger control, stress, self-image, self-perception. Pedometer task, indoor + outdoor games (e.g. line dancing). Healthy foods, fruit + vegetables, cooking, recipes, reduce sugar)	N/A	No-care control group (One information session over 2 years – no care)	Yes
Wright 2012	Kids N Fitness (KNF) intervention (6 weekly 90-min sessions (after-school) plus school + community activities. Involved PA sessions and activities Nutrition education – healthy lifestyle behaviours, food pyramid Also a parental support group – bimonthly educational newsletter)	N/A	General education (GE) (Standard PA programme in school. No education or other activities offered)	Yes
Barkin 2011	Group PA and goal setting (6 sessions over 6 months for child and parent. 1 clinic visit, received behaviour-modifi-	N/A	Standard care counselling and health education session	Yes

(Continued)

	cation counselling by a physician (trained in brief principles of motivational interviewing) and also a 45-min group health education session. Five monthly PA sessions (1 h long) at a recreational center. Each session included 20 min skills-building didactic based on American Heart Association educational materials, 30 min of group PA. Parent and child completed a goal setting contract. Behavioural and PA components, no dietary component.)		(2 sessions of standard care counselling by a physician and a 45-min health education session. Nutrition advice addressed both nutrition and PA. Programme manager responded to group questions	
Bryant 2011	WATCH IT intervention (30 min of motivational counselling weekly for 4 months (child + parent). Plus weekly 1-h sessions of PA given by sports coaches. Nutrition advice given through a Healthy Eating Lifestyle Programme. Given by health trainers instead of medical professionals)	N/A	Waiting-list control (No care for 12 months then offered the intervention)	Yes
Coppins 2011	Multi-component family-focused education package (2 workshops (8 h in total), held 1-2 weeks apart (child + parent). Plus 2 PA sessions (1 h/week). Workshops – behaviour change, psychological well-being, healthy eating)	N/A	Waiting-list control (No care, given intervention after 12 months)	Yes
Gunnarsdottir 2011a	Epstein's family-based behavioural treatment (FBBT) (11 weeks of treatments (4 months) – 11 group education sessions (60 min each) and 11 individual consulting sessions (30 min each) . Trained parents in behaviour modifications such as stimulus control. Group sessions focused on behaviour changes (exercise, Traffic Light Diet). Child and parent attended individual sessions together – participants were weighed, and daily food and activity records were analysed and graphed for weekly changes in body weight, fruit and vegetable consumption and PA; goal setting and problem solving were among the factors discussed.)	N/A	Standard care (waiting-list control) (One or two 30-min consultations with a paediatric endocrinologist. One or two 60-min nutritional counselling sessions. Participants offered the intervention after 12 months)	Yes
Maddison 2011	Active video game package (Given a Song PlayStation EyeToy upgrade – received 5 games during 6 months. Encourage to increase activity and substitute non-active video game play. No behavioural or nutrition component)	N/A	No-care control group (Continued with normal video play Given PlayStation update at 6 months)	Yes
Wafa 2011	Low-intensity intervention (8 x 1-h group session with a dietician over 26 weeks (parents only). 8 PA sessions for children – led by exercise instructor. Behaviour-change techniques (parenting skills, relapse). A clinical	N/A	Waiting-list control (Offered the intervention at 6 months)	Yes

(Continued)

	psychologist provided support in 1 session. Increase PA, decreasing sedentary behaviours. Changes in diet, food labels, cooking, traffic light plan, family meals)			
Bathrellou 2010	Behavioural intervention with parental involvement (Multidisciplinary programme (CBT principles), 12 weekly sessions (2 h each). The intervention had 3 components: delivery of a behavioural curriculum (Programa Cambia), consultations with registered dieticians and physician consultations. The behavioural curriculum included 12 weekly sessions of 2 h and was based on the health belief model and a simple food guide developed by the authors (a Health Nutrition Traffic Light system). Parental involvement in 2 individual sessions and last 10 min of other sessions. Monthly booster sessions from 3-9 months. Dietary and PA advice regarding energy balance. Goal setting and self-monitoring encouraged)	N/A	Behavioural intervention without parental involvement (Same multidisciplinary programme but no parental involvement in the sessions)	Yes
Diaz 2010	Behavioural curriculum plus registered dieticians and physician consultations (12 behavioural sessions over 12 weeks (2 h each). 12 dietician consultations over 12 weeks. Then monthly physician consultations (10-15 min) – total 6 months. Behavioural modification, exercise goal setting, traffic light diet (child + parent))	N/A	Physician consultations only (Monitored BMI and blood pressure and encouraged PA, reduce sedentary behaviour, nutrition advice and behavioural techniques 12 monthly sessions (10-15 min each))	Yes
Duggins 2010	Nutrition classes and family YMCA membership (4 nutrition sessions over 9 months (dietitian-led): eating habits, meal planning. Handbook on food choices, PA, sedentary behaviours. Every participant and their parents or guardians were scheduled to attend the nutrition classes (within 6 weeks of enrolment and 1 week later, at 6 months and 9 months). Also, received a no-cost 1-year family membership to a YMCA (swimming, jogging). YMCA diaries were completed by the participant during each visit to the YMCA throughout the 12-month study duration. No behavioural component)	N/A	Nutrition classes only (Received the same 4 nutrition classes but had no YMCA membership)	Yes
Faude 2010	Football training programme (FB) (6 months, 3 d/week (1-h sessions). 10% warm up, 50% small-sided games, 20% techniques, 20% fitness with ball. No behavioural or nutritional component)	N/A	Established standard sports programme (STD) (10% warm up, 40% aerobic endurance activities, 20% co-ordination/flexibility, 15%	Yes

(Continued)

			strength, 15% speed) 6 month intervention, 3 d/week, 1-h sessions	
Reinehr 2010	"Obeldicks Light" behaviour-changing intervention 3 months intensive phase (6 x 1.5-h child groups sessions, 6 x 1.5-h parent evening, 1 nutrition counselling + 1 PA training (1 per week, 1.5 h) Establishing phase (3 months) – 1 nutritional counselling, 3 x 30 min individual counselling and PA training continued Behavioural counselling based on systemic + solution-focused theories Exercise included ball games, reduce sedentary behaviours "Optimized mixed diet", diet guidelines, traffic light system, nutrition course	N/A	Waiting-list control Intervention offered after 6 months	Yes
Sacher 2010	MEND program 18 sessions over 9 weeks (2 h each) – behavioural, nutrition, PA Given access to swimming pool for 21 weeks Behavioural - stimulus control, goal setting, reinforcement (child and parent) Child took part in non-competitive group play Healthy eating advice, weekly targets, food habits, recipes, supermarket tours	N/A	Waiting-list control Offered intervention after 6 months	Yes
Kalarchian 2009	Family-based, behavioural weight control group (20 group meetings (child + parent separate, 60 min) for 6 months. 6 booster sessions between months 6-12. Behavioural: self-monitoring, goals, stimulus control, positive reinforcement. Encouraged to increase PA and decrease sedentary behaviours. Stoplight eating Plan with daily energy range based on body weight)	N/A	Usual care (2 nutrition consultations based on Stoplight eating plan. Offered intervention at 18 months)	Yes
Nowicka 2009	Summer camp (Week-long summer camp – children tried out at least 2 sports/d. Meals served during camp were nutritionally balanced + portion controlled. A coach was assigned to support child's favourite sport for a further 6 months. No behavioural component)	N/A	No-care control	Yes
Wake 2009	LEAP2 behavioural intervention	N/A	No-care control group	Yes

(Continued)

	(4 consultations over 12 weeks with a GP (child and parent) Behavioural changes – goals, family-based reinforcement techniques Target PA and nutrition (e.g. lower fat, breakfast))			
Alves 2008	Exercise programme (Exercises programme 3 x per week (6 months), 50 min sessions for child only. Moderate intensity exercises such as dancing. Taught by physical education teacher. No behavioural or diet component)	N/A	No-care control (no sessions, 6 months)	Yes
Hughes 2008	Behavioural programme (8 appointments during 26 weeks (total 5 h). Used family-centred approach, various behavioural-change techniques, modified traffic-light approach and restrict sedentary behaviour)	N/A	Standard care (3-4 outpatient appointments (total 1.5 h) typical dietetic care – direct-a-parent, mainly less focus on exercise/sedentary behaviour)	Yes
Weigel 2008	Active intervention group (2 x weekly (45-60 min) sessions at local sports center (child only). Parental support provided separately (monthly, up to 2 h). Coping strategies (e.g. eating behaviours), swimming + indoor sports provided. Food pyramid, fruit + vegetable template, food logbooks. Led by dietitians, sports coaches, psychologists Length = 12 months)	N/A	Usual care control group (Therapeutic care at 0 and 6 months. PA and diet recommendations. Coping strategies)	Yes
Weintraub 2008	After-school team sports programme Offered 3 d/week (2 ¼ h) for 5 months, then 4 d/week from month 5 (6 months in total) Supportive team building, warm up, stretching, soccer skills Matches held quarterly with children, parents and coaches No behavioural or nutrition arm	N/A	"active placebo" control 25 sessions on nutrition and health education After school meetings for 6 months	Yes
Berry 2007	Nutrition and exercise education programme (NEEP) plus coping skills training (CST) (24 weekly sessions aimed at child and parents. Parent received 6 weeks of NEEP and 6 weeks of CST. Children received 6 weeks of NEEP, 6 weeks of behavioural-modification with NEEP and 12 weeks of exercise. NEEP involved exercise classes, diet and PA education. CST - cognitive behaviour modification, barriers, problem solving (parents only))	N/A	Nutrition and exercise education programme only (No CST classes given to parents)	Yes

(Continued)

Gillis 2007	Exercise and diet education with weekly diaries and telephone calls (30 min talk about healthy diet + exercise at baseline and 3 months. During 3 months, weekly phone calls to review weekly diaries. Modify behaviours – weekly diaries to record exercise + food ingested 1 day of the week)	N/A	Exercise and diet education only (Received initial instruction. Did not record food/exercise in diaries or receive phone calls)	Yes
Kalavainen 2007	Family-centered group programme (15 sessions (90 min) separately for child and parent (1 joint at end) – 6 months. Based on principles of behavioural and solution orientated therapy. Promote healthy lifestyle and well-being instead of weight loss. Increase exercise and decrease sedentary behaviours Promote healthy diet using Finnish recommendations)	N/A	Routine treatment Modified from the counselling practice for obese children in Finland. Given booklets and children had 30 min individual appointments with a school nurse)	Yes
McCallum 2007	LEAP Intervention (Parents attended 4 consultations over 12 weeks. Family folder used to assist and record goals – behaviour change. Topic sheets – chose goals e.g. be more active, lower fat, drink water. Reinforcement techniques used to encourage parental participation)	N/A	No-care control group (Carried on seeing GP if required)	Yes
Rodearmel 2007	'America on the Move' intervention group (6 meetings with study staff over 24 weeks – no behavioural component. Told to wear pedometers, increase PA by 2000 steps/d. Told to eliminate 100 kcal/d, replace sugar with sucralose sweeteners. Food labelling, caloric content, eat breakfast, 5 x fruit + veg/d)	N/A	Self-monitoring group (Told to monitor usual behaviour during study. Wear pedometers and complete sweets survey. Did not receive any information on exercise)	Yes
Satoh 2007	Dietary guidance using an easily handled model nutritional balance chart (MNBC) (Meal chart completed 3 days of the week (nutrition component only) Investigators placed black dots on balance chart according to content of the meal chart (e.g. meat, green and yellow vegetables, sugar). Investigator responded with advice, comments and encouragement. No behavioural component)	N/A	Usual care (Received dietary guidance before the study started from nutritionists at hospitals. Then received conventional dietary guidance once per month)	Yes
Wilfley 2007	I1: behavioural-skills maintenance group (16 weekly sessions (20 min family + 40 min separate child + parent)	N/A	No-care control group	Yes

(Continued)

	Motivation for weight loss and promoting small changes in eating and exercise. Identify high-risk situations for overeating or missing PA. Preplanning, problem solving, cognitive restructuring, positive self-talk)			
	I2: social-facilitation maintenance group (Based on premise that relapse results from absence of a supportive social environment for weight control (instead of focusing on behavioural skills). Encourage child to form friendships, address body image concerns + teasing. Same nutrition and PA advice as above)	N/A		
Epstein 2005	Standardised family-based behavioural weight control programme plus reinforcement for increasing alternatives to eating (14 sessions (6 months), 6 booster sessions 6-12 months, as needed to 24 months. Reinforcement system to motivate children for behaviour change. Points received for meeting goals and alternative behaviour to eating. General PA information (moderate intensity), traffic light diet)	N/A	Standardised family-based behavioural weight control programme only (Received no reinforcement through alternative behaviour to eating)	Yes
Nemet 2005	Combined dietary and exercise programme (4 evening lectures over 3 months: therapeutic nutritional approach. 6 dietitian sessions + exercise programme twice weekly. Exercise programme – endurance activities, coordination + flexibility. Encouraged: + 30-45 min/week of exercise and decrease sedentary behaviours. Nutrition education – food pyramid, cooking, balanced hypocaloric diet)	N/A	Usual-care control group (Referred to an ambulatory nutrition consultation at least once during study Instructed to perform exercise 3 x per week)	Yes
Woo 2004	I1: diet plus supervised structured exercise programme with continuing training (Diet education twice weekly for 6 weeks then every two months until 12 months. Plus 6 weeks of exercise training (2 x/week) then weekly for 1 year (75 minutes). 18 exercise stations: aerobic exercise, resistance training, agility. Exercise intensity at 60% -70% predicted maximum heart rate (during aerobic). Balanced hypocaloric diet – low fat, high in complex carbohydrates, protein)	N/A	Diet modification only (No exercise training throughout 12 months)	Yes
	I2: diet plus supervised structured exercise programme with detraining (Stopped exercise training after 6 weeks but continued with the diet programme)	N/A		
Epstein 2001	A combination of reducing sedentary behaviour and increasing PA	N/A	Targeting increasing PA only	Yes

(Continued)

	(16 weekly meetings then 2 biweekly and 2 monthly – 6 months in total. Participants met with the therapist individually for 30 min the first week and on subsequent weeks they alternated between separate child and parent 30-min group meetings and individual meetings. Workbooks on self-monitoring, behaviour change, positive reinforcement. Traffic light diet, food labels, increase PA (up to 180 min per week), decrease sedentary (final goal of 15 h/week). Families were provided additional information about food labels, shopping, and current findings in the research on obesity and nutrition		(Participants were given the same intervention but targeted increased PA only and did not focus on reducing sedentary behaviours	
Nova 2001	Enhanced approach (Given specific diet (approximately 1400 calories), and guidelines on PA. Encouraged active parental commitment and gave a alimentary diary. Paediatrician reviewed the diary and evaluation accuracy (9 times over 24 mo). Parents rated commitment to the intervention – no behavioural component)	N/A	Routine approach (Received leaflets with general information about obesity and risks, advice on healthy eating and an invitation to take part in some PA)	Yes
Epstein 2000a	I1: behavioural weight-control programme plus parent and child problem solving (16 weekly meetings then 2 monthly meetings – 6 months. Behaviour change techniques – stimulus control, self-monitoring. Problem solving training, group + individual content. Workbooks on increasing exercise and traffic light diet)	N/A	Standard treatment with no additional problem solving (Same sessions as intervention group But homework assignments not based on problem solving)	Yes
	I2: behavioural weight-control programme plus child problem solving only (Problem solving only for children – parents not involved)	N/A		
Schwingshandl 1999	PA programme and dietary advice (Individualised training programme – twice weekly (60-70 min), 12 weeks. Walk up period, exercises such as lying leg press (sets, resistance increased). Dietary advice about energy requirements, nutrients, fibre, fluids, vitamins)	N/A	Dietary advice alone (Dietary advice only – no training sessions)	Yes
Duffy 1993	Cognitive self-management training plus behaviour therapy (8 weekly sessions (90 min each). Stimulus control, nutritional education (traffic light), increasing exercise. Parents taught goal setting and positive reinforcements CBT – monitoring negative thoughts, problem solving, self-reinforcement)	N/A	Behaviour therapy plus attention placebo control methods (No CBT - instead they received a placebo component which was relaxation training)	Yes
Flodmark 1993	Family therapy	N/A	Conventional treatment	Yes

(Continued)

	(Family therapy: dysfunctional structures in the family Led by a paediatrician and psychologist over 1 year Therapist reinforced resource to create optimal emotional climate Dietary counselling (1500 kcal-1700 kcal, decrease fat by 30%), no exercise advice)		(Given dietary counselling and paediatrician visits but no family therapy)	
Epstein 1985c	Behaviourally-orientated programme that emphasised parent management (5 weeks of sessions and 9 monthly maintenance sessions Behavioural: promote healthy habits, self-monitoring, praise, contracting. Exercise programme - encourage to do 6 x per week, goals. Traffic light diet)	N/A	Provided equal education and attention but not behavioural principles (No behavioural component)	Yes
Epstein 1985b	Diet and exercise education (8 weeks of intense treatment (3 per week), 10 monthly maintenance sessions. Traffic Light Diet - therapists reviewed food record books Behavioural methods – self-monitoring, praise, modelling, contracting Exercise sessions – aerobic exercise, increase caloric expenditure)	N/A	Diet education only (No exercise sessions)	Yes
Epstein 1985a	I1: diet plus programmed aerobic exercise programme (18 diet sessions over 12 months – traffic light diet system. Parents and children chose exercise (e.g. walk, cycle), 3 x per week, told what intensity to exercise at. Self-monitoring, modelling, contingency contracting, parental management)	N/A	Diet plus low-intensity calisthenic exercise programme (Instructed to perform 6 of 12 callisthenics three times per week Lower intensity than the other two programmes)	Yes
	I2: diet plus behaviour-changing programme Same diet sessions as above but isocaloric exercise programme instead Choose exercise but weren't instructed about intensity	N/A		
Epstein 1984a	I1: diet-plus-exercise group (15 sessions over 28 weeks (8 weekly sessions and then remaining 7 sessions spread over 20 weeks). Parent deposited USD 85 and received it back based on attendance. Parents trained to reinforce child's diet/exercise, give incentives. Therapists – taught parents social reinforcement. Nutrition sessions based on traffic light	N/A	Waiting-list control (No care – offered intervention after 6 months)	Yes

(Continued)

diet; exercise programme required increasing caloric expenditure above normal through a series of gradual steps. Each of the 15 sessions involved a group discussion (parents and children separated))	
I2: diet only (did not receive the life-style change exercise programme. Instead given information on low-expenditure stretching and callisthenics, and were not provided any suggestions or supports for systematic exercise)	N/A

- denotes not reported

[a]The term 'adequate' refers to sufficient use of the intervention/comparator with regard to dose, dose escalation, dosing scheme, provision for contraindications and other features necessary to establish a fair contrast between intervention and comparator

BMI: body mass index; C: comparator; CBT: cognitive behavioural therapy; CDS: clinical decision support; CST: coping skills training; GP: general practitioner; I: intervention; kcal: calories; MVPA: moderate to vigorous physical activity; N/A: not applicable; NEEP: nutrition and exercise education program; PA: physical activity; SMSMT: SMS maintenance treatment; SWITCH: Screen-Time Weight-loss Intervention Targeting Children at Home; YMCA: Young Men's Christian Association

Appendix 3. Baseline characteristics (I)

	Intervention(s) and comparator(s)	Duration of intervention/duration of follow-up (days, weeks, months, years)	Description of participants	Trial period (year to year)	Country	Setting	Ethnic groups (% (N))	Socioeconomic status	Duration of being overweight/obese (mean/ range years (SD), or as reported)
NCT02436330	I: exergaming and didactic healthy teaching	6 months (0 months)	Children 8-16 years old with BMI ≥ 85th percentile	April 2011-September 2013	USA	Unclear	Asian: 8 (5) Black or African American: 27 (16) White: 65 (39)	-	-
	C: didactic healthy teaching						Asian: 17 (4) Black or African American: 25 (6) White: 58 (14)	-	-
Ho 2016	I: standard nutrition counselling plus portion control equipment	6 months (0 months)	Age 8-16 overweight or obese children	2009-2014	Canada	Home	-	-	-
	C: standard nutrition counselling	6 months (0 months)				Unclear	-		-
Warschburger 2016	I: parental CBT training group plus child inpatient intervention	3-6 weeks (12 months)	Obese children age 7-13	First randomisation on 1 November 2007 and last on 3 March 2011 – first 1-year follow-up on 27 Janu-	Germany	Inpatient rehabilitation setting	All white	-	-
	C: parental information-only group plus child in-patient intervention							-	-

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				ary 2009 and last on 08 May 2012					
Epstein 2015	I: family-based treatment + variety of high energy-dense foods	25 weeks (0 weeks)	Overweight or obese children aged 8-12	-	USA	Obesity clinic	Minority (non-minority/minority): (8/5)	Highest parental education: 18.6 ± 3.3	-
	C: family-based treatment only	-					(6/5)	16.7 ± 3.5	-
Larsen 2015	I: an education programme in addition to health consultations	2 years (0 years)	Overweight children aged 5-9	August 2007-November 2010	Denmark	GP practices	-	-	-
	C: health consultations only	-	-				-	-	-
Serra-Paya 2015	I: Nereu group	8 months (0 months)	Overweight or obese children aged 6-12	Assessment made before (September 2012) and after intervention period (June 2013)	Spain	School centres and health care centres	Spanish: 70 Maghrebi: 20 Romanian: 10	-	-
	C: counselling group							-	-
Taveras 2015	I1: computerised point-of-care alerts plus direct-to-parent outreach and support	1 year (0 years)	Obese children aged 6 to 12	Recruitment between 1 October 2011-30 June 2012	USA	Paediatric clinician offices	White: 43.5 Black: 25.9 Latino: 14.7 Asian: 5.3 Other: 10.6	Annual household income (USD): < 50,000 37.8%, > 50,001 62.2%	-
	I2: computerised point-of-care alerts only						White: 64.4 Black: 16 Latino: 6.2 Asian: 4.6 Other: 8.8	23.3%, 76.7%	-

(Continued)

	C: usual care						White: 44.8 Black: 22.4 Latino: 21.9 Asian: 4.9 Other: 6	36.7%, 63.3%	-
Taylor 2015	I: tailored package	2 years (0 years) -	Overweight or obese children	-	New Zealand	University or parent's home	New Zealand European and others: 81 Maori: 16 Pacific: 3	-	-
	C: usual care						New Zealand European and others: 70 Maori: 22 Pacific: 8	-	-
Berry 2014	I: nutrition and exercise education and coping skills intervention	12 months (6 months)	Overweight children and their parents	Enrolment periods from August 2007-April 2010	USA	Schools	African American: 63.6 White: 27.2 Other: 9.2 Hispanic: 7.1 Not Hispanic: 92.9	Income (USD) < 20,000 35.33%, 20,000-39,999 32.61%, ≥ 40,000 20.1%, did not respond 11.96%	-
	C: waiting-list control						African American: 64.8 White: 26.5 Other: 8.7 Hispanic: 8 Not Hispanic: 92	Income (USD) < 20,000 30.86%, 20,000- 39,999 44.44%, ≥ 40,000 14.21%, did not respond 10.49%	-
Boutelle 2014	I: Regulation of Cues (ROC) program	4 months (4 months)	Children aged 8-12 who were overweight or obese, and their parents	-	USA	Outpatient clinic	White non-Hispanic: 68.2	Parents with a college degree 54.5%	-
	C: control group						White non-Hispanic: 70	63.6%	-

(Continued)

Hamilton-Shield 2014	I: standard care plus Mandolean training	12 months (0 months) Terminated before endpoint	Obese children	-	England (UK)	GP practices and the child's home	White: 100	-	-
	C: standard care only					GP practices	White: 91	-	-
Looney 2014	I1: newsletter and growth monitoring plus behavioural counselling	6 months (0 months)	Overweight or obese participants aged 4-10	Families were referred from primary care and research settings to the programme from April 2011-November 2012	USA	Primary care	Asian: 14.3 Black or African American: 0 White: 71.4 Two or more races: 14.3 Hispanic or Latino: 14.3	Income (USD) < 10,000 14.3%, 20,000-49,999 28.6%, ≥57.2%	-
	I2: newsletter and growth monitoring						Asian: 0 Black or African American: 0 White: 85.7 Two or more races: 14.3 Hispanic or Latino: 0	Income (USD) < 10,000 0%, 20,000-49,999 42.9%, ≥ 57.2%	-
	C: newsletter only						Asian: 0 Black or African American: 12.5 White: 62.5 Two or more races: 25 Hispanic or Latino: 0	Income (USD) < 10,000 12.5%, USD 20,000-49,999 37.5%, ≥ 50%	-
Maddison 2014	I: SWITCH intervention group	24 weeks (0 weeks)	Overweight or obese children aged 9-12	Undertaken 2010-2012	New Zealand	Child's home	Maori: 13 Pacific: 53 NZ/European: 34 Refused to answer: 0	Total household income before tax (NZD): < 20,000 11%, 20,001-30,000 11%, 30,001-40,000 15%, 40,001-50,000 14%, 50,001-60,000 4%, 60,001-70,000 9%, 70,001-80,000 7%, 80,001-90,000 5%, over	-

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								90,000 15%, don't know 7%, refused to answer 3%	
	C: control group					-	Maori: 11 Pacific: 53 NZ/European: 35 Refused to answer: 1	Total household income before tax (NZD): < 20,000 18%, 20,001-30,000 17%, 30,001-40,000 14%, 40,001-50,000 11%, 50,001-60,000 7%, 60,001-70,000 3%, 70,001-80,000 6%, 80,001-90,000 5%, over 90,000 10%, don't know 10%, refused to answer 0%	-
Markert 2014	I: telephone-based adiposity prevention for families (TAFF)	1 year (0 years)	Families were overweight children aged 3.5-17.4	Recruitment from 2009-2010	Germany	Community	-	-	-
	C: control group						-	-	-
Arauz Boudreau 2013	I: behaviour-changing intervention and coaching on behaviours	6 weeks (4.5 months)	Obese Latino children and their families	Data were collected July 2010-November 2011 and analyzed in 2012	USA	Urban community health center	Primary household language English: 25 Non-English: 75 Immigrant generation 1st: 41.7 ≥ 2nd: 58.3	Highest caregiver education Below high school 50.0% High school or higher 50.0%	-
	C: waiting-list control						Primary household language English: 21.4 Non-English: 78.6 Immigrant generation 1st: 64.3 ≥ 2nd: 35.7	Highest caregiver education Below high school 25.0 % High school or higher 75.0%	-
Davis 2013	I: telemedicine intervention	8 month (0 months)	Overweight/obese children	Schools in rural	USA	Child's home via	White: 96.8	Annual household income USD 56,603.10 (25,989.81) Free/reduced lunch N = 9	-

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			from a rural setting	Kansas were recruited during the 2007/2008 and 2008/2009 school years		telemedicine			
	C: physician-visit intervention					Primary care physicians	White: 81.5	Annual household income USD 48,922.55 (31,990.65) Free/reduced lunch N = 9	-
Davoli 2013	I: family paediatrician-led motivational interviewing	1 year (1 year)	Overweight (not obese) children aged 4-7, resident in the Reggio Emilia Province	Conducted June 2011-June 2012 Recruited from June-August 2011	Italy	Family paediatricians working in Reggio Emilia Province (Italy)	10% of children have at least one immigrant parent. The most common father's citizenships were Albania, Morocco and Pakistan. The most common mother's citizenships were Albania, Pakistan and Romania. At least 1 immigrant parent Intervention(s): n = 23 Comparator(s): n = 15	Father's educational background < 13 years of school; N = 92 Father's educational background 13 years of school; N = 71 Father's educational background > 13 years of school; N = 20 Mother's educational background < 13 years of school; N = 63 Mother's educational background 13 years of school; N = 97 Mother's educational background > 13 years of school; N = 24	Overweight before 5 years (N = 119)
	C: usual care plus a booklet on obesity prevention							Father's educational background < 13 years of school; N = 82 Father's educational background 13 years of school; N = 82 Father's educational background > 13 years of school; N = 15	Overweight before 5 years (N = 199)

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								Mother's educational background < 13 years of school; N = 58 Mother's educational background 13 years of school; N = 98 Mother's educational background > 13 years of school; N = 23	
Lochrie 2013	I: family-based intervention C: education session	6 months (6 months)	Overweight or obese children	Recruited 2006-2008. Group sessions for intervention group conducted 2007-2009	USA	Outpatient clinic	White: 49 African American: 32 Biracial: 5 Native American: 2 Other: 3 Unknown: 9 (Hispanic: 17 Non-Hispanic: 72 Unknown: 12)	Socioeconomic status (USD): < 18,745 12% 18,745-32,874 15% 32,875-48,999 15% 49,000-72,999 25% 73,000-126,500 27% > 126,500 3%	-
Mirza 2013	I: low-glycaemic load dietary group C: conventional low-fat dietary group	3 months (21 months)	Obese Hispanic American children and adolescents	November 2003-May 2008	USA	Children's National Medical Center (community-based clinic), and a clinical research center	All Hispanic	Maternal education: elementary plus some HS 64.9% graduated from HS 15.8% post HS or college graduate 19.3% Total household income: USD 27,700 ± 2300 Maternal education: elementary plus some HS 50% graduated from HS 30.4% post HS or college graduate 19.6% Total household income: USD 30,900 ± 2600	- -

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O'Connor 2013	I: "Helping Hand" obesity intervention	6 months (1 month)	Children who were overweight but not morbidly obese	-	USA	Community paediatrics clinics	Hispanic/Latino/Mexican American: 80 (16) African American: 15 (3) White/other: 5 (1)	Highest level of household education - high school/GED or less: 12 (60%) Annual household's income: < USD 30,000: 10 (50%)	-
	C: waiting-list control						Hispanic/Latino/Mexican American: 85 (17) African American: 10 (2) White/other: 5 (1)	Highest level of household education - High school/GED or less: 12 (60%) Annual household's income: < USD 30,000: 16 (80%)	-
Saelens 2013	I: self-directed approach	21-22 weeks (2 years)	Overweight/obese children and their parents/caregivers	-	USA	Research outpatient clinic	White: 85.7 African American: 5.7 Asian: 0 Other or multiple races: 8.6 Hispanic: 8.1	Annual household income (USD) < 30 K 17.1%, 30K-69 K 20%, 7 0K-99 K 28.6%, 100+ K 34.3%	-
	C: prescribed treatment approach						White: 83.8 African American: 8.1 Asian: 5.4 Other or multiple races: 2.7 Hispanic: 17.1	Annual household income (USD) < 30 K 13.5%, 30 K-69 K 27%, 70 K-99 K 29.7%, 100+ K 29.7%	-
Siwik 2013	I: "Choices" group office-visit intervention	12 weeks (14 weeks)	Overweight children	March-May 2006 and September -November 2006	USA	University research clinic	American Indian/Alaska native: 0 Asian/Pacific Islander: (2) Hispanic: (4) Non-Hispanic white: (9)	Mother's education - high school/GED: 3 some college or vocational training: 4 college degree: 5 > college: 2 Father's education - high school/GED: 4	-

(Continued)

								some college or vocational training: 5 college degree: 3 > college: 2 Family income (USD) - < 50,000: 6 ≥ 50,000-100,000: 4 > 100,000: 3	
	C: lagged control group						American Indian/Alaska native: (1) Asian/Pacific Islander: (1) Hispanic: (3) Non-Hispanic white: (12)	Mother's education - high school/GED: 0 some college or vocational training: 5 college degree: 2 > college: 5 Father's education - high school/GED: 3 some college or vocational training: 4 college degree: 2 > college: 3 Family income (USD) - < 50,000: 4 ≥ 50,000-100,000: 4 > 100,000: 4	-
Vann 2013	I1: pedometer + DVD group	6 months (0 months)	Overweight or obese children aged 4-17	April 2011 enrolled	USA	University clinic	Majority of participants were African-American: 79	-	-
	I2: pedometer group							-	-
	I3: DVD group							-	-
	C: control group							-	-
Wake 2013	I: HopSCOTCH (the shared care obesity trial) intervention	15 months (0 months)	Obese,aged 3-10	Measured July 2009-April 2010 November 2009-July 2010	Australia	GP practices	Largely white (including middle eastern) with some Asian and Indian	Family disadvantage index 1029 (65.7)	-
	C: usual care							1030 (45.3)	-

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				the child was seen by both a paediatrician and a dietitian					
Croker 2012	I: family-based behavioural treatment	6 months (6 months)	Overweight or obese English speaking, aged 8-12 with adequate parent support	June 2004-January 2008	England (UK)	Hospital	White: 67.6 (N = 25) Black: 18.9 (N = 7) Asian: 10.8 (N = 4) Mixed/other: 2.7 (N = 1)	Parent education: compulsory school education or below - 55.2% (N = 16) vocational/A Level - 31% (N = 9) degree or higher - 13.8% (N = 4)	-
	C: waiting-list control						White: 45.7 (16) Black: 20 (7) Asian: 17.1 (6) Mixed/other: 17.1 (6)	Parent education: compulsory school education or below - 36.7% (N = 11) vocational/A Level - 30% (N = 9) degree or higher - 33.3% (N = 9)	-
de Niet 2012	I: short message service maintenance treatment and behavioural treatment	9 months (0 months)	Motivated overweight and obese children aged 7-12 participating in a multicomponent obesity treatment programme	BFC programme 2006-2009	The Netherlands	Hospital	Dutch: 78	-	-
	C: behavioural treatment only						Dutch: 71	-	-
Eddy Ives 2012	I: dietary and physical exercise recommendations during 6 sessions	12 months (0 months)	Overweight or obese children aged 10-12	Recruitment June-December 2006. In-	Spain	Pediatric primary care units	-	-	-

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	C: dietary and physical exercise recommendations at 2 sessions only			tervention ended in December 2007			-	-	-
Kirk 2012	I1: low carbohydrate diet plus group exercise/education sessions	3 months (9 months)	Obese children aged 7-12	Participants were recruited in 6 cycles February 2005 -May 2007	USA	Outpatient clinic	White: 74.3	-	-
	I2: reduced glycaemic load diet plus group exercise/education sessions						White: 86.1	-	-
	C: standard portion-controlled diet plus group exercise/education sessions						White: 71	-	-
Lison 2012	I1: hospital clinic group exercise-diet programme	6 months (0 months)	Overweight and obese Spanish children	-	Spain	Hospital	All white	-	-
	I2: home-based combined exercise-diet programme					Child's home		-	-
	C: control group					-		-	-
Waling 2012	I: family-based intervention	2 years (0 years)	Overweight and obese children	Recruitment and randomisation occurred at 4 different time points: October 2006 and in January, March	Sweden	University research clinic	-	-	-
	C: control group						-	-	-

(Continued)

				and May 2007					
Wright 2012	I: Kids N Fitness (KNF) intervention	6 weeks (46 weeks)	Overweight or obese children from socioeconomically disadvantaged community in California	January 2009- January 2012	USA	School and community	Black or African American: 4 (5) Other: 0 Hispanic/Latino: 96 (116) Mexican/Mexican American: 99 (115)	Parent education n (%) 1st-8th grade: 36 (45) 9th-11th grade: 16 (20) Grade 12 or GED: 24 (30) College 1-4 years: 4 (5) Parent income (USD), n (%) 0-15K: 45 (46) 15K-25K: 35 (44)	-
	C: general education (GE)						Black or African American: 1 (1) Other: 4 (5) Hispanic/Latino: 95 (124) Mexican/Mexican American: 100 (124)	Parent education n (%) 1st-8th grade: 30 (43) 9th-11th grade: 9 (13) Grade 12 or GED: 28 (40) College 1-4 years: 3 (4) Parent income (USD), n (%) 0-15K: 43 (61) 15K-25K: 27 (39)	-
Barkin 2011	I: group physical activity and goal setting	6 months (0 months)	Latino overweight preadolescents, aged 8-11	-	USA	Community-based primary care clinic and the subsequent 5 sessions at the YMCA recreational centre	-	-	-
	C: standard care counselling and health education session					Clinic	-	-	-
Bryant 2011	I: WATCH IT intervention	4 months (8 months)	Obese children	01 October	England (UK)	Community and pri-	White: 91 (32) South Asian: 0 Black: 3 (1)	Annual household income (GBP): < 5000 N = 3 (9%), 5000-14,999 N = 14 (40%),	-

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			and adolescents	2006-01 July 2008		mary care trusts	Mixed ethnicity: 3 (1)	15,000-35,000 N = 11 (31%), > 35,000 N = 7 (20%)	
	C: waiting-list control						White: 83 (South Asian: 9(3) Black: 6 (2) Mixed ethnicity: 3 (1)	Annual household income (GBP): < 5000 N = 5 (14%), 5000-14,999 N = 13 (37%), 15,000-35,000 N = 11 (35%), > 35,000 N = 6 (17%)	-
Coppins 2011	I: multi-component family-focused education package	12 months (0 months)	Overweight/obese aged 6-14	-	England (UK)	Schools	All white	-	-
	C: waiting-list control							-	-
Gunnarsdottir 2011a	I: Epstein's family-based behavioural treatment (FBBT)	4 months (8 months)	Obese children aged 8-12	-	Iceland	Outpatient clinic - medical setting in Iceland	-	-	-
	C: standard care (waiting-list control)						-	-	-
Maddison 2011	I: active video game package	24 weeks (0 weeks)	Overweight or obese children	Recruited February 2008-June 2009	New Zealand	In the child's home	Maori: 16.9 (27) Pacific: 25.6 (41) NZ euro/other: 57.5 (92)	-	-
	C: control group					-	Maori: 17.3 (28) Pacific: 26.5 (43) NZ euro/other: 56.2 (91)	-	-
Wafa 2011	I: low-intensity intervention	26 weeks (0 weeks)	Obese, aged 711	2009	Malaysia	University	All majority ethnic group (Malay)	-	-
	C: waiting-list control							-	-
Bathrellou 2010	I: behavioural intervention with parental involvement	3 months (15 months)	Overweight or obese children aged 7-12 without any physical or	-	Greece	Dieticians, hospital	-	-	-
	C: behavioural intervention without						-	-	-

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	parental involvement		mental illness						
Diaz 2010	I: behavioural curriculum plus registered dieticians and physician consultations	12 months (0 months)	Obese children and their families living in Mexico	June 2006-October 2007	Mexico	Public primary care clinic	Mexican individuals from the State of Sonora, not belonging to any Ethnic indigenous group	Monthly income (USD): 1069 (503) Parents' education (highest number of academic years of both parents and divide by 2: 13.8 (3.2)	-
	C: physician consultations only						-	Monthly income (USD): 906 (772) Parents' education (highest number of academic years of both parents and divide by 2): 14.5 (3.4)	-
Duggins 2010	I: nutrition classes and family YMCA membership	12 months (0 months)	Overweight/obese (majority very obese) aged 5-17 representing wide variety of socioeconomic backgrounds	Randomised to treatment from 1 August 2005-31 January 2006	USA	Primary care clinics and YMCA	-	Income < USD 20,000 (%) 69 Parental high school education (%) 70	-
	C: nutrition classes only					Primary care clinics	-	Income < USD 20,000 (%) 80 Parental high school education (%) 73	-
Faude 2010	I: football training programme (FB)	6 months (0 months)	Overweight children aged 8-12	Both interventions took place from mid-May to mid-November	Germany	Community/schools	-	-	-
	C: established standard sports programme (STD)						-	-	-
Reinehr 2010	I: behavioural intervention	6 months (0 months)	Overweight (not obese) children	Recruitment April 2007-October 2008	Germany	Outpatient clinic	Predominantly white	-	-
	C: waiting-list control							-	-

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Sacher 2010	I: MEND program	9 weeks (17 weeks)	Obese English Children	January 2005-January 2007	England (UK)	Community sites	White: 50	Social class nonmanual 40%	-
	C: control group						White: 50	Social class nonmanual 38%	-
Kalarchian 2009	I: family-based, behavioural weight control group	6 months (12 months)	Severely obese children aged 8-1	March 2001-May 2006	USA	Pittsburgh Medical Center	Hispanic: 1.1 Non-hispanic: 99 American Indian/Alaska native: 0 Native Asian: 1.03 Black: 24.7 Native Hawaiian/other: 0 Pacific Islander: 0 White: 74.2	High school or less 14.4 Some college/technical 54.6 College or graduate degree 30.9 Family income (USD) % 0-30000 26.80 30001 or more 73.20	-
	C: usual care						Hispanic:1.1 Non-hispanic: 98.9 American Indian/Alaska native: 0 Native Asian: 0 Black: 27.4 Native Hawaiian/other: 0 Pacific islander: 0 White: 72.6	Parent education %: High school or less 25.3 Some college/technical 44.2 College or graduate degree 30.5 Family income (USD) % 0-30000 26.32 30001 or more 73.68	-
Nowicka 2009	I: summer camp	1 week (51 weeks) -	Obese children aged 8-12	-	Sweden	Sports camp and sports club	Mixed, reflecting the population of Malmö which is a multi-ethnic city. Mostly Swedish and Arabic	-	-
	C: control group					-		-	-
Wake 2009	I: LEAP2 behavioural intervention	12 weeks (40 weeks)	Overweight or mildly obese children	Recruitment May 2005-July 2006, intervention	Australia	GP practices	Largely white (including middle eastern) with some Asian and Indian	Mean (SD) social disadvantage score: 1028 (63)	-
	C: control group							Mean (SD) social disadvantage score: 1028 (70)	-

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				delivery in October 2005-December 2006, the first follow-up in April 2006-March 2007, and the second follow-up in October 2006-September 2007					
Alves 2008	I: exercise programme	6 months (0 month)	Overweight or obese children from low socioeconomic area	2005-unknown	Brazil	In the community	White: 48.7 Black: 25.6 Mixed: 25.6	71.8% earns < USD 1/d	-
	C: no care						White: 51.3 Black: 25.6 Mixed: 23.1	71.8% earns < $1/d	-
Hughes 2008	I: behavioural programme	26 weeks (26 weeks)	Obese children	-	Scotland (UK)	Hospital - outpatient	-	Carstairs scores from the 2001 Scottish census. Non-deprived (1-4) N (%): 28 (40.6) Deprived (5-7) N (%): 41 (59.4)	-
	C: standard care						-	Nondeprived (1-4) N (%): 30 (46.2) Deprived (5-7) N (%): 35 (53.8)	-
Weigel 2008	I: active intervention group	12 months (0 months)	Obese children aged 7-15	-	Germany	Outpatient clinic of hospital	-	-	-

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	C: control group						-	-	-
Weintraub 2008	I: after-school team sports programme	6 months (0 months)	Overweight children	Recruitment and follow-up 11 April 2005- 27 February 2006	USA	Schools	Self-reported ethnicities were: Hispanic/Latino 8 and 1 black or African American in the soccer group	6 of 9 families in the soccer group (67%) had total household incomes less than USD 40 000 6 of 9 families in the soccer group (67%) had a highest parent or caregiver level of education of high school graduate or below	-
	C: "Active placebo" control						10 Hispanic/Latino, 1 black or African American, and 1 Native Hawaiian or other Pacific Islander in the health-education group	9 of 12 families in the health education group (75%) had total household incomes less than USD 40 000 7 of 12 families in the health education group (58%) had a highest parent or caregiver level of education of high school graduate or below	-
Berry 2007	I: nutrition and exercise education programme plus coping skills training	6 months (0 months)	Obese multiethnic parents with overweight children	-	USA	School	Black: 42.5 Hispanic: 30 White: 27.5	Parental income (USD) < 19,900 N = 9 20,000-59,999 N = 19 > 60,000-> 100,000 N = 8	-
	C: nutrition and exercise education programme only						Black: 27.5 Hispanic: 27.5 White: 45	Parental income (USD) < 19,900 N = 9 20,000-59,999 N = 19 >60,000-> 100,000 N = 8	-
Gillis 2007	I: exercise and diet education with weekly diaries and telephone calls	3 months (3 months)	Obese children	-	Israel	Primary care clinics	All Jewish children	-	-
	C: exercise and diet education only							-	-

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Kalavainen 2007	I: family-centred group programme	6 months (2.5 years) -	Families with an obese child aged 7-9 attending primary school in Kuopio, Finland	-	Finland	University hospital outpatient clinic	All participants Finnish origin except one with an African father	Social class was defined by the highest school education achieved by either mother or father: 'low' to those who attended school for p9 years; 'middle' to those who attended school for 10–12 years; and 'high' to those who achieved an advanced level of education (X13 years). Social class: Low: 3 (8%) Middle: 16 (46%) High: 16 (46%)	-
	C: routine treatment					Health care centres		Social class Low: 0 (0%) Middles: 13 (37%) High: 22 (63%)	-
McCallum 2007	I: LEAP Intervention	12 weeks (53 weeks)	Overweight/mildly obese aged 5-9 years 11 months	Recruitment: June 2002-March 2003 Intervention delivery July 2002-June 2003. First follow-up: January-November 2003 Second follow-up: August 2003-March 2004	Australia	GP practices	-	Index of Relative Socioeconomic Disadvantage (Australian census-based Socio-Economic Indexes for Areas (SEIFA)) SES 1 (highest): 24 (29) SES 2: 16 (20) SES 3: 11 (13) SES 4: 14 (17) SES 5: 17 (21)	-
	C: control group						-	SES 1 (highest) N (%): 20 (25) SES 2: 9 (11) SES 3: 14(17) SES 4: 13 (16) SES 5 (lowest): 25 (31)	-

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Rodearmel 2007	I: "America on the Move" intervention group	6 months (0 months)	Overweight or at risk of overweight children and their families	-	USA	University research clinic	White: 52.6 Black: 13.8 Hispanic: 13.8 Other: 19.8	-	-
	C: self-monitoring group	-		-			White: 50.98 Black: 18.63 Hispanic: 12.75 Other: 15.69 Not reported: 1.96	-	-
Satoh 2007	I: dietary guidance using an easily handled model nutritional balance chart (MNBC)	6 months (0 months)	Obese male and female children aged 8-13	It took 2 years of serial participation by the participants, from August 2003- July 2005	Japan	Hospitals	-	-	-
	C: control group						-	-	-
Wilfley 2007	I1: behavioural skills maintenance group	4 months (20 months)	Overweight children aged 7-12 years	October 1999- July 2004	USA	University	Black: 5.9 (N = 3) White, non-Hispanic: 70.6 (N = 36) White, Hispanic: 21.6 (N = 11) Other race: 2 (N = 1)	Socioeconomic status: mean (SD) 47.9 (9.7) Maternal education college or higher: N = 26 (51.0%)	-
	I2: social facilitation maintenance group						Black: 14 (7) White, non-Hispanic: 64 (32) White, Hispanic: 16 (8) Other race: 6 (3)	Socioeconomic status: mean (SD) 47.0 (9.7) Maternal education college or higher: N = 28 (56.0%)	-
	C: control group						Black: 2 (1) White, non-Hispanic: 77.6 (38)	Socioeconomic status: mean (SD) 47.0 (13.8)	-

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							White, Hispanic: 18.4 (9) Other race: 2 (1)	Maternal education college or higher: N = 22 (44.9%)	
Epstein 2005	I: standardised family-based behavioural weight control programme plus reinforcement for increasing alternatives to eating	6 months (18 months)	Overweight children, age 8-12	-	USA	Obesity clinic	One African American participant, all others were all white	Mean Hollingshead 4-factor index of socioeconomic status (SES): 49.1 (12.5)	-
	C: standardised family-based behavioural weight control programme only							SES: 47.7 (9.3)	-
Nemet 2005	I: combined dietary and exercise programme	3 months (9 months)	Obese Israeli children and adolescents	January 2002-May 2003	Israel	Child health and sports training center at a hospital	-	-	-
	C: control group						-	-	-
Woo 2004	I1: diet plus supervised structured exercise programme with continuing training	6 weeks (46 weeks)	Overweight children	-	Hong Kong	Research clinic in a hospital	All Hong Kong Chinese	-	-
	I2: diet plus supervised structured exercise programme with detraining							-	-
	C: Ddiet modification only							-	-
Epstein 2001	I: a combination of reducing sedentary behaviour and increasing physical activity	6 months (6 months)	Obese children	-	USA	Obesity clinic	White: 94.6 African American: 3.6 Hispanic: 1.8	Mean Hollingshead 4-factor index of socioeconomic status (SES) was 50.0 (10.1), range from 25 to 66.	-

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	C: targeting increasing physical activity only								-
Nova 2001	I: enhanced approach	6 months (18 months)	Obese children		Italy	Pediatricians (local health units)	-	-	-
	C: routine approach						-	-	-
Epstein 2000a	I1: behavioural weight-control programme plus parent and child problem solving	6 months (18 months)	Obese children, mean age 10.3 years	-	USA	Obesity clinic	White: 97 African American: 2 Hispanic: 2	-	-
	I2: behavioural weight-control programme plus child problem solving only							-	-
	C: standard treatment with no additional problem solving							-	-
Schwingshandl 1999	I: physical activity programme and dietary advice	12 weeks (40 weeks)	Obese children	-	Austria	Exercise training sessions in a gym	-	-	-
	C: dietary advice only					-	-	-	-
Duffy 1993	I: cognitive self-management training plus behaviour therapy	8 weeks (18 weeks)	Overweight Australian children aged 7-13	-	Australia	Unclear - likely an outpatient clinic	-	-	-
	C: behaviour therapy plus attention placebo control methods						-	-	-
Flodmark 1993	I: family therapy	1 year (1 year)	Obese school	-	Sweden	Clinical setting	-	-	-

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	C: conventional treatment		children aged 10-11				-	-	-
Epstein 1985c	I: behaviourally-oriented programme that emphasised parent management	5 weeks (47 weeks)	Obese girls aged 5-8	-	USA	Obesity clinic	All white	-	-
	C: provided equal education and attention but not behavioural principles							-	-
Epstein 1985b	I: diet and exercise education	8 weeks (10 months)	Obese girls aged 8-12	-	USA	Obesity clinic	All white	-	-
	C: diet education only							-	-
Epstein 1985a	I1: diet plus programmed aerobic exercise programme	12 months (12 months)	Obese children aged 8-12 with at least one overweight parent residing in the USA	-	USA	Obesity clinic	All white	-	-
	I2: diet plus exercise programme							-	-
	C: diet plus low-intensity callisthenic exercise programme							-	-
Epstein 1984a	I1: diet-plus-exercise group	28 weeks (0 weeks)	Obese	-	USA	Obesity clinic	-	-	-
	I2: diet only	28 weeks (0 weeks)					-	-	-
	C: waiting-list control	28 weeks (0 weeks)					-	-	-

- denotes not reported

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BFC: Big Friends Club'; C: comparator; CBT: cognitive behavioural therapy; HS: High school; I: intervention; GED: general educational achievement; GP: general practitioner; K: thousand; MEND: Mind, Exercise, Nutrition, Do it; NZ: New Zealand; SD: standard deviation; SES: socioeconomic status; SWITCH: Screen-Time Weight-loss Intervention Targeting Children at Home; YMCA: Young Men's Christian Association

Appendix 4. Baseline characteristics (II)

	Intervention(s) and comparator(s)	Sex (female %)	Age (mean/ range years (SD), or as reported)	BMI / BMI z score (mean kg/m²/unit (SD))	Body weight (mean kg (SD))	Parental BMI	Comedications/co-interventions (% of participants)	Comorbidities (% of participants)
NCT02436330	I: exergaming and didactic healthy teaching	61.7	10.0 (1.2)	BMI z score: 2.2 (2.82)	-	-	-	-
	C: didactic healthy teaching	50.0	10.1 (1.1)	BMI z score: 2.2 (3.34)	-	-	-	-
Ho 2016	I: standard nutrition counselling plus portion control equipment	47.9	11.5 (2.15)	BMI 29.80 (5.63) BMI z score: 2.74 (0.42)	-	-	-	-
	C: standard nutrition counselling	60.8	10.9 (2.33)	BMI 28.53 (5.67) BMI z score: 2.69 (0.35)	-	-	-	-
Warschburger 2016	I: parental CBT training group plus child in-patient intervention	53.4	11.3 (1.3)	BMI SDS: 2.6 (0.4)	-	BMI: 29.7 (7.1)	Child in-patient intervention	-
	C: parental information-only group plus child in-patient intervention	51.5	11.3 (1.3)	BMI SDS: 2.5 (0.4)	-	BMI: 28.7 (6.7)		-
Epstein 2015	I: family-based treatment + variety of high energy-dense foods	61.5	10.5 (1.4)	BMI: 31.1 (7.5) BMI z score: 2.3 (0.4)	73.8 (22.7)	BMI: 39.5 (7.5)	-	-
	C: family-based treatment only	54.5	10.5 (1.4)	BMI: 28.0 (3.0) BMI z score: 2.2 (0.4)	63.0 (10.4)	BMI: 37.2 (6.8)	-	-
Larsen 2015	I: an education programme in addition to health consultations	66.7	6.1 (1.1)	BMI z score: 2.88 (0.87)	-	-	-	-
	C: health consultations only	62.9	6.3 (1.3)	BMI: 2.79 (0.82)	-	-		
Serra-Paya 2015	I: Nereu group	50.0	10.1 (1.98)	BMI: 25.22 (3.35) BMI z score: 2.47 (0.51)	52.54 (13.29)	-	-	-

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	C: counselling group	44.1	9.73 (1.97)	BMI: 24.65 (3.18) BMI z score: 2.42 (0.55)	50.83 (12.64)	-	-	-
Taveras 2015	I1: computerised point-of-care alerts plus direct-to-parent outreach and support	46.8	9.8 (1.8)	BMI: 26.0 (4.2) BMI z score: 2.08 (0.3)	-	BMI: 31.1 (7.7)	-	-
	I2: computerised point-of-care alerts only	47.9	9.8 (2.0)	BMI: 25.6 (4.5) BMI z score: 2.05 (0.3)	-	30.0 (7.0)	-	-
	C: usual care	45.7	9.8 (1.9)	BMI: 25.7 (4.2) BMI z score: 2.04 (0.3)	-	30.2 (5.9)	-	-
Taylor 2015	I: tailored package	56	6.5 (1.4)	BMI: 19.8 (2.5) BMI z score: 1.69 (0.50)	-	Maternal BMI: 29.2 (5.9)	-	-
	C: usual care	55	6.4 (1.4)	BMI: 19.0 (2.0) BMI z score: 1.56 (0.42)	-	29.2 (6.4)	-	-
Berry 2014	I: nutrition and exercise education and coping skills intervention	54.9	9.2 (0.96)	-	-	BMI 36.41 (0.61)	-	-
	C: waiting-list control	56.2	9.0 (0.93)	-	-	BMI 39.13 (0.65)	-	-
Boutelle 2014	I: Regulation of Cues (ROC) programme	45.5	10.5 (1.5)	BMI: 28 (5.0) BMI z score: 2.13 (0.40)	-	-	-	-
	C: control group	54.5	9.9 (1.1)	BMI: 26.5 (4.5) BMI z score: 2.06 (0.40)	-	-	-	-
Hamilton-Shield 2014	I: standard care plus Mandolean training	50	9.1 (1.6)	BMI: 25.4 (3.4)	-	BMI: 30.6 (8.3)	-	-
	C: standard care only	60	9.6 (1.9)	BMI: 25.7 (3.6)	-	31.1 (7.7)	-	-

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Looney 2014	I1: newsletter and growth monitoring plus behavioural counselling	85.7	8.2 (1.8)	BMI z score: 2.45 (0.36)	-	-	Newsletter	-
	I2: newsletter and growth monitoring	85.7	8.6 (1.8)	BMI: 2.39 (0.34)	-	-		-
	C: newsletter only	37.5	7.3 (1.8)	BMI: 2.21 (0.66)	-	-		-
Maddison 2014	I: SWITCH intervention group	43	11.2	BMI: 26.51 (4.50) BMI z score: 2.7 (0.8)	63.21 (15.92)	-	-	-
	C: control group	44	11.3	BMI: 26.62 (5.30) BMI z score: 2.58 (0.86)	63.98 (18.50)	-	-	-
Markert 2014	I: telephone-based adiposity prevention for families (TAFF)	50	9.7 (3.0)	BMI: 24.1 (4.2) BMI z score: 2.0 (0.52)	51.6 (19.9)	-	-	-
	C: control group	51	9.8 (3.1)	BMI: 24.2 (3.5) BMI z score: 2.04 (0.47)	51.9 (19.0)	-	-	-
Arauz Boudreau 2013	I: behaviour-changing intervention and coaching on behaviour changing	64.3	10.2 (1.3)	BMI z score: 2.0 (0.3)	-	26.7 (BMI)	-	-
	C: waiting-list control	58.3	10.4 (1.2)	BMI z score: 2.2 (0.4)	-	32.4 (BMI)	-	-
Davis 2013	I: telemedicine intervention	29.03	8.48 (1.73)	BMI z score: 1.88 (0.52)	-	-	-	-
	C: physician-visit intervention	29.63	8.69 (1.78)	BMI z score: 1.70 (0.45)	-	-	-	-
Davoli 2013	I: family paediatrician-led motivational interviewing	59.9	6.7 (0.99)	BMI: 18.28 (95% CI 18.16 to 18.39) BMI z score: 1.35 (95% CI 1.32 to 1.38)	-	Overweight/obese father: yes 28.9 Overweight/obese mother yes: 39	-	-

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	C: usual care plus a booklet on obesity prevention	63.2	6.5 (1.15)	BMI: 18.21 (95% CI 18.09 to 18.32) BMI z score: 1.35 (95% CI 1.32 to 1.37)	-	Overweight/obese father: yes 24.9 Overweight/obese mother yes: 39.5	-	-
Lochrie 2013	I: family-based intervention	63.0	9.9 (1.1)	BMI z score: 2.2 (0.4)	-	-	-	-
	C: education session				-	-	-	-
Mirza 2013	I: low-glycaemic load dietary group	56	11.8 (0.3)	BMI: 31.1 (6.0) BMI z score: 2.25 (0.38)	-	-	-	-
	C: conventional low-fat dietary group	41	11.5 (0.3)	BMI: 30.03 (4.5) BMI z score: 2.24 (0.22)	-	-	-	-
O'Connor 2013	I: "Helping Hand" obesity intervention	90	7.0 (1.0)	BMI z score: 1.82	-	BMI: 32.7 (6.8)	-	-
	C: waiting-list control	70	6.6 (1.1)	BMI z score: 1.85	-	BMI: 31.4 (6.2)	-	-
Saelens 2013	I: self-directed approach	65.7	9.7 (1.4)	BMI: 25.9 (4.0) BMI z score: 2.1 (0.3)	53.1 (14.0)	BMI: 32.9 (7.4)	-	-
	C: prescribed treatment approach	67.6	9.8 (1.4)	BMI: 27.0 (4.2) BMI z score: 2.0 (0.3)	55.9 (15.7)	33.6 (8.1)	-	-
Siwik 2013	I: "Choices" group office-visit intervention	53.3	9.7 (0.4) boys 9.7 (0.8) girls	BMI: Boys: 26.9 (3.6) Girls: 25.8 (4.0) BMI z score: Boys: 2.19 (0.33)	56.0 (9.1) boys 53.1 (8.8) girls	-	-	-

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				Girls: 2.00 (0.45)				
	C: lagged control group	47.1	9.6 (0.6) boys 9.3 (0.6) girls	BMI: Boys: 26.3 (6.2) Girls 27.5 (6.8) BMI z score: Boys: 2.07 (0.42) Girls: 2.11 (0.53)	56.8 (15.6) boys 58.8 (15.9) girls	-	-	-
Vann 2013	I1: pedometer + DVD group	79	11.23	BMI: 33.4	-	-	-	-
	I2: pedometer group			BMI: 31.2	-	-	-	-
	I3: DVD group			BMI: 41.1	-	-	-	-
	C: control group			BMI: 31.9	-	-	-	-
Wake 2013	I: HopSCOTCH (the shared care obesity trial) intervention	50	7.2 (2.3)	BMI: 22.3 (2.7) BMI z score: 2.2 (0.5)	-	Mother BMI: 26.9 (5.7) Father BMI: 27.8 (6.9)	-	-
	C: usual care	41	7.4 (2.2)	BMI: 22.8 (3.6) BMI z score: 2.1 (0.3)	-	Mother BMI 28.0 (7.1) Father BMI: 29.8 (4.9)	-	-
Croker 2012	I: family-based behavioural treatment	70.3	10.8 (1.6)	BMI: 30.6 (5.1) BMI z score: 3.1 (0.6)	70.8 (17.8)	31.9 (10.5)	-	-
	C: waiting-list control	68.6	9.8 (1.4)	BMI: 30.6 (5.7) BMI z score: 3.3 (0.6)	65.5 (18.8)	29.3 (6.1)	-	-
de Niet 2012	I: short message service maintenance treatment and behaviour-changing treatment	62	10.0 (1.3)	BMI z score: 2.63 (0.45)	-	-	BFC behavioural programme	-

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	C: behaviour-changing treatment only	66	9.8 (1.3)	BMI z score: 2.54 (0.44)	-	-		-
Eddy Ives 2012	I: Dietary and physical exercise recommendations during 6 sessions	50.6	11.73	BMI: 25.97 (2.5) BMI z score: 2.32 (0.4)	60.04 (9.5)	-	-	Personal history of asthma 11.5%, diabetes 1.1%, allergy 9.2%, endocrine disease 3.4%, malformations 0%, psychiatric disorder 1.1%, other diseases 12.6%
	C: dietary and physical exercise recommendations at 2 sessions only	49.4	11.88	BMI: 26.54 (2.9) BMI z score: 2.38 (0.5)	62.51 (10.9)	-	-	Personal history of asthma 19.5%, diabetes 0%, allergy 14.9%, endocrine disease 1.1%, malformations 1.1%, psychiatric disorder 1.1%, other diseases 10.3%
Kirk 2012	I1: low carbohydrate diet plus group exercise/education sessions	54.3	9.9 (1.6)	BMI: 29.9 (4.4) BMI z score: 2.3 (0.3)	-	-	Participants encouraged to take vitamin/mineral supplement and to consume adequate	-
	I2: reduced glycaemic load diet plus group exercise/education sessions	47.2	9.8 (1.7)	BMI: 29.2 (3.8) BMI z score: 2.3 (0.2)	-	-		-

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	C: standard portion-controlled diet plus group exercise/education sessions	74.2	9.7 (1.3)	BMI: 29.1 (3.8) BMI z score: 2.3 (0.3)	-	-	fluids with goal of 48 ounces/d, preferably water. Same exercise sessions given to all participants	-
Lison 2012	I1: hospital clinic group exercise-diet programme	51.1	12.3 (1.9)	BMI: 28.5 (3.8) BMI z score: 2.11 (0.33)	67.2 (17.3)	-	-	-
	I2: Home-based combined exercise-diet programme	48.8	11.9 (2.2)	BMI: 29.7 (3.7) BMI z score: 2.10 (0.26)	74.0 (16.2)	-	-	-
	C: control group	45.8	11.2 (2.1)	BMI: 29.2 (3.9) BMI z score: 2.23 (0.21)	69.2 (18.3)	-	-	-
Waling 2012	I: family-based intervention	44	10.5 (1.15)	BMI: 23.4 (2.79) BMI z score: 2.03 (0.88)	52.1 (9.95)	-	-	At baseline, 3 children in the study were defined as having MetS, 1 participant in the intervention group, and 2 in control
	C: control group	58	10.5 (1.02)	BMI: 22.6 (2.39) BMI z score: 1.77 (0.71)	50.4 (9.99)	-	-	
Wright 2012	I: Kids N Fitness (KNF) intervention	58	9.0 (1.6)	BMI: 21.89 (6.26) BMI z score: 2.3 (0.41)	-	-	-	-
	C: general education (GE)	62	8.3 (1.1)	BMI: 21.25 (6.68) BMI z score: 2.28 (0.5)	-	-	-	-
Barkin 2011	I: group physical activity and goal setting	54.1	9.3 (1.2)	BMI: 25.8 (4.9)	-	BMI: 33.6 (7.8)% Overweight: 18.9%	-	-

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	C: standard care counselling and health education session				-	Obese: 64.2%	-	-
Bryant 2011	I: WATCH IT intervention	63	11.5 (1.8)	BMI SDS: 2.86 (0.45)	-	-	-	-
	C: waiting-list control	66	11.3 (2.2)	BMI SDS: 3.11 (0.47)	-	-	-	-
Coppins 2011	I: multi-component family-focused education package	62.9	11.1	BMI: 28.0 (95% CI: 26.7-29.3) BMI z score: 2.7 (2.6-2.9)	63.3 (57.9-68.7)	-	-	-
	C: waiting-list control	70.0	9.7	BMI: 26.9 (25.0-28.8) BMI z score: 2.8 (2.5-3.0)	55.6 (48.6-62.5)	-	-	-
Gunnarsdottir 2011a	I: Epstein's family-based behavioural treatment (FBBT)	--	-	BMI SDS: 3.26 (0.51)	73.1 (13.4)	BMI: 33.8 (9.2)	-	Emotional difficulties (peer problems on SDQ, depression and/or anxiety) N = 2 Diagnosis of ADHD N = 1 Low IQ N = 1
	C: standard care (waiting-list control)	-	-				-	Emotional difficulties (peer problems on SDQ, depression and/or anxiety) N = 3 Diagnosis of ADHD N = 1 Low IQ N = 1

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Maddison 2011	I: active video game package	27.5	11.6 (1.1)	BMI: 25.6 (4.1) BMI z score: 1.3 (1.1)	63.0 (13.6)	-	-	-
	C: control group	26.5	11.6 (1.1)	BMI: 25.8 (4.3) BMI z score: 1.3 (1.1)	63.3 (15.2)	-	-	-
Wafa 2011	I: low-intensity intervention	46.2	9.7 (1.4)	BMI: 27.6 (3.4) BMI z score: 2.9 (0.49)	54.5 (12.1)	-	-	-
	C: waiting-list control	52.7	9.9 (1.6)	BMI: 28.0 (7.0) BMI z score: 2.95 (0.60)	54.6 (14.0)	-	-	-
Bathrellou 2010	I: behavioural intervention with parental involvement	76.2	9.4 (0.3)	BMI: 26.7 (0.8)	52.4 (2.3)	-	Behavioural intervention	-
	C: behavioural intervention without parental involvement		9.1 (0.3)	BMI: 27.4 (0.7)	53.3 (2.8)	-		-
Diaz 2010	I: behavioural curriculum plus registered dieticians and physician consultations	50	11.6 (2.1)	BMI: 30.2 (5.4) BMI z score: 2.12 (0.37)	70.3 (17)	-	Both received physician consultations	-
	C: physician consultations only	52	11.7 (2.2)	BMI: 29.1 (4.2) BMI z score: 2.07 (0.25)	69.2 (15)	-		-
Duggins 2010	I: nutrition classes and family YMCA membership	42	10.6 (3.9)	BMI percentile: 99.0 (91-99)	-	-	Nutrition classes given to both groups	-
	C: nutrition classes only	60	10.6 (3.4)	BMI percentile: 99.0 (93-99)	-	-		
Faude 2010	I: football training programme (FB)	45.5	10.8 (1.2)	BMI: 26.9 (2.9) BMI z score: 2.1 (0.5)	65.7 (11.1)	-	-	-
	C: established standard sports programme (STD)	27.2		BMI: 26.0 (3.3) BMI z score: 2.1 (0.6)	64.5 (12.6)	-	-	

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Reinehr 2010	I: behaviour-changing treatment	62	11.6 (1.6)	BMI: 24.2 (1.5) BMI z score: 1.73 (0.22)	-	-	-	-
	C: waiting-list control	59	11.4 (1.7)	BMI: 23.3 (1.7) BMI z score: 1.59 (0.15)	-	-	-	-
Sacher 2010	I: MEND program	63	10.3 (1.3)	BMI: 27.2 (3.7) BMI z score: 2.77 (0.51)	59.2 (12.5)	Maternal BMI: 29.3 (6.2)	-	-
	C: control group	45	10.2 (1.3)	BMI: 27.1 (4.9) BMIz score: 2.76 (0.63)	58.3 (14.8)	Maternal BMI: 30.5 (6.5)	-	-
Kalarchian 2009	I: family-based, behavioural weight control group	55.67	10.07 (1.19)	BMI: 31.71 (5.21)	70.17 (18.44)	BMI: 35.60 (9.20)	-	-
	C: usual care	57.89	10.30 (1.21)	BMI: 32.54 (4.67)	72.74 (16.63)	BMI: 35.60 (9.20)	-	-
Nowicka 2009	I: summer camp	-	-	-	-	-	-	-
	C: control group	-	-	-	-	-	-	-
Wake 2009	I: LEAP2 behavioural intervention	60	7.4 (1.4)	BMI: 20.2 (2.3) BMI z score: 1.9 (0.5)	-	-	-	-
	C: control group	61	7.6 (1.4)	BMI: 20.3 (1.9) BMI z score: 1.9 (0.5)	-	-	-	-
Alves 2008	I: exercise programme	53.8	7.97 (1.81)	BMI: 20.6 (3.33)	35.4 (12.3)	-	-	-
	C: no care	43.6	7.85 (1.47)	BMI: 21.0 (2.90)	34.4 (9.75)	-	-	-
Hughes 2008	I: behavioural programme	56.5	9.1 (1.7)	BMI z score median (IQR): 3.2 (2.7 to 3.6)	Median (IQR): 52.6 (43.8 to 61.2)	Maternal BMI median (IQR): 28.0 (24.2 to 32.8)	-	-

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						Paternal BMI median (IQR): 26.1 (23.7 to 31.5)		
	C: standard care	55.4	8.5 (1.9)	BMI z score (IQR): 3.3 (2.8 to 3.6)	Median (IQR): 49.0 (41.2 to 61.7)	Maternal BMI median (IQR): 30.0 (25.2 to 35.8) Paternal BMI median (IQR): 27.1 (24.7 to 31.7)	-	-
Weigel 2008	I: active intervention group	59.4	10.9 (1.4)	BMI: 27.3 (3.3) BMI z score: 2.24 (0.42)	-	-	-	-
	C: control group	50.0	11.6 (2.0)	BMI: 30.0 (3.7) BMI z score: 2.48 (0.58)	-	-	-	-
Weintraub 2008	I: after-school team sports programme	-	9.5 (0.58)	BMI: 27.17 (4.96) BMI z score: 2.15 (0.44)	-	-	-	-
	C: "Active placebo" control	-	10.34 (0.84)	BMI: 29.01 (4.77) BMI z score: 2.22 (0.33)	-	-	-	-
Berry 2007	I: nutrition and exercise education programme plus coping skills training	60.0	11.9 (2.3)	BMI: 35.8 (5.1)	-	BMI: 37.7 (7.0)	Same nutrition and exercise education programme	
	C: nutrition and exercise education programme only	57.5	11.9 (2.5)	BMI: 36.7 (5.6)	-	BMI: 37.9 (10.3)		
Gillis 2007	I: exercise and diet education with weekly diaries and telephone calls	50.0	11.2 (2.5)	BMI SDS: 1.98 (0.21)	-	-	-	-

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	C: exercise and diet education only	53.8	9.0 (2.2)	BMI SDS: 2.16 (0.34)	-	-	-	-
Kalavainen 2007	I: family-centred group programme	54	8.1 (0.9)	BMI: 23.4 (2.6) BMI z score: 2.6 (0.6)	43.1 (8.7)	Mother's BMI: 26.1 (5.4) Father's BMI: 26.9 (3.8)	-	Healthy N = 23 (66%), asthma/allergy N = 10 (28%), other disease N = 2 (6%)
	C: routine treatment	66	8.0 (0.8)	BMI: 22.9 (2.5) BMI z score: 2.5 (0.6)	40.4 (6.7)	27.0 (6.3) 27.7 (3.9)	-	Healthy N = 18 (52%), asthma/allergy N = 12 (34%), other disease N = 5 (14%)
McCallum 2007	I: LEAP Intervention	49	7.5 (1.6)	BMI: 20.5 (2.2) BMI z score: 2.0 (0.5)	-	-	-	-
	C: control group	54	7.4 (1.6)	BMI: 20.0 (1.8) BMI z score: 1.9 (0.5)	-	-	-	-
Rodearmel 2007	I: 'America on the move' intervention group	50.86	11.11 (2.08)	BMI: 25.40 (4.22) BMIz score: 1.76 (0.45)	58.3 (18.6)	BMI: 30.81 (7.80)	-	-
	C: self-monitoring group	53.92	11.28 (2.29)	BMI: 24.75 (5.04) BMIz score: 1.68 (0.42)	57.7 (19.4)	31.14 (7.04)	-	-
Satoh 2007	I: dietary guidance using an easily-handled model nutritional balance chart (MNBC)	52.4	11.0 (1.5)	-	-	-	-	Fatty liver N = 2
	C: control group	75.0	12.4 (1.6)	-	-	-	-	Fatty liver N = 0
Wilfley 2007	I1: behavioural skills maintenance group	72.5	9.9 (1.4)	BMI: 27.1 (3.3)	-	BMI: 35.2 (5.9)	-	-

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	I2: social facilitation maintenance group	70.0	9.9 (1.4)	BMI: 28.2 (3.3)	-	35.2 (5.9)	-	-
	C: control group	65.3	9.8 (1.2)	BMI: 27.3 (3.7)	-	34.6 (7.2)	-	-
Epstein 2005	I: standardised family-based behavioural weight control programme plus reinforcement for increasing alternatives to eating	59.1	10.2 (1.1)	BMI: 28.91 (3.1) BMI z score: 4.1 (1.2)	62.4 (11.2)	BMI: 31.4 (5.9)	All participants received the same behavioural weight control programme	-
	C: standardised family-based behavioural weight control programme only	52.6	10.1 (1.3)	BMI: 29.7 (3.4) BMI z score: 4.5 (1.3)	64.8 (10.8)	30.6 (6.0)		-
Nemet 2005	I: Combined dietary and exercise programme	41.7	10.9 (1.9)	BMI: 28.5 (4.1)	63.8 (19.1)	Parental obesity, no: 8 both 10 single 6 none	-	-
	C: control group	45.5	11.3 (2.8)	BMI: 27.8 (5.0)	63.4 (22.8)	Parental obesity, no: 7 both 11 single 4 none	-	-
Woo 2004	I1: diet plus supervised structured exercise programme with continuing training	34	10.0 (1.0)	BMI: 25.3 (2.4)	54.6 (9.5)	-	Diet modification	-
	I2: diet plus supervised structured exercise programme with detraining			BMI: 26.1 (4.0)		-		-
	C: diet modification only	34	9.9 (0.9)	BMI: 24.7 (3.1)	50.3 (8.5)	-		-
Epstein 2001	I: combination of reducing sedentary behaviour and increasing physical activity	48.1	Boys 10.4 (1.2) Girls 9.9 (1.1)	Boys 27.5 (2.5) Girls 27.9 (4.7)	Boys 132.8 (24.8) Girls 134.7 (40.6)	Father's BMI: 31.1 (7.3)	-	-

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						Mother's BMI: 28.5 (5.5)		
	C: targeting increasing physical activity only	48.3	Boys 10.8 (1.1) Girls 10.2 (1.4)	Boys 27.3 (3.8) Girls 26.9 (3.6)	Boys 134.5 (30.7) Girls 127.8 (32.4)	Father's BMI: 31.3 (4.4) Mother's BMI: 29.8 (3.4)	-	
Nova 2001	I: enhanced approach	47.2	8.6 (1.9)	23.75 (2.65)	-	-	-	-
	C: routine approach	41.6	8.6 (2.1)	22.37 (1.85)	-	-	-	-
Epstein 2000a	I1: behavioural weight-control programme plus parent and child problem solving	52.9	10.7 (0.9)	BMI z score score: 2.8 (0.9)	64.2 (13.2)	Weight: 89.0 (18.2)	All participants received a workbook with dietary + exercise advice and behavioural principles	-
	I2: behavioural weight-control programme plus child problem solving only	50.0	10.3 (1.2)	BMI z score: 2.6 (0.9)	58.2 (10.9)	79.8 (16.0)		-
	C: standard treatment with no additional problem solving	52.9	10.0 (1.2)	BMI z score: 2.7 (0.8)	57.0 (11.4)	87.0 (23.0)		-
Schwingshandl 1999	I: Physical activity programme and dietary advice	57.1	11.0 (2.5)	BMI SDS: 5.58 (2.46)	63.3 (16.5)	-	Dietary advice	-
	C: dietary advice only	56.3	12.2 (2.7)	BMI SDS: 5.33 (1.79)	69.2 (20.6)	-		-
Duffy 1993	I: cognitive self-management training plus behaviour therapy	78.6	9.9 (1.7)		57.14 (11.37)	-	Behaviour therapy taught to both groups	-
	C: behaviour therapy plus attention placebo control methods				55.55 (11.82)	-		-
Flodmark 1993	I: family therapy	56.0	-	BMI: 24.7 (1.76)	-	-	-	-
	C: conventional treatment	47.4	-	BMI: 25.5 (2.31)	-	-	-	-

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Epstein 1985c	I: behaviourally-orientated programme that emphasised parent management	100	-	BMI: 22.8 (2.6)	-	BMI: 28.0 (3.4)	Both groups received diet and exercise education	-
	C: provided equal education and attention but not behavioural principles	100	-	BMI: 22.7 (3.0)	-	BMI: 27.3 (4.8)		-
Epstein 1985b	I: diet and exercise education	100	-	-	53.77 (19.6)		Both groups received advice on behavioural procedures	-
	C: diet education only	100	-	-	53.95 (17.5)			-
Epstein 1985a	I1: diet plus programmed aerobic exercise programme	60	-	-	56.2 (10.1)	Weight: 95.9 (14.4) Percent overweight: 49.6 (17.9)	All participants received a diet intervention	-
	I2: diet plus behaviour-changing exercise programme			-	56.2 (11.4)	95.8 (18.3) 50.0 (21.3)		-
	C: diet plus low-intensity callisthenic exercise programme			-	56.2 (16.8)	95.9 (15.9) 50.2 (12.2)		-
Epstein 1984a	I1: diet-plus-exercise group	-	10.5 (1.3)	-	-56.1 (11.0)	-	-	-
	I2: diet only	-				-	-	-
	C: waiting-list control	-	10.3 (1.2)	-	56.7 (13.4)	-	-	-

- denotes not reported

ADHD: attention deficit hyperactivity disorder; BMI: body mass index; C: comparator; CBT: cognitive behavioural therapy; I: intervention; IQ: intelligence quotient; IQR: inter-quartile range; MetS: metabolic syndrome; MEND: Mind, Exercise, Nutrition, Do it; SD: standard deviation; SDS: standardised; SDQ: Strengths & Difficulties questionnaire; SEM: standard error of the mean; SWITCH: Screen-Time Weight-loss Intervention Targeting Children at Home; YMCA: Young Men's Christian Association

Appendix 5. Matrix of study endpoints (publications and trial documents)

	Endpoints quoted in trial document(s) (ClinicalTrials.gov, FDA/EMA document, manufacturer's website, published design paper)[a]	Endpoints quoted in publication(s)[b,c]
NCT02436330	**Source:** NCT02436330 **Primary outcome measure(s)**:): BMI z -score change	N/A
	Secondary outcome measure(s): after school screen time, Saturday screen time; activity levels measured by pedometers; self perception as assessed using the Children and Youth Physical Self-Perception Profile (CY-PSPP), physical self-worth: changes in physical self-worth, global self-worth score; dietary change (total calorie intake, % fat, % carbohydrates, number of vegetable servings, number of fruit servings, number of sugar-sweetened beverages); attendance, WC change; systolic blood pressure change; heart rate change, shuttle run change	
	Other outcome measure(s): -	
Ho 2016	**Source:** NCT00881478 **Primary outcome measure(s)**: change in age and gender-adjusted BMI z score	**Primary outcome measure(s)**: BMI z score
	Secondary outcome measure(s): age and gender-adjusted WC percentile, age and gender-adjusted blood pressure percentile, fasting lipid profile, fasting insulin and fasting glucose, plasma visfatin level, plasma adiponectin level, proportion of children achieving a BMI below the 85th percentile for age and gender	**Secondary outcome measure**(s): BMI (kg/m2), BMI percentile, BMI z score, WC (cm), systolic BP, systolic BP percentile, systolic BP z score, diastolic BP, diastolic BP z score, fasting insulin, fasting glucose, glucose at 2-h OGTT, total cholesterol, triglycerides, total adiponectin, high-molecular-weight adiponectin
	Other outcome measure(s): -	**Other outcome measure(s)**: compliance (≥ 80% of recommendations)
Epstein 2015	**Source:** NCT01208870 **Primary outcome measure(s)**: responding for food on the habituation task, BMI z score	**Primary outcome measure(s)**: -
	Secondary outcome measure(s): dietary intake	**Secondary outcome measure**(s): -
	Other outcome measure(s): -	**Other outcome measure(s)**: percent overweight, parent BMI, adherence, fat calories, total calories, carbohydrate calories, red foods, fruit and vegetables
Larsen 2015	N/A	**Primary outcome measure(s)**: BMI z score

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		Secondary outcome measure(s): WC, waist-to-height ratio
		Other outcome measure(s):
Serra-Paya 2015	**Source:** NCT01878994 **Primary outcome measure(s):** BMI z score	**Primary outcome measure(s):** BMI z score
	Secondary outcome measure(s): PA habits (Actigraph accelerometers (GT3X+ models))	**Secondary outcome measure(s):** height, BMI, weight, WC, waist-to-height ratio, PA and sedentary time (accelerometer), dietary intake (food frequency questionnaire)
	Other outcome measure(s): (from protocol) weight, height, BMI, WC, waist-to-height ratio, triceps and subscapular skinfold thickness, blood pressure, cholesterol, triglycerides, glucose, insulin, TSH, cortisol, PA and fitness levels (ALPHA fitness test), sedentary and PA behaviour (accelerometry), dietary behaviours (dietary recall and questionnaire), PA self-efficacy, body image, PA enjoyment, HRQoL, cost-utility of the intervention, parental outcomes (anthropometric, sedentary + PA behaviours, diet, psychological aspects, economic data, pubertal stage, socioeconomic and demographic parameters, adherence, degree of satisfaction	**Other outcome measure(s)**: -
Taveras 2015	**Source:** NCT01537510 **Primary outcome measure(s):** BMI, blood pressure, and laboratory screening, provision of nutrition and PA counselling	**Primary outcome measure(s):** BMI and quality of care (HEDIS measures)
	Secondary outcome measure(s): BMI, health behaviours (sugar-sweetened beverage intake, fast food, PA, TV viewing and sleep), costs	**Secondary outcome measure(s):** -
	Other outcome measure(s): -	**Other outcome measure(s):** parent's height and weight and BMI, parental acceptance and satisfaction of interventions
Taylor 2015	**Source:** ACTRN12609000749202 **Primary outcome measure(s):** BMI z score	**Primary outcome measure(s):** BMI z score
	Secondary outcome measure(s): PA (accelerometry), food behaviours and intake, QoL, psychological functioning	**Secondary outcome measure(s):** WC, height, weight, BMI, waist girth, waist-to-height ratio, percentage fat, dietary intake, home food availability, accelerometry, parental feeding practices, home environment, QoL, motivation
	Other outcome measure(s): -	**Other outcome measure(s):** -
Berry 2014	**Source:** NCT01378806	**Primary outcome measure(s):** BMI percentile children, decrease in BMI parents

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	Primary outcome measure(s): change in BMI in adults and BMI percentile in children	
	Secondary outcome measure(s): change in adiposity for adults and children as measured by change in WC, triceps, and subscapular skinfold measures; WC and triceps and subscapular skinfold measures; change in health behaviours as measured by nutrition and exercise in adults and children; nutrition and exercise behaviours in adults and children based on questionnaire scores; change in self-efficacy in adults and children as measured by belief that they can improve their eating and exercise behaviours; eating and exercise self-efficacy in adults and children based on questionnaire scores	**Secondary outcome measure(s):** decrease in adiposity and an improvement in health behaviours and self-efficacy
	Other outcome measure(s): -	**Other outcome measure(s):** -
Boutelle 2014	N/A	**Primary outcome measure(s): -**
		Secondary outcome measure(s): -
		Other outcome measure(s): absence of hunger, subjective bulimic episode, objective bulimic episode, objective over-eating episode, loss of control eating, overeating episodes, caloric intake, BMI, BMI z score, treatment acceptability
Hamilton-Shield 2014	**Source:** ISRCTN90561114 **Primary outcome measure(s):** child BMI standard deviation scores (SDS)	**Primary outcome measure(s)**: BMI z score
	Secondary outcome measure(s): adult eating rate, child BMI SDS, child eating rate, child ideal portion size choice, child self-determined portion size, parent BMI, parent ideal portion size choice, parent self-determined portion size, HRQoL (PedsQL, CHU9D, EQ5D, EQ5D-Y)	**Secondary outcome measure(s):** height and weight of parents; maintained BMI or BMI z-score value improvement at 12 months post therapy; QoL measures in child (PedsQL, CHU9D and EQ-5D-Y) and parents; resource-use questionnaire, including child's use of primary and secondary care services; change in eating speed and self-determined portion size; precise measures of changes in 'ideal portion size' and 'expected satiety levels'; changes in PA levels, measured as number of steps/d for 1 week (pedometers)
	Other outcome measure(s): -	**Other outcome measure(s): -**
Looney 2014	**Source:** NCT01358448 **Primary outcome measure(s):** weight status (BMI z score), dietary intake, leisure-time behaviours, care feeding behaviours	**Primary outcome measure(s):** BMI z score
	Secondary outcome measure(s): cost effectiveness	**Secondary outcome measure(s):** child dietary intake, leisure time behaviours
	Other outcome measure(s): -	**Other outcome measure(s):** -
Maddison 2014	**Source:** ACTRN12611000164998	**Primary outcome measure(s):** child BMI z score

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	Primary outcome measure(s): child BMI z score	
	Secondary outcome measure(s): parent BMI, parent PA, child's daily min in sedentary behaviour, child min spent in PA, child dietary intake	**Secondary outcome measure(s):** child BMI ,weight, WC, % body fat, self-reported daily PA, total sedentary time, sleep, dietary intake, perceived enjoyment of PA and sedentary behaviour, parental BMI and self-reported PA
	Other outcome measure(s): -	**Other outcome measure(s):** -
Markert 2014	**Source:** DRKS00000803 (German Clinical Trial Register) **Primary outcome measure(s):** BMI SDS	**Primary outcome measure(s):** BMI SDS
	Secondary outcome measure(s): eating behaviour, nutrition, PA and leisure time habits, QoL	**Secondary outcome measure(s):** HRQoL, eating patterns, PA, leisure time habits
	Other outcome measure(s): -	**Other outcome measure(s):** -
Arauz Boudreau 2013	**Source:** lists Clinicaltrials.partners.org 2009P001721 – however, unable to find the record	**Primary outcome measure(s):** HRQoL, metabolic markers of obesity (lipids, glucose, insulin, HbA1c, AST/ALT, C-reactive protein, IL-6, TNF-α, cholesterol, triglycerides, HDL, VLDL, LDL), BMI, accelerometer-based PA
		Secondary outcome measure(s): -
		Other outcome measure(s): nutrition knowledge and intake, height, weight, BMI z scores
Davis 2013	**Source:** Gallagher et al. Treating rural pediatric obesity through telemedicine: baseline data from a randomised controlled trial. 2011. Journal of pediatric psychology. 36 (6). 687-95 (see Davis 2013) **Primary outcome measure(s):** -	**Primary outcome measure(s):** BMI z score
	Secondary outcome measure(s): -	**Secondary outcome measure(s)**:dietary behaviours, PA behaviours, child behaviour checklist, behavioural feeding assessment scale
	Other outcome measure(s): BMI, actigraph activity monitor information, 24 h dietary recalls, child-behaviour checklist, behavioural paediatrics feeding assessment scale	**Other outcome measure(s):** -
Davoli 2013	**Source:** NCT01822626 **Primary outcome measure(s):** BMI z score	**Primary outcome measure(s):** individual variation in BMI (BMI z score)
	Secondary outcome measure(s): PA behaviours variation, dietary behaviours variation	**Secondary outcome measure(s)**: percentage of positive changes in parent-reported dietary behaviours and in PA
	Other outcome measure(s): -	**Other outcome measure(s):** -
Lochrie 2013	**Source:** NCT01146314	**Primary outcome measure(s):** BMI

(Continued)

	Primary outcome measure(s): improvement of health status of overweight children, BMI, blood pressure, WC, and reducing the risk of the development of type 2 diabetes and metabolic syndrome	
	Secondary outcome measure(s): improvement of health behaviours and psychosocial adjustment; changing health behaviours, such as eating patterns, diet, and eating behaviour; evaluate the effects of maintaining of improving adjustment to psychological stressors associated with being overweight (self-esteem, depression, behaviour)	**Secondary outcome measure(s)**: -
	Other outcome measure(s): -	**Other outcome measure(s):** total cholesterol, HDL, LDL, WC, abdominal girth, triceps skinfold, child depression inventory, pediatric QoL parent, pediatric QoL youth, Harter SPP global self-worth, BASC-2 parent version-externalising, BASC-2 parent version internalising, blood pressure
Mirza 2013	**Source:** NCT01068197 **Primary outcome measure(s):** insulin sensitivity, BMI z score	**Primary outcome measure(s):** BMI z score
	Secondary outcome measure(s): body fat mass, LDL, cholesterol, triglycerides, FFA, hormonal, metabolic outcomes	**Secondary outcome measure(s)**: changes in insulin resistance and metabolic risk markers
	Other outcome measure(s): -	**Other outcome measure(s):** dietary intake, adverse events, metabolic syndrome
O'Connor 2013	**Source:** NCT01195012 **Primary outcome measure(s)**: family attendance	**Primary outcome measure(s)**: -
	Secondary outcome measure(s): -	**Secondary outcome measure(s)**: -
	Other outcome measure(s): -	**Other outcome measure(s)**: attendance, satisfaction, height, weight, parent BMI, child BMI z scores and percentiles, child behaviours (diet, physical activities, TV viewing), parent behaviours
Saelens 2013	N/A	**Primary outcome measure(s)**: BMI z score, parent BMI
		Secondary outcome measure(s):
		Other outcome measure(s): parent self-efficacy and confidence
Siwik 2013	**Source:** NCT01674920 **Primary outcome measure(s)**: BMI z scores	**Primary outcome measure(s)**: BMI z score

(Continued)

	Secondary outcome measure(s): weight z scores	**Secondary outcome measure(s)**: -
	Other outcome measure(s):-	**Other outcome measure(s)**: weight z score, height z score, BMI, weight, height, METs (low, medium, high), percent body fat, qualitative interview measures
Vann 2013	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): BMI, glucose, total cholesterol, triglycerides, HDL, LDL, PA (min/d), steps/d
Wake 2013	**Source:** ACTRN12608000055303 **Primary outcome measure(s)**: BMI z score	**Primary outcome measure(s)**: change in BMI z score
	Secondary outcome measure(s): % fat, % lean muscle mass, WC, harm (poorer health status, body satisfaction or global self-worth), acceptability and feasibility	**Secondary outcome measure(s)**: change in % fat, WC, health status, body satisfaction, global self-worth
	Other outcome measure(s): -	**Other outcome measure(s)**: -
Croker 2012	**Source:** ISRCTN51382628 **Primary outcome measure(s)**: weight, BMI, percentage BMI	**Primary outcome measure(s)**: BMI SDS and BMI
	Secondary outcome measure(s): other child anthropometric measures (waist, body composition), child blood lipids/glucose/insulin/blood pressure, eating behaviours, dietary intake, activity level (using accelerometers), self-esteem, mood, parental eating behaviours and parenting styles	**Secondary outcome measure(s)**: % BMI, weight, weight SDS, height, height SDS, waist, waist SDS
	Other outcome measure(s):-	**Other outcome measure(s)**: fat mass index and fat-free mass index, blood pressure, self-esteem, mood, parental-reported child difficulties, QoL, Children's Eating Attitudes
de Niet 2012	**Source:** ISRCTN33476574 **Primary outcome measure(s)**: dropout rate	**Primary outcome measure(s)**: BMI SDS, eating behaviour, psychological well-being
	Secondary outcome measure(s): BMI-SDS, problem behaviour, measured with Youth Outcome Questionnaire (YOQ), family functioning, measured with the Dutch version of the Family Adaptability and Cohesion Evaluation Scale (FACES III), HRQoL measured with the Child Health Questionnaire-Parent Form (CHQ-PF-50), perceived competence, measured with Dutch version of the Self-Perception Profile for Children (SPPC), eating behaviour, measured with the Dutch Eating Behaviour Questionnaire (DEBQ)	**Secondary outcome measure(s)**: adherence, self-reported health behaviours and mood, feasibility of the SMSMT

(Continued)

	Other outcome measure(s): -	**Other outcome measure(s)**: -
Eddy Ives 2012	**Source:** ISRCTN35399598 **Primary outcome measure(s)**: reduction in BMI	**Primary outcome measure(s)**: BMI and BMI z scores
	Secondary outcome measure(s): social-economic class, eating and PA habits, emotional status (AF-5)	**Secondary outcome measure(s)**: abdominal perimeter, abdominal perimeter z score, dietary and physical exercise habits, self-esteem indicators
	Other outcome measure(s): -	**Other outcome measure(s)**:-
Kirk 2012	**Source:** NCT00215111 **Primary outcome measure(s)**: body weight, height, BMI, WC, percent body fat, adipose mass, lean body mass, bone mineral density, fasting lipid profile, fasting insulin, fasting glucose, 2-h glucose (baseline and 3-month assessment), 2-h insulin (baseline and 3-month assessment), interleukin-6, tumor necrosis factor, C-reactive protein, serum amyloid A, ketones, energy intake, macronutrient intake (carbohydrate, protein and fat), micronutrient intake (vitamins and minerals), dietary fibre intake, glycaemic load, psychological measures (Child Behavior Checklist and Teach Report Form)	**Primary outcome measure(s)**: BMI z score, WC, % body fat, dietary intake
	Secondary outcome measure(s): PA (3-d PA records and pedometer readings), compliance with behavioural intervention (frequency rewards were earned), attendance at group and individual sessions during initial 3-month intervention, parent/guardian weight, parent/guardian body mass index, Sexual Maturity Rating, Hunger/Satiety assessment (Three-Factor Eating Questionnaire), parent/guardian perception of success for each diet assignment prior to their child being randomised to a diet group	**Secondary outcome measure(s)**: clinical metabolic parameters (fasting glucose, fasting insulin, total cholesterol, triglycerides, HDL, LDL, SBP and DBP)
	Other outcome measure(s): -	**Other outcome measure(s)**: -
Lison 2012	**Source:** NCT01503281 **Primary outcome measure(s)**: BMI, BMI-Z score	**Primary outcome measure(s)**: -
	Secondary outcome measure(s): WC, percentage body fat	**Secondary outcome measure(s)**: -
	Other outcome measure(s): -	**Other outcome measure(s)**: anthropometric values (including body weight, height, BMI, BMI-Z score, and WC), percentage body fat was also determined with a body fat analyser (TANITA TBF-410 M)
Waling 2012	**Source:** NCT01012206	**Primary outcome measure(s)**: BMI

(Continued)

	Primary outcome measure(s): BMI	
	Secondary outcome measure(s): food intake, PA	**Secondary outcome measure(s)**: -
	Other outcome measure(s): -	**Other outcome measure(s)**: WC, sagittal abdominal diameter, body composition analysis (DEXA), body fat, truncal fat, fat mass index, blood pressure, plasma glucose, serum lipids (cholesterol, HDL, LDL, triglycerides, apo A and apo B), insulin, HbA1c, HOMA-Index, metabolic syndrome, total energy expenditure, basal metabolic index, energy intake, macronutrient intakes (e.g. protein, sucrose, fat, fibre), PA level, steps/d, metabolic equivalents, screen time
Wright 2012	N/A	**Primary outcome measure(s)**: BMI z scores, dietary measures
		Secondary outcome measure(s): -
		Other outcome measure(s): food preferences, knowledge and self-efficacy
Barkin 2011	N/A	**Primary outcome measure(s)**: BMI , BMI percentile
		Secondary outcome measure(s): -
		Other outcome measure(s): -
Bryant 2011	**Source:** ISRCTN95431788 **Primary outcome measure(s)**: adiposity at 12 months (% body fat by DEXA scan)	**Primary outcome measure(s)**: BMI, WC, BIA, DXA
	Secondary outcome measure(s): adiposity from bioimpedance, BMI SD score and WC at 6 and 12 months, feasibility (e.g. recruitment rate, attrition, acceptability etc.), biomedical markers of morbidity, lifestyle, psychological measures and physical fitness	**Secondary outcome measure(s)**: 2-h oral glucose tolerance, lipid level, liver function, blood pressure, fitness (step test), PA (accelerometry), parental height and weight, diet questionnaire, eating behaviour, PA questionnaire, sedentary behaviour questionnaire, QoL, strengths and difficulties questionnaire, social and cognitive competence
	Other outcome measure(s): -	**Other outcome measure(s)**: -
Coppins 2011	N/A	**Primary outcome measure(s)**: BMI SDS
		Secondary outcome measure(s): WC, body fat, lifestyle outcomes (food and activity diary, frequency of specific foods, pedometer steps, time in low, moderate and high intensity activity)
		Other outcome measure(s): -
Gunnarsdottir 2011a	N/A	**Primary outcome measure(s)**: ratings of treatment acceptability (measured post treatment) and child changes in BMI-SDS
		Secondary outcome measure(s): -

(Continued)

		Other outcome measure(s): daily fruit and vegetable consumption, daily exercise (min), parental BMI
Maddison 2011	**Source:** ACTRN12607000632493 **Primary outcome measure(s)**: BMI z score, BMI centile	**Primary outcome measure(s)**: change from baseline in BMI; in kg/m2
	Secondary outcome measure(s): percent body fat (%), WC (cm), physical fitness measured in VO2Max (mL/kg/min) PA Questionnaire for Children score (self-report levels), average daily time spent in light-to-vigorous activities (min) as measured via accelerometry, average daily time spent in active video games (min) (self-report), average daily time spent in non-active video games (min) (self-report)	**Secondary outcome measure(s)**: changes in percentage body fat, PA, cardiorespiratory fitness, video game play, and food snacking
	Other outcome measure(s): -	**Other outcome measure(s)**: -
Wafa 2011	**Source:** ISRCTN14241825 **Primary outcome measure(s)**: change in BMI SDS	**Primary outcome measure(s)**: BMI z score
	Secondary outcome measure(s): HRQoL, PA and sedentary (accelerometry) and estimated fat free mass (impedance)	**Secondary outcome measure(s)**: weight change, HRQoL, objectively measured PA and sedentary behaviour
	Other outcome measure(s): -	**Other outcome measure(s)**: -
Bathrellou 2010	**Source:** methods paper (Bathrellou et al, Child & Family Behaviour Therapy, 32:34-50, 2010) **Primary outcome measure(s)**: -	**Primary outcome measure(s)**: percent overweight
	Secondary outcome measure(s): -	**Secondary outcome measure(s)**: -
	Other outcome measure(s): anthropometric (percent overweight, weight, height, BMI, percent body fat), dietary intake (energy and macro-nutrient intake, consumption of specific food groups, meal pattern), dietary behaviour (eating in response to external stimuli, emotional cues, or restraint, PA (time allocated to moderate-to-vigorous intensity physical activities, and weighted-activity-metabolic-equivalent score, total screen time), biochemical & metabolic (fasting glucose, lipid and lipoprotein profile, hormonal and inflammatory markers, psychological (self-esteem, depression, anxiety, behaviour problems, depression, family function)	**Other outcome measure(s)**: weight, height, BMI
Diaz 2010	N/A	**Primary outcome measure(s)**: changes in body weight, changes in BMI

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		Secondary outcome measure(s): changes in other obesity parameters, changes in body composition, changes in blood pressure, changes in biochemical parameters
		Other outcome measure(s): -
Duggins 2010	N/A	**Primary outcome measure(s)**: BMI percentile
		Secondary outcome measure(s): -
		Other outcome measure(s): attendance, eating habits, number of participants who met AMA weight loss targets, number of participants who lost weight
Faude 2010	N/A	**Primary outcome measure(s)**: height, weight, BMI, BMI percentile, BMI z score, POmax, VO2 max, max lactate, max heart rate, psychometric data (total score, physical well-being, emotional well-being, self-esteem, family, friends, school), training compliance and training intensity, time one-leg standing right, time one-leg standing left, sit and reach test, counter movement jump height, agility test, 20 m shuttle run min, maximal heart rate during shuttle run
		Secondary outcome measure(s): -
		Other outcome measure(s): -
Reinehr 2010	**Source:** NCT00422916 **Primary outcome measure(s)**: change of weight status	**Primary outcome measure(s)**: changes in BMI SDS
	Secondary outcome measure(s): change of eating and exercise behaviour, and change of QoL	**Secondary outcome measure(s)**: BMI, WC, triceps skinfold thickness, subscapularis skinfold thickness, percentage fat mass based on skinfold measurements, lean body mass, fat mass, % body fat, SBP, DBP, dietary intake (energy, fat, protein, carbohydrate, sugar), sports activity, TV consumption, computer consumption
	Other outcome measure(s): -	**Other outcome measure(s)**: -
Sacher 2010	**Source:** ISRCTN30238779 **Primary outcome measure(s)**: WC	**Primary outcome measure(s)**: WC
	Secondary outcome measure(s): body composition, weight, height, BMI, self- esteem, family functioning, child mental health, cardiovascular fitness and dietary intake and composition	**Secondary outcome measure(s)**: BMI and % body fat
	Other outcome measure(s): -	**Other outcome measure(s)**: systolic and diastolic blood pressure, heart rate, PA, sedentary activity, self-esteem
Kalarchian 2009	**Source:** NCT00177229 (given as NCT00277229 in publication but is wrong as no record available – searched for title of publication and found the above identifier)	**Primary outcome measure(s)**: percent overweight

(Continued)

	Primary outcome measure(s): BMI and cardiovascular risk factors	
	Secondary outcome measure(s): eating, activity, and psychosocial functioning	**Secondary outcome measure(s)**: -
	Other outcome measure(s): -	**Other outcome measure(s)**: changes in blood pressure, body composition, WC, and HRQoL, binge eating (in additional publication)
Nowicka 2009	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): BMI z score, weight, height, DXA % body fat, DXA body fat DXA lean mass, MRI subcutaneous fat caudal, fat cranial, visceral fat caudal, visceral fat cranial, physical education, involvement in sports clubs, TV viewing weekdays and weekends, computer weekdays and weekends
Wake 2009	**Source:** ISRCTN52511065 **Primary outcome measure(s)**: BMI	**Primary outcome measure(s)**: BMI, BMI z score
	Secondary outcome measure(s): accelerometry, child WC, parent-reported child nutrition, parent-reported PA, parent-reported child functional health status (PedsQL™), child-reported functional health status (PedsQL™), child-reported body satisfaction, child-reported appearance/self-worth	**Secondary outcome measure(s)**: WC, maternal and paternal BMI, PA (accelerometry), PA (diary), nutrition (diary), HRQoL, body dissatisfaction, physical appearance and self-worth
	Other outcome measure(s): -	**Other outcome measure(s)**: -
Alves 2008	N/A	**Primary outcome measure(s)**: weight, height, BMI
		Secondary outcome measure(s): -
		Other outcome measure(s): -
Hughes 2008	**Source:** : protocol (Stewart 2005) **Primary outcome measure(s)**: change in BMI z score	**Primary outcome measure(s)**:BMI z score
	Secondary outcome measure(s): growth velocity, PA and sedentary behaviour (measured objectively with accelerometry), and QoL	**Secondary outcome measure(s)**: WC, weight, height, total activity, monitored time (sedentary, light, MVPA), QOL (child self -report and parent proxy report)
	Other outcome measure(s): -	**Other outcome measure(s)**: -
Weigel 2008	N/A	**Primary outcome measure(s)**: BMI z score
		Secondary outcome measure(s): -

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		Other outcome measure(s): BMI, fat mass, lean mass, SBP, DBP, triglycerides, total cholesterol, uric acid, HDL, ALT, AST, cortisol, TSH or heart rate
Weintraub 2008	**Source:** NCT00186173 **Primary outcome measure(s)**: BMI	**Primary outcome measure(s)**: BMI
	Secondary outcome measure(s): WC, triceps skinfold thickness, resting heart rate, PA monitoring, sedentary behaviours, psychosocial measures	**Secondary outcome measure(s)**: PA (accelerometers), moderate PA, vigorous PA, television and other screen time, depressive symptoms, over-concerns with weight, self-esteem
	Other outcome measure(s): -	**Other outcome measure(s)**:
Berry 2007	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): BMI, body fat percentage, pedometer steps, parental behaviour outcomes
Gillis 2007	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): BMI z score, LDL, HDL, triglycerides, CRP, consumption of sugar containing drinks, physical fitness, ALT, AST, HbA1c, fasting glucose, insulin, glucose/insulin ratios
Kalavainen 2007	N/A	**Primary outcome measure(s)**: the change of weight for height based on Finnish growth charts
		Secondary outcome measure(s): changes in BMI and BMI standard deviation scores (BMI-SDS)
		Other outcome measure(s): fat mass, lean body mass, WC, waist/height, SBP, DBP, triglycerides, LDL, HDL, total cholesterol, fasting glucose, fasting insulin, HOMA-IR (from ID4097), cost effectiveness (Kalavainen 2009)
McCallum 2007	**Source:** protocol (McCallum 2005) **Primary outcome measure(s)**: change in BMI	**Primary outcome measure(s)**: BMI
	Secondary outcome measure(s): child WC, HRQoL, behaviour, self-esteem and family activities, parental concern regarding child's weight, readiness to change, child PA, sedentary behaviour, child and family nutrition, relationship with GP	**Secondary outcome measure(s)**: parent reported child nutrition, PA and health status, child-reported health status, body satisfaction, appearance/self-worth
	Other outcome measure(s): -	**Other outcome measure(s)**: costs
Rodearmel 2007	N/A	**Primary outcome measure(s)**: BMI for age for target children and change in BMI for parents

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		Secondary outcome measure(s): change in the following anthropometric measurements: BMI (children), weight, percentage of body fat, and WC
		Other outcome measure(s): steps/d, sugar intake
Satoh 2007	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): intake of foods (meat, fish, eggs, milk, beans, green and yellow vegetables, light coloured vegetables, fruit, grains, oil and sugar), percentage overweight
Wilfley 2007	**Source:** NCT00301197 **Primary outcome measure(s)**: weight (child and parent)	**Primary outcome measure(s)**: BMI z score, percent overweight
	Secondary outcome measure(s): weight-related behaviours, psychological functioning (specific and general)	**Secondary outcome measure(s)**: treatment specific psychosocial targets
	Other outcome measure(s): -	**Other outcome measure(s)**: -
Epstein 2005	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): BMI z score, percent overweight, time spent in MVPA, alternative to eating, children's episodes of eating and drinking/d
Nemet 2005	N/A	**Primary outcome measure(s)**: weight change
		Secondary outcome measure(s): -
		Other outcome measure(s): skinfold thickness, BMI, body weight, screen time, habitual activity, endurance time, caloric intake, carbohydrate, protein, fat, triglycerides, cholesterol, HDL, LDL, height, BMI percentile, body fat %
Woo 2004	N/A	**Primary outcome measure(s)**: arterial endothelium-dependent dilation and intima-media thickness
		Secondary outcome measure(s): -
		Other outcome measure(s): body weight, height, body fat, fasting serum cholesterol, triglycerides, HDL, LDL, waist-to-hip ratio, LDL ratio, BMI
Epstein 2001	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -

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		Other outcome measure(s): height, weight, percent overweight, BMI, motivation, perceived support of immediate family and friends, adherence
Nova 2001	N/A	**Primary outcome measure(s)**: variation in percentage overweight
		Secondary outcome measure(s): behavioural modifications (PA, PC or TV usage)
		Other outcome measure(s): adherence to follow-up visits (parental commitment and compliance)
Epstein 2000a	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): height; weight; BMI z scores; PEPSI; CBCL: total behaviour problems, total competence, internalising behaviour problems, externalising behaviour problems, adherence, KEDS: total score, weight dissatisfaction, bingeing/purging; parental weight, height, PSI, GSI, adherence, binge eating symptoms
Schwingshandl 1999	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): weight, BMI SDS, fat-free mass
Duffy 1993	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): weight, height, percentage overweight, number of red foods/d
Flodmark 1993	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): BMI, triceps, subscapular, suprailiac skinfold thickness, physical fitness (w/kg for normal weight and height at pulse 170)
Epstein 1985c	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): BMI, percent overweight, eating behaviour, parent and child self-control
Epstein 1985b	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -

(Continued)

		Other outcome measure(s): weight, percent overweight, physical work capacity, activity levels
Epstein 1985a	N/A	**Primary outcome measure(s)**: -
		Secondary outcome measure(s): -
		Other outcome measure(s): child and parent outcomes - percent overweight, weight fitness, eating behaviour, intervention compliance
Epstein 1984a	N/A	**Primary outcome measure(s)**: percent overweight
		Secondary outcome measure(s): -
		Other outcome measure(s): adherence, girth, skinfold thickness, fitness and serum lipids

- denotes not reported

[a]Trial document(s) refers to all available information from published design papers and sources other than regular publications (e.g. FDA/EMA documents, manufacturer's websites, trial registers).
[b]Publication(s) refers to trial information published in scientific journals (primary reference, duplicate publications, companion documents or multiple reports of a primary trial).
[c]Other outcome measures refer to all outcomes not specified as primary or secondary outcome measures.

ALT: alanine transaminase; AMA: American Medical Association; Apo A: Apolipoprotein A; Apo B: Apolipoprotein B; AST: aspartate transaminase;

BASC-2: Behavior Assessment System for Children - Second Edition; BIA: Bioelectrical impedance analysis; BMI: body mass index; BMI SDS: standardised body mass index; BP: blood pressure;

CBCL: Child Behavior Checklist; CFQ: Child feeding questionnaire; CHU9D: Child Health Utility 9-Dimensions; CRP: c-reactive protein; CRPBI: Child Report of Parental Behavior Inventory;

DBP: diastolic blood pressure; DXA/DEXA: dual-energy X-ray absorptiometry;

EAH: eating in the absence of hunger; EDI: Eating Disorder Inventory; EMA: European Medicines Agency; EQ-5D-Y: European Quality of Life 5-Dimensions – youth;

FDA: Food and Drug Administration (US); FFA: free fatty acids; FFM: fat-free mass;

GP: General Practitioner; GSI: Global Severity Index; HbA1c: Glycated haemoglobin;

HDL: high-density lipoprotein; HEDIS: Healthcare Effectiveness Data and Information Set; HOMA-IR: homeostatic model assessment – insulin resistance; HRQoL: health-related quality of life;

IL-6: interleukin-6;

KEDS: Kids' Eating Disorders Survey;

LDL: low-density lipoprotein;

METs: metabolic equivalents; MRI: Magnetic resonance imaging; MVPA: moderate-to-vigorous physical activity;

N/A: not applicable;

OGTT: oral glucose tolerance test;

PA: physical activity; PedsQL: Pediatric Quality of Life Inventory; PEPSI: Purdue Elementary Problem-Solving Inventory; POmax: maximal power output; PSI: Problem Solving Inventory; PWC: physical work capacity;

QoL: quality of life

(Continued)

QUICKI: quantitative insulin sensitivity check index;

RCT: randomised controlled trial; RED: high energy density foods; ROC: regulation of cues;

SBP: systolic blood pressure; SD: standard deviation; SMSMT: Short Message Service Maintenance Treatment; SPP: Self-Perception Profile; SWITCH: Screen-Time Weight-loss Intervention Targeting Children at Home;

TC: total cholesterol; TG: triglycerides; TNF-α: tumor necrosis factor alpha; TSH: thyroid-stimulating hormone;

VLDL: very low density lipoprotein; VO_{2max}: maximal oxygen uptake;

WC: waist circumference; w/kg: watts per kilogram

Appendix 6. High risk of outcome reporting bias according to ORBIT classification

	Outcome	High risk of bias (category A)[a]	High risk of bias (category D)[b]	High risk of bias (category E)[c]	High risk of bias (category G)[d]
NCT02436330	N/D				
Ho 2016	All primary and secondary outcome ITT analyses (only results for completers were presented in the text)	Yes			
Warschburger 2016	N/D				
Epstein 2015	Child BMI z score		Yes		
	Dietary intake	Yes			
Larsen 2015	N/D				
Serra-Paya 2015	N/D				
Taveras 2015	N/D				
Taylor 2015	N/D				
Berry 2014	N/D				
Boutelle 2014	N/D				
Hamilton-Shield 2014	N/D				
Looney 2014	Dietary intake and leisure-time behaviours	Yes			
Maddison 2014	N/D				
Markert 2014	QoL	Yes			
	Eating patterns	Yes			

(Continued)

	PA	Yes				
	Media consumption	Yes				
Arauz Boudreau 2013	N/D					
Davis 2013	N/D					
Davoli 2013	N/D					
Lochrie 2013	Behaviour assessment	Yes				
	WC and other measures of fatness	Yes				
	QoL	Yes				
Mirza 2013	N/D					
O'Connor 2013	N/D					
Saelens 2013	Parent self-efficacy		Yes			
Siwik 2013	N/D					
Vann 2013	N/D					
Wake 2013	N/D					
Croker 2012	Eating behaviours, dietary intake, activity level (using accelerometers)					Yes
de Niet 2012	N/D					
Eddy Ives 2012	N/D					
Kirk 2012	N/D					
Lison 2012	N/D					
Waling 2012	N/D					
Wright 2012	N/D					
Barkin 2011	BMI/BMI percentile (BMI results are not presented for intervention and control separately)			Yes		
Bryant 2011	N/D					
Coppins 2011	PA	Yes				
	Dietary composition	Yes				
Gunnarsdottir 2011a	N/D					

(Continued)

Maddison 2011	N/D				
Wafa 2011	N/D				
Bathrellou 2010	Behaviour changes			Yes	
	HRQOL			Yes	
	Body fat distribution			Yes	
Diaz 2010	N/D				
Duggins 2010	Behaviour changes - eating habits	Yes			
Faude 2010	N/D				
Reinehr 2010	HRQoL		Yes		
Sacher 2010	Dietary intake, family functioning, child mental health				Yes
Kalarchian 2009	Self esteem, self-reported depressive and anxiety symptoms, and eating disorder symptoms (binge eating)	Yes	Yes		
Nowicka 2009	N/D				
Wake 2009	N/D				
Alves 2008	N/D				
Hughes 2008	N/D				
Weigel 2008	Triglycerides, total cholesterol, uric acid, HDL, ALT, AST, cortisol, TSH or heart rate	Yes			
Weintraub 2008	WC, triceps skinfold thickness			Yes	
Berry 2007	N/D				
Gillis 2007	Dietary habits	Yes			
Kalavainen 2007	N/D				
McCallum 2007	WC, total body fat mass, fat-free mass	Yes			
Rodearmel 2007	Sugar intake	Yes			
Satoh 2007	N/D				
Wilfley 2007	N/D				
Epstein 2005	Behaviour changes - diet and PA	Yes			

(Continued)

Nemet 2005	N/D			
Woo 2004	N/D			
Epstein 2001	N/D			
Nova 2001	PA, PC and TV viewing	Yes		
Epstein 2000a	Behaviour changes - kids' eating disorder survey (not reported by group)		Yes	
Schwingshandl 1999	BMI (at 12 months endpoint)	Yes		
Duffy 1993	N/D			
Flodmark 1993	N/D			
Epstein 1985c	Behaviour changes - eating behaviour and self-control	Yes		
Epstein 1985b	N/D			
Epstein 1985a	BMI			Yes
	Behaviour changes - fitness and eating behaviour	Yes		
Epstein 1984a	N/D			

[a]Clear that outcome was measured and analysed; trial report states that outcome was analysed but reports only that result was not significant
(Classification 'A', table 2, Kirkham 2010)
[b]Clear that outcome was measured and analysed; trial report states that outcome was analysed but report no results
(Classification 'D', table 2, Kirkham 2010)
[c]Clear that outcome was measured but was not necessarily analysed; judgement says likely to have been analysed but not reported because of non-significant results
(Classification 'E', table 2, Kirkham 2010)
[d]Unclear whether outcome was measured; not mentioned, but clinical judgement says likely to have been measured and analysed but not reported on the basis of non-significant results
(Classification 'G', table 2, Kirkham 2010)

ALT: alanine transaminase; AST: aspartate transaminase; BMI: body mass index; HDL: High-density lipoproteins; HRQoL: health-related quality of life; ITT: intention to treat; N/A: not applicable; N/D: non detected; ORBIT: Outcome Reporting Bias In Trials; QoL: quality of life; PA: physical activity; TSH: thyroid-stimulating hormone; WC: waist circumference

Appendix 7. Definition of endpoint measurement

	All-cause mortality	Behaviour change	Changes in BMI and body weight	Health-related quality of life	Morbidity	Other measures of body fat distrubution	Socioeconomic effects	Participants views of the intervention	Severe/serious adverse events
NCT02436330	NI	PA: activity levels measured by pedometer and fitness level measured by shuttle run, heart rate change Sedentary behaviour: measured by: after school screen time, Saturday screen time Dietary intake: dietary change measured by: total calorie intake, % fat, % carbohydrates, number of vegetable servings, number of fruit servings, number of sugar-sweetened beverages	BMI z score change (not reported which growth chart applied)	Self-perception as assessed using the CY-PSPP: physical self-worth changes in Physical Self-worth, Global Self-Worth Score	NI	WC change	NI	NI	Unclear how they were assessed
Ho 2016	NI	NI	Weight was measured in clothed participants with no jackets or shoes using a calibrated scale (Seca, Germany). Height was measured using a wall-mounted, calibrated stadiometer (Holtain Limited, Britain). Collected at 0, 3, 6 months	NI	NI	WC was measured using the technique - described by Douketis 2005 collected at 0, 3, 6 months	NI	NI	NI
Warschburger 2016	NI	Children's food intake was assessed using a food frequency list including "healthy" (fruits, vegetables) and "problematic" food items (e.g. sweets, salty snacks). Parents rated the fre-	Weight data of the child were assessed by means of a standard beam scale (accurate to 100 g) and measured with a cal-	Children's HRQoL was measured using the KID-	NI	NI	NI	NI	NI

(Continued)

quency of the child's consumption of the items on a 5-point scale ("never" – "several times a day"). A score for the number of servings/d was calculated and converted to a 0 to 100 scale, with higher values representing more frequent consumption. Children's activity level including media consumption and exercise was evaluated. The parents were asked about the mean duration (in hours) of their child's use of television, video or computers on a 5-point Likert scale separately for weekdays and weekends. A summarised value reflecting the overall media consumption during an entire week was used. Regarding the frequency of exercise, parents reported the mean duration (in hours) completed during the week.	ibrated stadiometer (accurate to 1 cm). A standardised BMI was calculated according to age and sex of the child (Kromeyer-Hauschild 2001). At the follow-ups, children were asked to visit their physicians, who were blind to trial-group assignment and the study goals. In order to decrease attrition bias, families were reminded several times (by post and telephone) and reimbursed for their efforts. When unable to visit their physician, a reimbursement for the use of a calibrated scale in pharmacies or a visit at home was offered. Furthermore, all parents reported their height and weight, as well as the respective data of their partners	KINDL-R filled in by the parents (e.g. "Last week my child was proud of him/herself."). On the basis of 4 subscales (psychological well-being, self-esteem, family and peer relationship), a sum score was composed. The child's weight-related QoL was assessed by the GW-LQ-KJ, including 11 items (e.g. "In the last two weeks our child lacked self-confidence because of his/her weight") rated on a 5-point	

(Continued)

				Likert scale					
Epstein 2015	NI	Children and parents completed three 24-h food recalls at baseline and 6 months. Variety was coded for Traffic Light Diet categories. To differentiate variety, foods were coded as different if they had different ingredients, different methods of preparation, or different toppings or condiments. Beverages were a separate category 3-d food recalls were scored using Nutritionist Pro, version 5.2. Recalls were scored by one research assistant, and a second research assistant independently coded 5 food records, with agreement on coding food group and variety of 96%	BMI z score – CDC growth charts	NI	NI	Percent overweight was calculated as the percentage of the average BMI value for children based on age and sex (Kuczmarski 2002)	NI	NI	NI
Larsen 2015	NI	NI	Body weight was measured with the child in light underwear to the nearest 0.1 kg, using the same digital medical scale for the same child. Height was measured in standing position with no shoes to the nearest 0.1 cm using a stadiometer. Danish reference material was used to calculate BMI z scores (SDS). Change in BMI z score was defined	NI	NI	WC was measured as an indicator of abdominal obesity using a measuring tape to the nearest 0.1 cm at the level of the umbilicus. The WHtR was calculated	NI	NI	NI

(Continued)

			as the difference between the child's BMI z score at baseline and the BMI z score after the 2-year intervention						
Serra-Paya 2015	NI	Sedentary and PA behaviours assessed by means of a) the objective measurement of PA levels during 7 d and b) the filling in of a self-report activity questionnaire. The objective measurement of PA level was done using ActiGraph GT3X + accelerometers. Accelerometers worn by participants all d for 8 consecutive d; The mean activity counts/min calculated and analyzed with ActiLife 6.0 software application (ActiGraph, Pensacola, EEUU). Age and gender-specific cut-off points used to categorise behaviours into sedentary, light, moderate and vigorous intensity activity. Children filled out the Spanish version of the PAQ-C. This is a self-administered questionnaire that assesses PA levels in children during the last 7 d of the school year. To assess and monitor the dietary status of participants, a dietary 24 h-intake-recall for 3 d and an eating-frequency questionnaire will be performed. On the other hand, children also completed a eating-frequency questionnaire. The questionnaire consists of a list of nutrients or group of nutrients	Anthropometric parameters measured using standard practice: weight measured to the nearest 0.1 kg using an electronic scale (Tanita Model SECA 214, Hamburg, Germany) and height (Ht) to the nearest of 0.1 cm with a stadiometer (Seca 214, Hamburg, Germany) with children lightly dressed and barefoot. BMI calculated as weight (kg) divided by squared (m^2) height and BMI SD score determined from the LMS method	NI	NI	WC measured in cm with an anthropometric tape (precision: 0.1 mm), placed horizontally at the level of the maximum abdominal protrusion at the end of a gentle expiration. WHtR calculated as WC (cm)/ height (cm)	NI	NI	NI
Taveras 2015	NI	NI	Medical assistants measured child's	NI	NI	NI	NI	To access parents'	NI

(Continued)

			weight without shoes using electronic calibrated scales and measured the child's height using a stadiometer. Calculated BMI and age- and sex specific BMI z scores using CDC growth charts					acceptance of and satisfaction with the intervention components, parents in the intervention groups asked to rate how satisfied they were with the programme and whether they would recommend the programme to their family or friends	
Taylor 2015	NI	Children wore an accelerometer (ActiGraph GT33, Pensacola, FL) fitted over the right hip for 7 d and 8 nights to measure PA and sleep. MVPA was estimated. Dietary intake assessed using the Children's Dietary Questionnaire, which assesses intake patterns over the past week for which intake is recommended and foods for which intake is discouraged. Portion size of vegetables, meat and starch-based foods assessed by 3 brief questions which have been validated by duplicate	Duplicate measures of height (Tanita portable stadiometer), weight (Tanita BC-418) were obtained after standard techniques. BMI was derived and z scores calculated – CDC growth charts	QoL assessed using the PedsQL4.0, a validated 23- item questionnaire for children aged 2-18 years, which assesses physical,	NI	Duplicate measures of WC (level of the umbilicus) were obtained after standard techniques. WHtR was calculated. Estimates of percentage FM were obtained by	NI	NI	NI

(Continued)

		24-h recall measures in 7-year old children. Food availability in the home assessed using a modified version of the Home Food Inventory. The Lifestyle Behaviour Checklist used to assess what challenges parents of overweight children face in managing their children's behaviour and how we might address this as part of the tailored package treatment. The Checklist includes 26 weight-related behaviours and asks parents to rate how much of a problem each is, and their confidence in changing each behaviour. Child behaviour assessed using the SDQ		emotional, social and school functioning. Parent proxy versions of the questionnaire used as appropriate. As utilities have not been determined for PedsQL, QoL also measured using the Health Utilities Index. The 40-item version (HUI23P4E.40Q) answered by a parent/guardian on behalf of each child		BIA (Tanita BC-418), which provide a good estimate of change in percentage fat at this age			
Berry 2014	NI	The Child Health Behavior Survey (20 items) and the Adult Health Behavior Survey (23 items) were used to collect information on usual food and beverage intake. The Health Promoting Lifestyle Profile II, with four subscales, was used	Weight was measured twice to the nearest 0.1 kg in street clothes without shoes, using a Tanita WB110A Digital Scale (Tani-	NI	NI	WC was measured 3 times and averaged using a Figure Finder measuring tape with a lock (Novel	NI	NI	NI

(Continued)

		to measure nutrition, exercise, health responsibility and stress management in parents. The 48 items have four responses (never, sometimes, often or routinely) on a 4-point Likert scale. Mean subscale scores were calculated. The CATCH questionnaire was used to measure health behaviours in children. The CATCH contains 130 items in seven subscales using a 3-point Likert scale. PA of the children and parents was measured using the Actical Omni-directional accelerometer (Phillips Respironics, Bend, OR, USA)	ta, Arlington Heights, IL, USA), and averaged. For children, BMI percentiles were calculated with a computer using height, weight, age and gender, and for parents BMI was calculated with a computer using height and weight (kg/m2). CDC charts for children			Products Inc., Rockton, IL, USA). Triceps and subscapular skinfolds were measured according to the National Health and Nutrition Examination Survey Procedures on the right side of the body, 3 times, and averaged			
Boutelle 2014	NI	EAH: Each child participated in a standard ad libitum pizza dinner with their parents. Self-reported post-meal satiety was assessed with a cartoon representation of three levels of fullness along with two questions regarding each child's level of hunger. 10 min after the completion of the meal, each child tasted and rated palatability of small samples of snacks as ''yummy,'' ''just ok,'' and ''yucky''. Following the rating of foods the child was left alone in a room with containers of pre-weighed portions of the snack foods as well as toys and games. After 10 min, the co-ordinator returned to the room, and the amounts of remaining food items were measured. The total calories consumed by	Child height was measured using a standard stadiometer in duplicate. Children's weight was measured in duplicate on a calibrated slide scale without jackets, outerwear, or shoes. The average of the two values was used for analysis. Children's heights and weights were translated to BMI-for age percentile scores using the CDC growth charts and to BMI-Z scores	NI	NI	Percent overweight was derived by calculating the child's percent over the median BMI for age and sex (child's BMI-median BMI for age and sex/median BMI for age and sex x 100) using CDC growth charts	NI	At the post-treatment assessment visit, each child participant in the intervention group completed a treatment evaluation form that asked ''How much did you like the ROC program?''	NI

(Continued)

	each child was calculated from the amount consumed data, and this total was divided by child's estimated daily calorie needs to derive the percent of calorie needs consumed during the free access period (EAH%). Dietary intake of the child was assessed with three 24-h dietary recalls. Average total daily caloric intake was used as a measure of outcome. The EAH Questionnaire for Children and Adolescents–Parent Report of Child includes three subscales: Negative Affect, External Eating, and Fatigue/Boredom Eating. Parents completed two scales from the CEBQ regarding their child's eating patterns: Food Responsiveness and Satiety Responsiveness Children were also asked to respond how true the following statements were for them ''Because of ROC, I feel more in control of my eating.'' Additionally, children responded to the following question with a yes or no answer: ''Do you think other kids your age would like the ROC program?'' At the post-treatment assessment visit, each parent participant

in the intervention group completed a treatment evaluation form that asked ''How much did you like the ROC program?'' and ''How much do you think your child liked the ROC program?'' Additionally, parents reported how much they agreed or disagreed with the following statement ''The ROC program has taught my child to have more control of

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								their eating."	
Hamilton-Shield 2014	NI	Change in eating speed and self-determined portion size in 'blinded' test meals for both child and parent. These were to be measured using a 'blind' Mandolean, which acted solely as a measuring device and did not provide any feedback on eating rate or portion size choice. They were asked to eat three meals using the device over the course of 1 week. Precise measures of changes in 'ideal portion size' and 'expected satiety levels' across a range of commonly consumed foods for both child and parent were to be compared between treatment groups. The meal photographs were advised by a paediatric dietitian as foods likely to be consumed by children in that age range. Changes in PA levels, measured as number of steps/d for 1 week, were collected at baseline using the New Lifestyles NL-800 pedometers (New Lifestyles Inc., MO, USA). For children aged 8 years and over, dietary restraint measures were to be collected at 0, 12 and 24 months. This is a self-complete measure adapted from the DEBQ. A measure of children's diets over the last 2–3 months was collected using a paper FFQ	BMI – accurate height and weight – converted to BMI z score-values at 12 months. Weight was measured without shoes in light clothing to the nearest 0.1 kg, using a portable Tanita floor scales (WB 100 S MA, Tanita Europe BV, the Netherlands). The scales were calibrated on a quarterly basis. Height was measured without shoes to the nearest 0.1 cm, using a Seca Leicester stadiometer (Seca, UK)	QoL measures in child (PedsQL, CHU9D and EQ-5D-Y) and parents (EQ-5D) for self-completion at 0, 3, 6, 9, 12 and 24 months	NI	NI	NI	The purpose of the interviews was to explore the views and experiences of families who were using the Mandolean and receiving standard care	Not clear how they were measured
Looney 2014	NI	Caretakers completed food records for their child for 3 d (2 weekdays, 1 weekend d) to assess the child's dietary intake	Child height and weight were collected at baseline and 6 months by a	NI	NI	NI	NI	At 6 months, families evaluated	NI

(Continued)

		at baseline and 6 months. Overall energy intake, percent energy intake from fat, servings of SSBs and whole fruit and vegetables were determined using Nutrition Data System for Research software. Leisure-time activity was assessed at baseline and 6 months using the PD-PAR over 3 d (2 weekdays, 1 weekend d). MET values and percentages of time in varying types and intensities of leisure-time activities and hours of TV time were calculated from the PD-PAR	trained researcher at the child's primary care office. Weight was assessed by an electronic scale and height by a stadiometer using standard procedures, in light clothing without shoes. BMI (kg/m2) was calculated and the child's BMI value was standardised in relation to the population mean and standard deviation for the child's age and sex to determine BMI z score					the programme with regard to usefulness; number of additional contacts in relationship to nutrition, PA, and growth and additional overall comments	
Maddison 2014	NI	Children's PA and sedentary behaviour were measured using the MARCA. Children were asked to recall their activities for the 2 previous d (48 h). Time spent in each activity was summed to determine how much time each participant spent in total PA, LPA MPA, VPA, locomotion, total sedentary time, screen-based sedentary time, non-screen sedentary time, and sleep. A semi-quantitative FFQ was used to record information on dietary intake	Anthropometric measurements were conducted according to standard practices. BMI was calculated from height and weight data (kg/m^2) and converted to a standardised z-score using age- and sex-specific 2007 WHO growth reference for 5–19 years	NI	NI	Body composition was assessed via BIA using the ImpediMed DF50 Bioimpedence Monitor (Queensland, Australia). FFM, FM, % BF were calculated for all participants using New Zealand specific equations	NI	Primary caregivers involved in the intervention completed an exit survey to determine their perceptions of the intervention and their use of the intervention components	The intervention was delivered in a one-off meeting with the primary caregiver, who was only contacted again after 12 weeks to confirm contact details and monitor adverse events

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Markert 2014	NI	The FFQ used in the KIGGS study (individual eating habits) and the AD-EVA questionnaires (family eating habits) were applied. An eating behaviour score was calculated based on four basic areas of eating habits: number of meals/d, joint meals within the family, activity during meals, regular mealtimes. Combining these four values results in a 9-point scale to run from −10 (bad) to +10 (good) in steps of 2.5. The level of PA was assessed, based on the questionnaires used by KiGGS as well as the PA scale (MoMo questionnaire). Information on media consumption (and leisure time habits) was obtained applying the KIGGS-questionnaire	Measurements of body weight and body height were assessed at 0 and 12 months of intervention by local paediatricians with standardised procedures and centrally collected in the CrescNet database. BMI data were standardised to age and sex of the children applying German reference data and were calculated as BMI-SDS. A cut off ≥ 1.28 SDS (90th centile) classifies overweight and a cut off ≥ 1.88 SDS (97th centile) classifies obesity in German children	HRQoL was assessed by the KINDL-R questionnaire. Additional parameters that were obtained include resources and protection factors for HRQoL expectancy for self-efficacy, subjective life satisfaction, and information on social support. Items from the KINDL-R were utilised. Higher score values correspond with a higher QoL, with a high degree of reliability and validity	NI	NI	NI	NI	NI

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Arauz Boudreau 2013	NI	Nutrition knowledge and intake assessed by SPAN questionnaire, which included 24-h recall questions, with responses ranging from 0 to ≥ 3. PA date collected using accelerometers and a valid d was when the accelerometer was worn for ≥ 8 hours with a minimum of 10% nonzero epochs per hour	BMI z scores calculated using CDC growth charts	Assessed using PedsQL child self-report and caregiver proxy report generic core scales	NI	NI	NI	NI	NI
Davis 2013	NI	The 24-h diet recall is a standardised three-pass method, developed by the US Department of Agriculture for use in national dietary surveillance. Parents completed the phone recalls regarding their child's diet for two weekdays and one weekend d at each time point using standardised procedures. All dietary data were analysed using NDSR software version 2005. The ActiGraph (Actigraph LLC, Pensacola, FL, USA) measured PA duration and intensity. Participants were asked to wear the activity monitor for at least 6 h/d for a minimum of 3 d during a 1-week period. All data were run through Santech MeterPlus software. The CBCL (Achenbach, 1991) is a standardised measure that assesses parental report of child competencies and behavioural or emotional problems. Values for total score, internalising behaviour, and externalising behaviour were assessed. BPFAS: The measure is composed of 35 items: 25 describe the child's feeding behaviour and 10 describe parent's feel-	Height and weight were assessed by school nurses via a Harpenden Holtain stadiometer, Model 603 (Holtain, Crymych, UK) and a portable SECA digital scale (SECA, Hamburg, Germany). Height and weight were taken in triplicate and used to calculate BMI z score and BMI percentile for children (which was used for educational purposes) based on the CDC growth charts	NI	NI	NI	NI	NI	NI

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		ings about or strategies for dealing with eating problems. Parents are also asked to rate on a scale from 1-5 how much they agree or disagree with each statement, as well as whether each of the 35 items are a problem. Higher scores are suggestive of more problematic feeding behaviours							
Davoli 2013	NI	Secondary outcomes were the percentage of positive changes in parent-reported dietary behaviours and in PA. These factors were measured by using the questionnaire	The primary outcome was the individual BMI score variation as suggested by Cole 2000. BMI score was calculated as the weight (kg) divided by the square of height (m). The difference in BMI was calculated as the within-child difference between BMI score at 12 months and at baseline. BMI z scores and changes from overweight status to normal weight or obesity were also reported to allow comparability with previous studies	NI	NI	NI	NI	NI	Assessed through paediatricians, where possible
Lochrie 2013	NI	The BASC-2: P (for ages 8-18) is a well-validated instrument for the assessment of both positive and negative features of	Measurements were then converted to BMI, BMI percentiles, and BMI z scores. BMI z score reflects the number of standard deviations above or below the average	CDI-S is a self-report, symptom-orientated scale	NI	WC was measured with a steel measuring tape at the high point of the iliac crest (to the nearest 0.1	NI	NI	BP was measured three times with the participant comfortably

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	behavioural adjustment in youth throughout the pediatric age range	value for a child's age and gender, based on the current childhood norms	measuring depressive symptoms. The CDI-S has 10 items, each of which consists of three choices. The CDI profile contains questions regarding negative mood, interpersonal problems, ineffectiveness, anhedonia, and negative self-esteem. Higher scores indicate more depressive symptoms, as reported by the child. Harter SPP is a child	cm) at minimal respiration at the end of normal expiration. Measurement of WC was transformed into percentiles using childhood norms	sitting, relaxed, and using an appropriately fitted cuff and an automated sphygmomanometer. Two manual BPs determined by detection of Korotkoff sounds were done for confirmation. Only children with normal BP were entered into the study

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			self-report revision of the PCSC. The SPP assesses child and adolescent	
			self-perception in areas believed to be important for self-esteem: scholastic competence,	
			social acceptance, athletic competence, physical appearance, behaviour conduct, and global self-worth.	
			PedsQL (caregiver and child). Pediatric	
			QoL was measured with the PedsQL generic version, completed separate-	

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				ly by caregivers and youth. The PedsQL is a 23-item instrument with separate but similar versions for children (ages 8-12) and adolescents (ages 13-17) that measures HRQoL					
Mirza 2013	NI	Dietary intake and composition were assessed with both a 24-h dietary recall and a 2-week dietary recall by using a Block Kid FFQ. The Nutritionist Pro software (version 4.2; Axxya System) was used to perform an energy and macronutrient analysis of the 24-h dietary recall. The daily GI was calculated by summing the weighted GI values for each food item. The GL was calculated as the product of the daily GI and total carbohydrate and adjusted for energy intake	BMI (in kg/m2) was calculated. BMI z score (BMI expressed as a standard z score relative to CDC age- and sex-specific norms)	NI	Changes in metabolic syndrome prevalence with intervention were assessed by using metabolic syndrome criteria proposed by Cook 2003. The risk of metabolic syndrome (present compared with	Total BF mass and FFM were assessed by using air-displacement plethysmography (BodPod; Life Measurement Inc)	NI	NI	Unclear how they were measured

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					absent) was compared by treatment group at each of the time points of 3, 12, and 24 months by assessing the current odds of metabolic syndrome at each time point and taking into account the status at the time just before (transition modelling)				
O'Connor 2013	NI	PA was assessed via 5 d of accelerometer wear (Actigraph-7064, Pensacola, FL, USA). Activity thresholds were identified as sedentary, light and moderate-vigorous. Dietary intake was assessed via three non-consecutive 24-h dietary recalls including one weekend d by a trained dietician via a telephone interview using standard protocols with multiple pass methodology. The family was provided 2-dimensional food models and the parent and child were questioned together about the child's intake. Dietary da-	Children's BMI z scores and BMI percentiles, using US national standards (CDC growth charts)	NI	NI	NI	NI	Satisfaction was assessed via semi-structured exit interviews conducted by staff trained in qualitative methods. Exit interviews were audio-record-	NI

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		ta were collected and analysed using the Research Nutrient Data System, University of Minnesota. TV viewing was assessed by parent report of their child's TV viewing					ed, transcribed and translated by bilingual staff. Interview responses were grouped for coding into 5 main themes: general feedback, programme and material, health advisor, programme barriers, and programme improvement and sub-codes assigned	
Saelens 2013	NI	At each assessment point, parents rated their self-efficacy or confidence to help their child make and maintain eating and PA lifestyle changes using two items (response ranges strongly disagree to strongly agree; items were averaged). It was expected that parent-provided self-directed intervention would have more positive	Children and participating parents were weighed 3 times in light clothing without shoes using a digital Scaletronix scale, with more measurements until agreement within 0.1 kg,	NI	NI	NI	NI	NI	NI

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		changes in self-efficacy over time than parent provided prescribed intervention	and those values averaged. Height was measured with a Heightronic stadiometer at least in triplicate, until agreement within 0.5 cm, with those values averaged. In one instance at 2-year follow-up, child weight and height information was obtained only by parent-report of child measures at a recent paediatrician appointment. BMI was calculated as kg/m2. Children's percent above median BMI and BMI z scores were calculated using CDC growth charts for age-specific median, standard deviation, and distribution skewness correction and the LMS method (Kuczmarski 2002)						
Siwik 2013	NI	At each data collection visit, the children were given a validated PA recall focused on recalling activities before, during, and after school of the current and previous d. A MET (a unit describing the energy expenditure of a specific activi-	Reference population data from the CDC were used for z Scores	NI	NI	Weight and % BF were measured on an electronic scale with built-in BIA (Tani-	NI	All parents and their children were contacted for 30-min qualitative inter-	NI

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	ty) was assigned to each activity. Pedometers were used as an intervention tool, but did not contribute to the outcome measures	
		ta, Arlington Heights, IL)
		views 12-18 months and again at 18- 24 months after intervention. Sex-matched interviewers met the children individually. Initial questions were open-ended and regarded recall of the intervention; probes on the easiest, most difficult, and continuing lifestyle changes followed. Parents were queried about project content (Choices model, thinking patterns), changes in children's behaviour,

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							and the durability of those changes. Interviews were recorded digitally		
Vann 2013	NI	The IPAQ used to assessed PA. Recalls activity over 7 d. Pedometers used to measures steps/d	No description of how it was measured	NI	NI	NI	NI	NI	NI
Wake 2013	N/I	NI	Diet quality: 4-d food diary; parent-report. Parents reported child's consumption of each of 17 food and drink items (0, 1, 2, > 2 times) for two weekdays and two weekend d. Dichotomous ("yes," "no") variables derived for 5 "healthy behaviours" (high fruit, vegetables, and water; low fatty/sugary foods and non-diet sweet drinks) for each d. Number of healthy behaviours/d summed to give score between 0 and 5 (higher score indicates more healthy behaviour). PA: worn for 7 full d; ≥ 5 valid d required. Valid d had ≥ 10 h of	Height measured twice and average used; if values differed by > 0.5 cm, 3rd measurement taken and average of 2 closest values used. Weight, while wearing light clothing, measured once at baseline and twice at outcome. Average weight used at outcome; if values	PedsQL 4.0; self-report and parent- proxy versions. Parent completed 23-item scale that yields total, physical summary, and psychosocial summary scores, each with possible range of 0-100 (100 = best possible health); quantitative variable		WC: Lufkin Executive Steel Tape (W606PM) measured. Average of 2 waist measurements; if they differed by ≥ 1 cm, 3rd measurement taken and mean of 2 closest used. WHtR calculated as WC (cm)/ height (cm) BF: Tanita Digital Body Composition. Av-	NI	Process evaluation completed by parents and GPs. Items documented extent to which interventions were implemented, acceptability, barriers to attendance, and perceived harms and benefits. Parents reported other assistance received (source, type, intensity) for their

(Continued)

					erage of 2 body percentage fat measurements.	children's weight status
	non-missing data between 06:00 h and 11:00 h. Missing data were segments with ≥ 20 min of consecutive "0" counts, or counts > 0 that were constant for ≥ 10 min. Outcomes across all valid d: mean activity counts/min and % time spent in MVPA Actical Accelerometer (Mini Mitter) measured	differed by ≥ 0.2 kg, 3rd measure taken and average of 2 closest values used. BMI calculated as weight (kg)/(height m^2); z score calculated according Portable rigid stadiometer (model IP0955, Invicta, Leicester, UK); measured. Calibrated digital scale (model ITHD646,Tanita, Toyko, Japan); BMI index z score - US CDC reference values	Physical appearance and self-worth: modified from Harter's PCSC; self-report. 6 pairs of statements with binary response format; children chose statement from each pair closest to their competence. Each of 6 responses then coded as being either "positive/better perception" or "negative/worse perception". 6 responses analysed as single outcome (% positive responses				

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					and population averaged odds ratio of positive response)				
Croker 2012	NI	Children's attitudes towards eating measured by the CHEAT	Standard deviation scores for BMI and weight were calculated from raw values by adjusting for age and gender using British 1990 reference data	Self-esteem measured by Harter Scale, mood by the CDI, parent-reported child difficulties by the SDQ and QoL by the child and parent-reported PedsQL	NI	Standard deviation scores for WC were calculated from raw values by adjusting for age and gender using British 1990 reference data. Fat-mass index and fat-free-mass index were measured using the 3-component (3C) model which requires measures of TBW, BV and weight. TBW was measured using deuterium oxide dilution and BV by air-displacement plethysmography using BODPOD. FM and FFM were derived using established equations and	NI	NI	Adverse events were reported; however, a serious adverse event was not defined

(Continued)

						index values calculated by dividing each by height squared to take height into account			
de Niet 2012	NI	DEBQ measures emotional eating and external eating, it also measures restrained eating - high scores reflect high degree of eating behaviour. SPPC measures scholastic competence, social acceptance, athletic competence, physical appearance and behavioural conduct. In addition it assess global self-worth. High scores reflect greater perceived competence or global self-worth	BMI-SDS corrected for age and gender. BMI-SDS of 1.1 represents the threshold for overweight, and BMI-SDS of 2.3 indicates obesity (Cole 2000)	HRQoL assessed by the CHQ-PF50 and was a Dutch-validated version. Higher scores reflect best possible health state	NI	NI	NI	NI	NI
Eddy Ives 2012	NI	Dietary and physical exercise habits, recorded in a questionnaire developed specifically for that study	Evaluation of the BMI and the associated z score. The BMI z scores were calculated using the growth charts published by the WHO	AF-5 questionnaire for self-esteem – dimensions included emotional, physical, academic, social, family	NI	Measured the abdominal perimeter and the associated z score	NI	NI	NI
Kirk 2012	NI	Food records were kept over 3 consecutive d (2 weekdays and 1 weekend d) during the week before the assessment visit. Food records were analysed using the Nutrition Data System for Windows version 4.04 (Nutrition Coordinating Center, University of Minnesota, Minneapolis, Minnesota)	Following standardised protocols, trained research staff measured height using a wall-mounted stadiometer (Ayrton 226; Stadiometer.com, Snoqualmie,	NI	NI	WC using a fibreglass tape measure with calibrated tension device (Gulick M-22C; Creative Health Products, Plymouth, Michigan).	NI	NI	Elevated metabolic outcomes were assessed

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			Washington), body weight using a digital scale (Model 5002 Stand-on Scale; Scale Tronix, White Plains, New York). BMI z score was calculated using the CDC 2000 growth charts and the SAS macro			%BF was determined by DEXA scan (4500; Choplogic, Waltham, Massachusetts)			
Lison 2012	NI	NI	Obesity was diagnosed when the BMI (weight in kg divided by height in m^2) > 95th percentile for age and sex. Participants with a BMI ranging from the 85^{th}-95th percentile of the BMI distribution were defined as being overweight. The extent of overweight/obese was quantified with the use of Cole's LMS method, which normalises BMI, and its skewed distribution, by expressing BMI as a standard deviation score (Cole 2000)	NI	NI	%BF was determined by a BF analyser (TANITATBF-410 M) – BIA measurements were taken based on standard procedures. This method for estimating %BF has a high correlation with DEXA in children. WC was measured to the nearest cm by a flexible tape halfway between the lower rib margin and the iliac crest	NI	NI	NI
Waling 2012	NI	DHI covering the previous 2-week period. Portion sizes of each food item and dish eaten by the child were described	Height and weight were measured with the children lightly clothed and with-	NI	The children were classified as having	WC measurements were	NI	NI	NI

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with the help of food-portion photographs, household measures, standard weights of food items, or bags of rice in different volumes. To follow the children's food habits, three 2-d food records were conducted by each child during the first year of the study. The records were scheduled to cover weekdays and weekend d as well as different seasons. After 1 year of participation, each child conducted a 4-day food record. Reported food intakes from the DHI at baseline and the food records were entered into the dietary analysis programme Dietist XP version 3.0 to calculate the daily energy and nutrient intake. Dietist XP uses the Swedish food composition database (version March 6, 2008). TEE was measured using a SenseWear armband. At baseline, TEE was measured during 4 d included in the 14-d period that the DHI covered and for the food records, TEE was measured during the same d. PA was assessed with SenseWear Armband during 4 consecutive d (2 weekdays and 2 weekend d) at baseline and after 2 years of participation	out shoes. Height was measured to the nearest 0.1 cm with a wall stadiometer (HyssnaMeasuring Equipment AB, Sweden), and weight was measured to the nearest 0.1 kg with an electronic scale (AJ Medical, Sweden). The main outcome of the study, BMI, was calculated as weight (kg)/height $(m)^2$ and converted to BMI z scores by using both US reference data and a Swedish reference dataset. Children were classified as normal weight, overweight, or obese using the IOTF definitions	METS using the definitions of the International Diabetes Federation; WC ≥ 90th percentile and the presence of 2 or more other clinical features (i.e. elevated TC, low HDL-C, high BP, or increased glucose)	recorded to the nearest 0.1 cm midway between the tenth rib and the iliac crest with children in a standing position using a non-elastic flexible tape. Sagittal abdominal diameter was measured to the nearest 0.1 cm using a ruler with the child in a supine position from the bed to the top of the abdomen. Body composition analysis was performed using DEXA (Lunar Prodigy whole-body scanner GE Medical Systems, Madison, WI, USA), with the child in a supine position. BF content is expressed as absolute values (kg) and as FM %, and truncal fat expressed as

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						percent fat (truncal FM %) in the soft tissue of the trunk. FM index (kg/m^2) was calculated as FM (kg)/ height (m)^2			
Wright 2012	NI	ASSQ is a self-administered questionnaire (approximately 30 min) designed to measure the behavioural and psychosocial variables targeted by the intervention of children 7–12 years. The ASSQ items were created by the CATCH programme based on modified questions from the CATCH SPAN Health Behavior Questionnaire, which has been found to have acceptable reliability and validity (greater than 0.6). Measured constructs included: dietary intake for the previous d (6 questions); healthy dietary behaviours (6 questions); food knowledge (10 questions asking children to choose the food that is "better" for their health); nutrition knowledge (3 questions regarding food pyramid); food intentions (8 questions asking which between 2 foods would the child eat); and dietary self-efficacy (8 questions asking the child how sure they were that they could eat certain foods)	Weight was measured twice (once by each of the research associates) to the nearest 0.1 kg with shoes removed using a Detecto electronic weight scale that was calibrated daily. If the two measurements of weight varied by more than 0.2 kg, a 3rd measurement was taken by Kynna Wright. Height was measured twice to the nearest 0.1 cm using the Harpenden stadiometer. If the 2 measurements of height varied by more than 0.2 cm, a 3rd measurement was taken by the PI. BMI values (kg/ m^2) and associated z scores were calculated using Epi Info software developed by the CDC	NI	NI	NI	NI	NI	NI
Barkin 2011	NI	NI	BMI is defined as weight in kg divid-	NI	NI	NI	NI	NI	NI

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			ed by the square of height in m. For children, BMI percentile for age and gender was calculated by using the CDC calculator. "Because approximately two thirds of children were above the 95th percentile, we used absolute BMI instead of BMI percentile to avoid a compressed percentile scale bounded by 100."						
Bryant 2011	NI	PA over a 7-d period measured by accelerometry (Actigraph™). Questionnaires included the WATCH IT Diet questionnaire and Home Food Availability checklist (two questionnaires designed specifically to examine foods aligned to the dietary goals promoted as part of the intervention), DEBQ, PAC-Q, Robinson School-Based Sedentary Behaviour Questionnaire, SDQ, and the Harter Scale of Perceived Social and Cognitive Competence	Height was measured to within 0.1 cm using a wall-mounted Seca stadiometer (Vogel and Halke, Hamburg, Germany). To ensure consistency, 2 measurements were taken, and an average was used. Whenever they differed by > 0.5 cm, a 3rd measurement was taken, and an average of the closest 2 was used. Weight was measured in light clothing with no shoes (to within 0.1 kg) using a calibrated Seca digital weighing scale	PedsQL questionnaire	NI	Trained researchers measured weight, height, WC, and BIA (HYDRA ECFICF model 4200; Xitron technologies, San Diego, CA) and performed a DEXA (Lunar Prodigy; GE Medical Systems, Madison, WI) scan at baseline and 6 and 12 months. WC was measured twice at 4 cm above the umbilicus. Whenever measure-	NI	Feedback interviews for any individual assessment. Of the 10% of families who were randomly selected to provide feedback at the end of the study, all except 1 parent reported a positive experience	They were measured and on the agenda at each meeting – none reported

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						ments were > 1.0 cm apart, a 3rd measurement was taken, and an average of the closest 2 was used			
Coppins 2011	NI	Food and activity assessed by a 7-d food diary at baseline and each 6-month review. Frequency of use of specific food was extracted from food diaries - this method not validated. PA assessed by Yamax Digi-Walker electronic pedometer over 7-d period. Record also taken of time spent in low-, moderate- and high-intensity activity	BMI calculated using weight/height^2 and plotted on the Child Growth Foundation BMI chart (1997). BMI adjusted for age and gender to give BMI SDS (BMI z score) using British 1990 Growth Reference Data	NI	NI	WC was measured in centimetres to one decimal point using a standard anthropometric tape at the maximal abdominal girth. Results were plotted on the Child Growth Foundation WC Chart (2005) and converted to WC SDS (z score) using the British 1990 Growth Reference Data. The Tanita BF Monitor (BIA) (Chasmors Ltd) was used to analyse BF to ± 0.5% precision and results were plotted on the Child Growth Foundation BF Chart (2005).	NI	NI	NI

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						In addition to this, 3 skinfold calliper measurements (mm) were taken at the calf, subscapular and triceps sites using the non-dominant side and averaged. Sum of 3 skinfolds was calculated			
Gunnarsdottir 2011a	NI	Children and parents were given instructions on measuring and recording consumption of fruits and vegetables. The average number of servings/d was graphed weekly to monitor changes during treatment. Children and parents were instructed to record all children's PA outside of school that went on for at least 5 continuous min and was of at least medium intensity (defined and taught before the start of monitoring as being equivalent to a brisk walk). The average min of PA/d was graphed from week to week during treatment to monitor changes	Weight was measured with a digital scale (Marel type C2, Marel, Reykjavík, Iceland). Height was measured with a wall-mounted digital stadiometer (Ulm, Germany). BMI (weight in kg m^2) was calculated, and BMI standard deviation scores (BMI-SDS) were derived from BMI reference values for Swedish children as calculation of BMI-SDS not possible based on the cut-offs of IOTF	Psychological disorder/learning disability defined by the diagnoses were confirmed during screening by semi-structured interviews. SDQ: the CDI and MASC: results not presented in the paper)	Psychological disorders/learning disability diagnosed using questionnaires given in HRQoL section	NI	NI	At the end of treatment, participants completed acceptability questionnaires. Individual treatment components were rated on a 5-point Likert scale, where 1 represented "very helpful/satisfied" and 5 "not helpful/ satisfied at all". Addition-	NI

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								ally, participants were interviewed about how they perceived and experienced the treatment process. Families dropping out were interviewed to discover their dropout reasons	
Maddison 2011	NI	Cardiovascular fitness was assessed by using the 20-m shuttle test that requires participants to run continuously between 2 lines, which are 20 m apart, in time to recorded beeps. The output can be used to determine VO2max in this age group. Participants were instructed to wear the accelerometer on their right hip during waking hours for 7 d after each assessment. During the 7 d after each assessment, participants provided self-reports of their daily time spent playing all video games by using a diary developed and tested in a previous pilot study. Participants completed a snack food diary to self-report the frequency and quantity of snack foods consumed for 7 consecutive d. The diary consisted of pictures of 29 common categories of snack	The mean of 2 measurements or the median of 3 measurements were used for analysis. BMI z score was derived separately at each time point by using data from the 2002 New Zealand National Children's Nutrition Survey before calculating the change in BMI z score	NI	NI	WC was measured twice (as for height and weight) to the nearest 0.1 cm with a standard anthropometric tape at the maximal circumference. BF was assessed by using standardised analysis procedures of BIA with the ImpediMed DF50 Bioimpedence Monitor (ImpediMed, Queensland, Australia).	NI	NI	A serious adverse event was defined as any event that required hospitalization and was determined at 12 and 24 weeks

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		foods and drinks. For each food or drink, 3 pictures were presented. Participants indicated the number of servings of the respective food and serving size they had consumed on each d. Each serving size was assigned a caloric value (kJ). The caloric value of all reported snacks was summed and divided by 7 d to give the average daily total energy consumed from snacks (kJ)				Children were hydrated and required to void their bladder before measurement. A equation was used to calculate FM, FFM and percentage BF for all participants			
Wafa 2011	NI	Habitual PA and sedentary behaviour were measured objectively over 5 d – during the waking hours – at baseline and follow-up using a CSA/MTI GT1M accelerometer (The Actigraph, Fort Walton Beach, Florida, USA). Accelerometry data were included so long as at least 4 d of monitoring with at least 10 h/d were obtained accelerometry counts/min (cpm) were used as a measure of total volume of PA. Accelerometry data were also summarised using cut-off points as percentage of the time spent in sedentary behaviour LPA and MVPA.	In the absence of Malaysian reference data for BMI for age, the primary study outcome measure was BMI z score calculated relative to US CDC 2000 BMI for age reference data. Weight was measured to 0.1 kg in light indoor clothing with children not wearing shoes, and height was measured to 0.1 cm with a portable stadiometer (Leicester Height Measure, SECA, UK) and children not wearing shoes.	HRQoL of participating children was assessed by using the validated PedsQL 4.0 Generic Core Scales. The Peds QL scales produce a Physical Health Summary Score (the total of the physical functioning subscale) and a Psychosocial Health Summary Scale (from the	NI	NI	NI	NI	Assessed through HRQoL and growth velocity

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				emotional, social and school functioning subscales) which add to give a Total Score. Both the participating parents and children were asked to complete the Peds QL, providing separate parent and child perspectives since these can be quite different and both are important					
Bathrellou 2010	NI	Dietary intake, dietary behaviour and PA reported as outcomes in the protocol; however, no description of how it was measured or any results given	Percent overweight calculated as ((current BMI - BMI cut off for overweight)/BMI cut off for overweight) x 100. Based on cut offs by IOTF	Self-esteem, depression, anxiety and behaviour problems reported as outcomes in the protocol; however, no	NI	Percent BF (assessed by DEXA) – no results given in publication	NI	NI	NI

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				description of how measured or any results given					
Diaz 2010	NI	NI	BMI and BMI z score were obtained using Epi Info software. Based on US growth charts (Kuczmarski 2002)	NI	NI	BF was determined by a whole-body DEXA scan (Lunar DPX-MD, GE Lunar Corporation, Madison, WI), and WC measured according to established guidelines	NI	NI	NI
Duggins 2010	NI	Eating habits assessed by questionnaire - based on National Institutes of Health We Can! Go, slow and whoa foods. Number of servings of different food types were identified	BMI for age percentile was determined using measured height and weight and reference to age- and sex-normative data from the CDC	NI	NI	NI	NI	NI	NI
Faude 2010	NI	Cycling ergometry used to measure aerobic capacity and heart rate. Oxygen uptake was continuously measured until exhaustion. Motor ability tests included counter-movement jump, a sit and reach test, a balance test (by a one-leg standing test), an agility test and a 20 m shuttle run test	Age and gender-standardised BMI z scores were calculated using the LMS method. BMI percentiles were calculated with respect to a large German reference sample (Kromeyer-Hauschild 2001)	The KINDL-R questionnaire was used to calculate HRQoL. Is in German language and comprises 24 items on a 5-	NI	NI	NI	NI	NI

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				point Likert scale					
Reinehr 2010	NI	For the evaluation of dietary intake, 3-d weighed dietary records were used. Children or their parents weighed and recorded all foods and fluids consumed as well as leftovers using electronic food scales (± 1 g). Semi-quantitative recording (e.g. number of spoons, scoops) was allowed if weighing was not possible. Dietary records were evaluated in the Research Institute of Child Nutrition. Energy and nutrient intake were calculated using the nutrient database LEBTAB. Daily energy intake (kcal/d) and percentage energy from fat, protein, carbohydrates, and sugar were calculated. Sports activity was determined by a semi-quantitative questionnaire for children measuring physical activities not including school sport and exercise training in the intervention	Expressed BMI as a standard deviation score (BMI-SDS). Reference data for German children were used (Kromeyer-Hauschild 2001)	HRQoL was measured by German age-specific self-report versions and parent proxy versions of the KINDL-R questionnaire No results given for intervention and control groups separately	NI	Triceps and subscapularis skinfold thickness was measured twice using a caliper and averaged to calculate the percentage of BF using a skinfold thickness equation. BIA was measured using leg–leg and hand– leg systems (BC418; TANITA, Uxbridge,UK). We used estimates of total BF, lean body mass, and percentage BF provided by the manufacturer's software based on age, gender, height, and weight. No information regarding the formulas used could be obtained from the manufacturer due to its commer-	NI	NI	Measured by questionnaires and face to face appointments

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						cially sensitive nature			
Sacher 2010	NI	Levels of PA and the amount of sedentary behaviours were assessed using a non-validated questionnaire This was administered by the researchers to parents and children and included the number and duration of physical education lessons, time spent on different types of vigorous activities (e.g. sports), and time spent on sedentary activities (e.g. television, computer)	Weight and height were obtained for both children and their mothers, and were subsequently used to calculate BMI. Children were classified as obese if their BMI was > 98th percentile for age and gender using the recommended cut-off for treatment or referral	For self-esteem assessment, children completed the Harter SPP a widely-used assessment tool validated for UK children of this age group	NI	Body weight, height, and WC were measured following standardised procedures/ Deuterium dilution was used to measure children's TBW, and hence FM and FFM were derived	NI	NI	Measured by log-books
Kalarchian 2009	NI	Eating disorder symptoms were assessed at baseline using the ChEAT, a 26-item self-report questionnaire designed to assess attitudes and behaviours related to eating disorders in school-aged children. To assess binge eating, children's responses to the ChEAT item "I have gone on eating binges where I feel that I might not be able to stop" were coded as symptomatic or non-symptomatic based on established ChEAT scoring guidelines. Specifically, children who reported eating binges "always" "very often" or "often" were coded as symptomatic (Binge Eating Group), and children who reported eating binges "never," "rarely" or "sometimes" were coded as non-symptomatic (No Binge Eating Group)	Children and adults were weighed in street clothes, without shoes, by using a digital scale (Scale-Tronix 5002; Scale-Tronix, White Plains, NY). A stationary stature board was used for height assessments. Child percent overweight, calculated as percent over the median BMI for age and gender	Self-reported depressive and anxiety symptoms were assessed at baseline using the CDI and the STAIC, respectively. Child self-esteem was measured using the global self-worth score from the SPPC. The CDI, STAIC and SPPC all	NI	WC was measured at the midpoint between the lowest rib and the iliac crest. Body composition was determined through DEXA with a GE Lunar Prodigy system (GE Medical Systems Lunar, Madison, WI). Percent BF, total BF, and FFM were determined	NI	NI	NI

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				have well-established psychometric properties and are used widely in research. Adults also completed the general health perceptions and global health subscales of the CHQ-PF50, for assessment of HRQoL					
Nowicka 2009	NI	Lifestyle was measured with a semi-structured questionnaire with questions about daily activities, transportation, and sports. Although this questionnaire has not been validated, it has been extensively used in the childhood obesity unit since 2001 to evaluate treatment effects of primary obesity	Body weight was measured using an electronic scale (Tanita BWB-800) to the nearest 0.1 kg with the participant wearing light clothing without shoes. Height was measured using a standardised stadiometer (Hyssna) to the nearest 0.5 cm without shoes. BMI was calculated as weight/height^2 (kg/m^2) and BMI z score was calculated using Swedish age- and	NI	NI	Body composition was also measured with DEXA and MRI before and 12 months after the intervention. DEXA, a whole-body fan beam (Hologic QDR 4500A; equipped with paediatric software; Hologic, Bedford, MA, USA) was used to scan to esti-	NI	NI	NI

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			sex-specific reference values			mate the children's total BF, %BF, and lean tissue. MRI (Siemens Sonata 1.5 Tesla, Erlangen, Germany) was used to measure subcutaneous and visceral fat at the lumbar level. Image analysis software (Tomovision Inc., Montreal, Canada) was used to segment the cross-sectional images for adipose tissue (AT) and skeletal muscle (SM). The AT compartment was further segmented into total subcutaneous AT, visceral AT, and AT volume			
Wake 2009	NI	PA: Actical Accelerometer (Mini Mitter). Worn for 7 full d; ≥ 5 valid d required. Outcomes across all valid d: mean activity counts/min, and % time spent in MVPA. Also 4-d activity diary; parent-report parent rating of child's activity on 7-point scale (1 = sedentary, 7 = intense activity). Nutrition: 4 -d food di-	Weight was measured in light clothing to the nearest 100 g using digital scales (Tanita, Japan, Model THD-646) and height was measured (twice) to the nearest 0.1 cm using a	PedsQL 4.0 self-report and parent proxy versions. 23 items that yield total, physical summary,	NI	WC: Lufkin Executive Steel Tape (W606P-M); average of two WC measurements; if they differed by ≥ 1 cm, a 3rd measurement was	NI	NI	Assessed through HRQoL, body dissatisfaction, and self esteem

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ary; parent-report. Parents reported child's consumption of each of 10 food and drink items (0, 1, 2, > 2 times) for two weekdays and two weekend d, from which were derived dichotomous ("yes" v "no") variables for 5 "healthy behaviours" (high fruit, vegetables, and water; low fatty/sugary foods and non-diet sweet drinks)/d . The number of healthy behaviours/d was summed to give a score between 0 and 5 (higher score indicating more healthy behaviour), thus providing 4 measurements at each wave	portable rigid stadiometer (Invicta, Oadby, Leicester, Model IPO955). The average of the height measurements was used in analyses; if the two differed by ≥ 0.5 cm a 3rd measurement was taken and the mean of the closest 2 values was used. BMI z score was also calculated using the CDC 2000 sex-specific BMI-for-age growth charts	and psychosocial summary scores, each with a possible range of 0-100 (100 = best possible health); quantitative variable. Physical appearance and self worth: modified from Harter's perceived competence scale; child self report. 6 pairs of statements with binary response format; children chose the statement from each pair closest to their competence. Each of the 6 responses was then	taken and the mean of the closest 2 used	

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				coded as being either "positive/better perception" or "negative/worse perception". The 6 responses were analysed as a single outcome					
Alves 2008	NI	NI	BMI calculated from weight and height - kg/m^2	NI	NI	NI	NI	NI	NI
Hughes 2008	NI	Measured habitual PA and sedentary behaviour objectively for 7 d during all waking hours using the CSA/MTI WAM-7164 accelerometer (Manufacturing Technology Inc, Fort Walton Beach, FL). Activity data were summarised as total PA (accelerometer count/min) and percentage of waking hours in sedentary behaviour, LPA, and MVPA using cut points validated against direct observation and energy expended during free-living activities for children	BMI was calculated by measurement of height to 0.1 cm and weight to 0.1 kg in duplicate using a portable stadiometer (Leicester Height Measure; Child Growth Foundation, London, England) and portable scales (TANITA 300GS; Cranlea & Co, Birmingham, England) with children in light indoor clothing and no socks and shoes. BMI and height were expressed relative to UK 1990 population reference data as z scores	QoL of participating children: using the PedsQL 4.0, which provides valid and reliable assessments and includes parallel parent-proxy reports and child self-report versions for those aged 5-7 and 8-12	NI	WC was expressed relative to UK reference data as a z score to provide an index of fat distribution	NI	NI	Adverse effects of the intervention were determined by measuring growth velocity and QoL (using the PedsQL questionnaire which provides parent-proxy and child self-reports)

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Weigel 2008	NI	Log of PA and diet were encouraged – but was not defined as an outcome measure	Pairs of weight and height measurements, obtained using calibrated equipment, were used to calculate BMI and were adjusted for age and gender to calculate BMI z score. For control purposes, recent German reference data were used that had been obtained from 17,147 boys and 17,275 girls aged 0-18 years	NI	NI	FM and lean mass measured by BIA	NI	NI	NI
Weintraub 2008	NI	PA was assessed on 6 consecutive d using accelerometers (ActiGraph; Manufacturing Technologies Inc, Fort Walton Beach, Florida) worn on belts at the right hip. Mean daily counts/min, min of MPA, and min of VPA 07:00 h -10:00 h were used in the analysis. To assess screen time, self-report instruments were used and demonstrated to be sensitive to change in previous studies of reducing screen time. Children reported their own television viewing, videotape viewing, and video game use	The BMI was the primary measure of BF. Height was measured twice with participants barefoot using a direct reading stadiometer (Shorr Productions, Olney, Maryland), with methods to account for hair. Weight was measured twice with participants barefoot and wearing light clothing using an electronic scale (model 5602; Scaletronix, White Plains, New York). The mean of the replicate measures was used in the analysis. Age and sex-standardised BMI (BMI z score) was cal-	The 10-item Rosenberg Self-esteem Scale was used to assess self-esteem. The 10-item CDI was used to assess depressive symptoms. The over-concerns with weight and shape subscale of the McKnight Risk Factor Survey was used to assess	NI	NI	NI	NI	Injuries and all adverse events (any medical illnesses or injuries requiring a visit to a medical professional or institution) during the previous 3 months were formally assessed in both groups at baseline and at all the fol-

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			culated using the LMS method from the CDC BMI charts	weight concerns					low-up assessments and were monitored continuously between assessments as staff became aware of them
Berry 2007	NI	Steps were counted with pedometers (Accusplit Eagle 170 Deluxe Activity Pedometer) and Pedometer Walking Book which were logged in a logbook for the duration of the intervention	BMI was calculated kg/m^2 and used BMI gender- and age-specific growth charts for children (Kuczmarski 2002)	NI	NI	BF percentage was obtained using the TBF300 which uses leg-to-leg BIA - which is a low-level electrical signal that is passed through the body using foot electrodes. BF percentage is calculated based on the amount of impedance as the current flows from one point to another	NI	NI	NI
Gillis 2007	NI	Physical fitness was evaluated by a modified Harvard step test. In brief, this procedure is designed to evaluate heart-lung endurance. It includes going up and down a step raised 50 cm	BMI SDS were produced by the STAT Growth BPrM version 2'51 for palm computers based	NI	NI	NI	NI	NI	NI

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		from the ground once every 2 sec or as fast as the child can manage for 5 min. At the 6-month visits participants from both groups filled in a questionnaire together with their parents regarding lifestyle changes	upon data-from the CDC						
Kalavainen 2007	NI	NI	The primary outcome measure of the study was the change of the weight for height, which is in routine use. Weight for height was defined as 'percentage deviation of weight from median weight for height and gender'; thus, this deviation means the deviation in % units, the mean weight for height in the population being 100%. The calculation of BMI-SDS was based on the British reference	NI	NI	WC was measured at the midpoint between the lateral iliac crest and the lowest rib to the nearest 0.5 cm using a flexible tape. WHtR was calculated by dividing WC (cm) by height (cm) FM and lean body were assessed by BIA with Inbody 3.0® (Biospace, Seoul, South Korea) for participants in upright position after voiding	NI	NI	NI
McCallum 2007	NI	Child PA, sedentary behaviour and nutrition were measured using 4-d food and activity diaries. Parents were given a list of 14 food and drink items, which were later broken down into 'healthy' and 'less healthy' food and drink categories by the study team. They reported their children's consump-	The primary outcome measure was BMI (kg/m2), measured by trained researchers using standard protocols and equipment. BMI z score outcomes are report-	Child health status was measured using the Total Scores from the 23-item PedsQL	NI	NI	NI	NI	NI

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		tion of each over each of four 24 h periods. Higher scores indicating better nutrition. Using the validated Bouchard after-school activity diary, parents were given a list of 7 activity categories. Average daily activity scores were calculated from parent ratings of children's activity on a scale of 1 (sedentary)-7 (intense activity) at 15-min intervals between 15.30 h and 18.30 h over 4 d. Children's activity was also dichotomised into percentage of time spent in low-level activity (ratings 1–3) vs higher level of activity (ratings 4–7, reported as percentage time spent MVPA	ed using the US CDC 2000 gender-specific BMI-for-age growth charts that came into wide use after commencement of the study	Parent Proxy and Child Self-report, and child body satisfaction and physical appearance and global self-worth using the Collins body figure perception and the modified Harter scales, respectively					
Rodearmel 2007	NI	Electronic pedometers (Accusplit AE120, San Jose, CA) were used. Participants were instructed to maintain (not change), monitor, and record their usual lifestyle with regard to PA (steps/d) during the 2-week baseline period. Each family member, regardless of group assignment, was asked to record daily steps continuously throughout the first 18 weeks of the study and during the last week of the study. Both groups were asked to complete a sweets survey during baseline and at the end of the 6-month intervention. The survey assessed participants' consumption of sugar	Study staff measured height and weight for all participants at each of the 6 family meetings using a stadiometer (Invicta Plastics Ltd, Leicester, England) and a calibrated electronic scale (Take-A-Weigh electronic scale, model PS-6600; Befour Inc, Saukville, WI), respectively. BMI was calculated for all participants, and BMI-for-age z scores and corresponding percentile scores were calculated for target	NI	NI	WC and percentage of BF were assessed by study staff for all participants before the intervention (family meeting 1) and after intervention months 3 and 6 (family meetings 4 and 6). WC was measured using a Gulick II tape measure	NI	NI	NI

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		and non-calorically sweetened foods and beverages	children. The primary outcome was BMI for age analysed on the z score scale (z scores are considered more suitable for statistical analysis than the corresponding percentile scores)			(Country Technology, Gays Mills, WI), and percentage of BF was assessed by BIA (Biodynamics BIA Analyzer, model 450; Biodynamics Corp, Seattle, WA)			
Satoh 2007	NI	Nutritional balance: the actual food intake (black dots), the ideal food intake following the MNBC (black dots)). Thus, the nutritional balance based on the MNBC was ideally "1". Only measured in intervention group	BMI not measured	NI	Fatty liver measured at baseline but not at follow-up (medical check). Blood results at entry also showed normal results for TC serum glucose, serum protein, serum triglyceride, and haemoglobin (but was not evaluated at follow-up)	Percentage overweight values, defined as the fractional difference of actual weight to age and sex-matched standards derived from nationwide surveys of Japanese children	NI	Participants asked about intervention (17 participants)	NI
Wilfley 2007	NI	The Child Dietary Self-efficacy Scale evaluated children's self-efficacy in choosing healthy, low-fat foods. The Self-effica-	BMI was calculated from weight, which was measured to the nearest one-	NI	NI	Percentage overweight was defined as percentage	NI	NI	Unclear how they were measured

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		cy Scale for Children's PA examined children's perceived self-efficacy in overcoming barriers to achieving weight goals and developing positive alternatives to unhealthy habits. The Child Eating Disorder Examination assessed weight and shape concerns. The Coping with Teasing Scale measured the adequacy of children's responses to teasing. Peer support for diet and PA was measured using the Social Support for Eating Habits/Exercise Survey. The levels of social problems of the children were evaluated by using the social problem subscale of the Achenbach CBCL-Parent Version	fourth pound (0.1kg) on a Detecto balance-beam scale (Cardinal Scale Manufacturing, Webb City, MI), and height, which was measured to the nearest one-eighth inch (0.3cm) with a stadiometer. The BMI z scores of the children were determined using the age-specific and sex-specific median BMI			above median BMI			
Epstein 2005	NI	PA measured using 3 d from PD-PAR. Measures calculated included minutes sampled, average activity in METS and mins and percentage of PA > 3 METS, with MET values based on the revised compendium of physical activities. Eating episodes calculated using 4 d of dietary recording in habit books - episode defined as occasion where food was consumed at a single sitting	Standardised BMI was calculated by comparing the youth BMI to mean BMI of population/standard deviation of population (Kuczmarski 2002)	NI	NI	Percent overweight based on comparisons of the BMI to the 50th percentile BMI for age and sex using the CDC growth charts	NI	NI	NI
Nemet 2005	NI	Participants kept three 2-d food records (at baseline, at the end of the 3-month programme, and 1 year later). The food record data were reviewed by the project nutritionist and checked for omissions	Standard calibrated scales and stadiometers were used to determine height, weight, and BMI. Because BMI	NI	NI	Triceps and subscapular skinfold values were measured to the nearest 0.1 mm,	NI	NI	Unclear how they were measured

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		and errors. Food records were analysed with the Israeli Ministry of Health tables. Fitness was assessed with a progressive treadmill exercise test, to determine exercise endurance. Participants performed an exercise test. All participants were familiarised with the treadmill for 5 min and performed a warm-up of 1 min at a speed of 2.2 miles (3.5km) per hour, with no incline. The exercise intensity was enhanced every 2 min. All participants were encouraged throughout the test by the staff members and exercised to the limit of their tolerance. Endurance time was measured from the end of the warm-up period to exhaustion	changes with age, BMI-for-age percentiles were calculated according to the CDC growth charts. The age-adjusted z score corresponding to the exact percentile for a given measurement was calculated			with Holtain skinfold calipers (CMS Weighing Equipment, Crymych, United Kingdom). Measurements were made on the right side of the body. All measurements (baseline, 3 months, and 1 year) were performed by the same trained individual. Calculations of percentage BF were performed with standard equations			
Woo 2004	NI	NI	Body weight was measured with an electronic body weight scale (Seca Delta Model 707) with participants dressed in a light T-shirt and shorts. Height was measured with a Harpenden statiometer	NI	NI	BF content was determined by DEXA, with the fan beam model (Hologic QDR-4500)	NI	NI	NI
Epstein 2001	NI	Motivation to engage in PA was assessed using the Children's Self-Perception of Adequacy and Predilection for PA Scale. This self-report scale was de-	Height was measured in 0.125-inch (0.3cm) intervals either using a laboratory-construct-	NI	NI	Percentage of overweight calculations were based on compar-	NI	NI	NI

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		veloped for children ages 9-16 to assess perceived adequacy, predilection, and enjoyment of PA. Reliability over a 2-week period for each factor ranged between 0.70 and 0.91. The total scale score was strongly related to free-time PA (r between 0.59 and 0.76), teacher evaluation of PA (r between 0.50 and 0.67), and standardised tests of motor co-ordination (r between 0.70 and 0.82) on a sample of 1205 children	ed height board or a stadiometer (Seca, Columbia, MD), and weight was measured in 0.25-pound (0.1kg) intervals using a medical balance beam scale (Healthometer, Bridgeview, IL). Children and parents who were ≥85th BMI percentile were considered obese			isons of the participant BMI to the 50th BMI percentile for age and sex using standards derived from the National Health and Nutrition Examination Survey III			
Nova 2001	NI	Change in behaviours – number of hs of PA per week, number of h spent using the TV and PC/d. This information was measured by interviewing the child and his/her parents	BMI measured but not reported at follow-up	NI	NI	Percentage overweight measured – no explanation	NI	NI	NI
Epstein 2000a	NI	Child problem solving assessed by PEPSI; lower scores indicate greater self-perception of problem solving. Child psychological problems assessed by the CBCL; Achenbach 1991. Total competence, total behaviour problems, internalising behaviour problems and externalising behaviour problems reported. The KEDS was used to assess symptoms of disordered eating and possible eating disorders	BMI = kg/m^2 converted to standard z scores based on sample BMI mean and standard deviation for age and gender (Rosner 1998)	NI	NI	NI	NI	NI	NI
Schwingshandl 1999	NI	NI	No description	NI	NI	Body composition was estimated from BIA. Measurements were performed at baseline and after 4, 8, and 12 weeks. To-	NI	NI	NI

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						tal body resistance was measured by a bioelectrical impedance analyser (Akern- RJL BIA 101/S) in supine position as described previously. FFM was estimated from the resistance index (RI), height, and age of the subject			
Duffy 1993	NI	Used the Traffic Light System to calculate the number of "red" foods (high-risk) a child consumed/d	Weight measured using digital scale but BMI not calculated. Used percentage overweight as an outcome to measure BF	NI	NI	Percent overweight to measure BF. Percentage above average weight for age, height and sex of each child = (actual weight – average weight for age, height and sex)/average weight for age, height and sex x 100	NI	NI	NI
Flodmark 1993	NI	The work capacity of the children was evaluated with a bicycle ergometer, the word load being expressed as watts/kg for normal weight and actual height at pulse of 170	Height and weight measurements taken by school nurse – no other description	NI	NI	Triceps, subscapular and suprailiac skinfold thickness measured with	NI	NI	Report checking blood thyroid status and BP during

(Continued)

						Harpenden callipers			the study – and all were normal
Epstein 1985c	NI	Eating behaviour and child self-control assessed by mother report using standardised questionnaires	BMI calculated by kg/m^2	NI	NI	Percent overweight: (Robinson 1968)	NI	NI	NI
Epstein 1985b	NI	Fitness assessed by submaximal physical work capacity testing on bicycle ergometer. The absolute physical work capacity was divided by the child's weight (kilopond-meters/kg) to control for differences in work capacity as a function of child size or differences in weight loss. The Leisure Time Activity Survey was used to assess the activity level of all children. The scale, given during structured interviews, provides for the quantification of a large variety of standard leisure activities in METs in three categories: low, medium, and high	NI	NI	NI	Percent overweight was calculated by child ideal weight standards (Jelliffe 1966)	NI	NI	NI
Epstein 1985a	NI	Eating behaviour assessed by standardised inventory of eating behaviours. Physical work capacity assessed using graded bicycle ergometry test where subject worked for 3 min at a workload with workloads increasing at 3-min intervals. Heart rate at each workload was entered into a linear regression equation to predict amount of work the subject could do at 150 beats per min (PWC150)	BMI calculated kg/m2	NI	NI	Percent overweight calculated in reference to ideal weight for height, age and sex (Metropolitian Life Insurance Company 1959, Robinson 1968)	NI	NI	NI

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Epstein 1984a	NI	Fitness assessed using a submaximal step test and percentile rankings using recovery heart rates were calculated based on standardisation data	Weights were taken on a balance beam scale, zeroed before each measurement. Heights were obtained on a specially constructed height measure calibrated in 0.125- in. (3.2 mm) intervals. BMI was calculated according to the following formula: BMI = weight (kg/height (m)2	NI	NI	Percentage overweight calculated in reference to the ideal weight for age, sex and height (Jelliffe 1966)	NI	NI	NI

AF-5: Five-Factor Self-Concept Questionnaire; ASSQ: The Child and Adolescent Trial for Cardiovascular Health After-School Student Questionnaire

BASC-2: P Behavioral Assessment System for Children: Parent version; BF: body fat, BIA: Bioelectrical impedance analysis; BMI: body mass index; BP: blood pressure; BPFAS: Behavioral Pediatrics Feeding Assessment Scale; BV: body volume

CATCH: Child and Adolescent Health; CBCL: Child Behavior Checklist; CDC: centre for disease control and prevention; CDI:Child Depression Inventory CDI-S: Child Depression Inventory short form; CEBQ: Child Eating Behaviour Questionnaire; CFCA CY-PSPP: Children and Youth Physical Self-Perception Profile; CHQ-PF50: Child Health Questionnaire - PF50; CHU9D: Child Health Utility 9-Dimensions;

DEXA: dual energy X-ray absorptiometry; DEBQ: Dutch Eating Behavior Questionnaire; DHI: diet history interviews

EAH: eating in the absence of hunger; EQ-5D-Y: European Quality of Life 5-Dimensions – youth; EQ-5D: European Quality of Life 5-Dimensions

FFM: fat free mass; FM: fat mass; FFQ: food frequency questionnaire;

GI: glycaemic index; GL: glycaemic load; GP: general practitioner; GW-LQ-KJ: weight-specific quality-of life measure, children and young;

HDL: high density lipoprotein;

IOTF: International Task Force of Obesity; IPAQ: international physical activity questionnaire

KEDS: Kids Eating disorder survey; KiGGS: the German health Interview and Examination Survey for children and adolescents

LPA: low physical activity;

MARCA: Multimedia Activity Recall for Children and Adolescents; MASC: Multidimensional Anxiety Scale for Children; MetS: metabolic syndrome; METs: metabolic equivalent; MPA: moderate physical activity; MRI: magnetic resonance imaging; MVPA: moderate-vigourous physical activity

N/D: not defined; N/I: not investigated;

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PA: physical activity; PAQ-C: Physical Activity Questionnaire for Children; PCSC: Perceived Competence Scale for Children; PD-PAR: Previous Day Physical Activity Recall; PedsQL:Pediatric Quality of Life Inventory; PEPSI: Purdue Elementary Problem-Solving Inventory

QoL: quality of life

ROC: regulation of cues;

SD: standard deviation; SDS: standard deviation scores; SDQ: Strengths and Difficulties questionnaire; SPAN: School Physical Activity and Nutrition; SPPC: Self-Perception Profile for children; SSB: sugar sweetened beverages; STAIC: State-Trait Anxiety Inventory for Children

TBW: total body water; TC: total cholesterol; TEE: Total Energy expenditure;

VO2max: maximal oxygen uptake; VPA: vigorous physical activity;

WC: waist circumference; WHO: World Health Organization; WHtR: waist to height ratio

Appendix 8. Adverse events (I)

	Intervention(s) and comparator(s)	Participants included in analysis (N)	Deaths (N)	Deaths (%)	All adverse events (N)	All adverse events (%)	Severe/serious adverse events (N)	Severe/serious adverse events (N)
NCT02436330	I: exergaming and didactic healthy teaching	60	0	0	0	0	0	0
	C: didactic healthy teaching	24	0	0	0	0	0	0
Ho 2016	I: standard nutrition counselling plus portion control equipment	48	0	0	0	0	0	0
	C: standard nutrition counselling	51	0	0	0	0	0	0
Warschburger 2016	I: parental CBT training group plus child inpatient intervention	336	0	0	0	0	0	0
	C: parental information-only group plus child inpatient intervention	350	0	0	0	0	0	0
Epstein 2015	I: family-based treatment + variety of high energy-dense foods	13	0	0	-	-	-	-
	C: family-based treatment only	11	0	0	-	-	-	-
Larsen 2015	I: an education programme in addition to health consultations	45	0	0	-	-	-	-
	C: health consultations only	35	0	0	-	-	-	-
Serra-Paya 2015	I: Nereu group	54	0	0	-	-	-	-
	C: counselling group	59	0	0	-	-	-	-
Taveras 2015	I1: computerised point-of-care alerts plus direct-to-parent outreach and support	171	0	0	0	0	0	0
	I2: computerised point-of-care alerts only	194	0	0	0	0	0	0
	C: usual care	184	0	0	0	0	0	0

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Taylor 2015	I: tailored package	104	0	0	0	0	0	0
	C: usual care	102	0	0	0	0	0	0
Berry 2014	I: nutrition and exercise education and coping skills intervention	189	0	0	0	0	0	0
	C: waiting-list control	169	0	0	0	0	0	0
Boutelle 2014	I: Regulation of Cues (ROC) programme	22	0	0	0	0	0	0
	C: control group	22	0	0	0	0	0	0
Hamilton-Shield 2014	I: standard care plus Mandolean training	26	0	0	0	0	0	0
	C: standard care only	35	0	0	0	0	0	0
Looney 2014	I1: newsletter and growth monitoring plus behavioural counselling	7	0	0	0	0	0	0
	I2: newsletter and growth monitoring	7	0	0	0	0	0	0
	C: newsletter only	8	0	0	0	0	0	0
Maddison 2014	I: SWITCH intervention group	127	0	0	2	1.6	2	1.6
	C: control group	124	0	0	3	2.4	3	2.4
Markert 2014	I: telephone-based adiposity prevention for families (TAFF)	154	0	0	-	-	-	-
	C: control group	149	0	0	-	-	-	-
Arauz Boudreau 2013	I: behaviour-changing intervention and coaching on behaviour-changing behaviours	23	0	0	-	-	-	-
	C: waiting-list control	18	0	0	-	-	-	-
Davis 2013	I: telemedicine intervention	31	0	0	0	0	0	0
	C: physician-visit intervention	27	0	0	0	0	0	0

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Davoli 2013	I: family paediatrician-led motivational interviewing	187	0	0	0	0	0	0
	C: usual care plus a booklet on obesity prevention	185	0	0	0	0	0	0
Lochrie 2013	I: family-based intervention	65	0	0	-	-	-	-
	C: education session	65	0	0	-	-	-	-
Mirza 2013	I: low-glycaemic load dietary group	57	0	0	0	0	0	0
	C: conventional low-fat dietary group	56	0	0	1	1.8	0	0
O'Connor 2013	I: "Helping Hand" obesity intervention	20	0	0	0	0	0	0
	C: waiting-list control	20	0	0	0	0	0	0
Saelens 2013	I: self-directed approach	43	0	0	-	-	-	-
	C: prescribed treatment approach	46	0	0	-	-	-	-
Siwik 2013	I: "Choices" group office-visit intervention	15	0	0	-	-	-	-
	C: lagged control group	17	0	0	-	-	-	-
Vann 2013	I1: pedometer + DVD group	7	0	0	0	0	0	0
	I2: pedometer group	7	0	0	0	0	0	0
	I3: DVD group	7	0	0	0	0	0	0
	C: control group	7	0	0	0	0	0	0
Wake 2013	I: HopSCOTCH (the shared care obesity trial) intervention	62	0	0	0	0	0	0
	C: usual care	56	0	0	0	0	0	0
Croker 2012	I: family-based behavioural treatment	37	0	0	0	0	0	0
	C: waiting-list control	35	0	0	1	2.9	0	0

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de Niet 2012	I: short message service maintenance treatment and behaviour-changing treatment	73	0	0	0	0	0	0
	C: behaviour-changing treatment only	68	0	0	0	0	0	0
Eddy Ives 2012	I: dietary and physical exercise recommendations during 6 sessions	87	0	0	0	0	0	0
	C: dietary and physical exercise recommendations at 2 sessions only	87	0	0	0	0	0	0
Kirk 2012	I1: low carbohydrate diet plus group exercise/education sessions	35	0	0	-	-	-	-
	I2: reduced glycaemic load diet plus group exercise/education sessions	36	0	0	-	-	-	-
	C: standard portion-controlled diet plus group exercise/education sessions	31	0	0	-	-	-	-
Lison 2012	I1: hospital clinic group exercise-diet programme	45	0	0	0	0	0	
	I2: home-based combined exercise-diet programme	41	0	0	0	0	0	
	C: control group	24	0	0	0	0	0	
Waling 2012	I: family-based intervention	58	0	0	0	0	0	
	C: control group	47	0	0	0	0	0	
Wright 2012	I: Kids N Fitness (KNF) intervention	165	0	0	-	-	-	-
	C: general education (GE)	140	0	0	-	-	-	-
Barkin 2011	I: group physical activity and goal setting	80	0	0	-	-	-	-
	C: standard care counselling and health education session	79	0	0	-	-	-	-
Bryant 2011	I: WATCH IT intervention	35	0	0	0	0	0	0

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	C: waiting-list control	35	0	0	0	0	0	0
Coppins 2011	I: multi-component family-focused education package	35	0	0	0	0	0	0
	C: waiting-list control	30	0	0	0	0	0	0
Gunnarsdottir 2011a	I: Epstein's family-based behavioural treatment (FBBT)	8	0	0	-	-	-	-
	C: standard care (waiting-list control)	8	0	0	-	-	-	-
Maddison 2011	I: active video game package	160	0	0	2	1.3	2	1.3
	C: control group	162	0	0	6	2.5	6	2.5
Wafa 2011	I: low-intensity intervention	52	0	0	0	0	0	0
	C: waiting-list control	55	0	0	0	0	0	0
Bathrellou 2010	I: behavioural intervention with parental involvement	24	0	0	-	-	-	-
	C: behavioural intervention without parental involvement	23	0	0	-	-	-	-
Diaz 2010	I: behavioural curriculum plus registered dieticians and physician consultations	38	0	0	0	0	0	0
	C: physician consultations only	38	0	0	0	0	0	0
Duggins 2010	I: nutrition classes and family YMCA membership	44	0	0	-	-	-	-
	C: nutrition classes only	39	0	0	-	-	-	-
Faude 2010	I: football training programme (FB)	19	0	0	-	-	-	-
	C: established standard sports programme (STD)	20	0	0	-	-	-	-
Reinehr 2010	I: behaviour-changing treatment	39	0	0	0	0	0	0

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	C: waiting-list control	32	0	0	0	0	0	0
Sacher 2010	I: MEND programme	60	0	0	0	0	0	0
	C: control group	56	0	0	0	0	0	0
Kalarchian 2009	I: family-based, behavioural weight control group	97	0	0	0	0	0	0
	C: usual care	95	0	0	0	0	0	0
Nowicka 2009	I: summer camp	20	0	0	0	0	0	0
	C: control group	28	0	0	0	0	0	0
Wake 2009	I: LEAP2 behavioural intervention	139	0	0	0	0	0	0
	C: control group	119	0	0	0	0	0	0
Alves 2008	I: exercise programme	39	0	0	0	0	0	0
	C: no care	39	0	0	0	0	0	0
Hughes 2008	I: behavioural programme	69	0	0	0	0	0	0
	C: standard care	65	0	0	0	0	0	0
Weigel 2008	I: active intervention group	37	0	0	-	-	-	-
	C: control group	36	0	0	-	-	-	-
Weintraub 2008	I: after-school team sports programme	9	0	0	-	-	-	-
	C: "Active placebo" control	12	0	0	-	-	-	-
Berry 2007	I: nutrition and exercise education programme plus coping skills training	40	0	0	0	0	0	0
	C: nutrition and exercise education programme only	40	0	0	0	0	0	0

(Continued)

Gillis 2007	I: exercise and diet education with weekly diaries and telephone calls	14	0	0	0	0	0	0
	C: exercise and diet education only	13	0	0	0	0	0	0
Kalavainen 2007	I: family centred group programme	35	0	0	0	0	0	0
	C: routine treatment	35	0	0	0	0	0	0
McCallum 2007	I: LEAP Intervention	81	0	0	-	-	-	-
	C: control group	82	0	0	-	-	-	-
Rodearmel 2007	I: 'America on the Move' intervention group	116	0	0	-	-	-	-
	C: self-monitoring group	102	0	0	-	-	-	-
Satoh 2007	I: dietary guidance using an easily handled model nutritional balance chart (MNBC)	29	0	0	-	-	-	-
	C: control group	14	0	0	-	-	-	-
Wilfley 2007	I1: behavioural skills maintenance group	51	0	0	0	0	0	0
	I2: social facilitation maintenance group	50	0	0	0	0	0	0
	C: control group	49	0	0	0	0	0	0
Epstein 2005	I: standardised family-based behavioural weight control programme plus reinforcement for increasing alternatives to eating	19	0	0	-	-	-	-
	C: standardised family-based behavioural weight control programme only	22	0	0	-	-	-	-
Nemet 2005	I: combined dietary and exercise programme	30	0	0	0	0	0	0
	C: control group	24	0	0	0	0	0	0
Woo 2004	I1: diet plus supervised structured exercise programme with continuing training	22	0	0	0	0	0	0

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	I2: diet plus supervised structured exercise programme with detraining	19	0	0	0	0	0	0
	C: diet modification only	41	0	0	-	-	-	-
Epstein 2001	I: a combination of reducing sedentary behaviour and increasing physical activity	67	0	0	-	-	-	-
	C: targeting increasing physical activity only		0	0	-	-	-	-
Nova 2001	I: enhanced approach	72	0	0	-	-	-	-
	C: routine approach	114	0	0	-	-	-	-
Epstein 2000a	I1: behavioural weight-control programme plus parent and child problem solving	17	0	0	-	-	-	-
	I2: behavioural weight-control programme plus child problem solving only	18	0	0	-	-	-	-
	C: standard treatment with no additional problem solving	17	0	0	-	-	-	-
Schwingshandl 1999	I: physical activity programme and dietary advice	14	0	0	-	-	-	-
	C: dietary advice only	16	0	0	-	-	-	-
Duffy 1993	I: cognitive self-management training plus behaviour therapy	27	0	0	-	-	-	-
	C: behaviour therapy plus attention placebo control methods		0	0	-	-	-	-
Flodmark 1993	I: family therapy	25	0	0	-	-	-	-
	C: conventional treatment	19	0	0	-	-	-	-
Epstein 1985c	I: behaviourally-orientated programme that emphasised parent management	24	0	0	-	-	-	-
	C: provided equal education and attention but not behavioural principles		0	0	-	-	-	-

(Continued)

Epstein 1985b	I: diet and exercise education	23	0	0	-	-	-	-
	C: diet education only		0	0	-	-	-	-
Epstein 1985a	I1: diet plus programmed aerobic exercise programme	41	0	0	-	-	-	-
	I2: diet plus exercise programme		0	0	-	-	-	-
	C: diet plus low intensity calisthenic exercise programme		0	0	-	-	-	-
Epstein 1984a	I1: diet-plus-exercise group	18	0	0	-	-	-	-
	I2: diet only	18	0	0	-	-	-	-
	C: waiting-list control	17	0	0	-	-	-	-

- denotes not reported

C: comparator; CBT: cognitive behavioural therapy; I: intervention; MEND: Mind, Exercise, Nutrition, Do it; N: number of participants: SWITCH: Screen-Time Weight-loss Intervention Targeting Children at Home; YMCA: Young Men's Christian Association

Appendix 9. Adverse events (II)

	Intervention(s) and comparator(s)	Participants included in analysis (N)	Participants discontinuing trial due to an adverse event (N)	Participants discontinuing trial due to an adverse event (%)	Participants with at least one hospitalisation (N)	Participants with at least one hospitalisation (%)	Participants with at least one outpatient treatment (N)	Participants with at least one outpatient treatment (%)
NCT02436330	I: exergaming and didactic healthy teaching	60	0	0	0	0	0	0
	C: didactic healthy teaching	24	0	0	0	0	0	0
Ho 2016	I: standard nutrition counselling plus portion control equipment	48	0	0	0	0	0	0
	C: standard nutrition counselling	51	0	0	0	0	0	0
Warschburger 2016	I: parental CBT training group plus child inpatient intervention	336	0	0	0	0	0	0
	C: parental information-only group plus child inpatient intervention	350	0	0	0	0	0	0
Epstein 2015	I: family-based treatment + variety of high energy-dense foods	13	-	-	-	-	-	-
	C: family-based treatment only	11	-	-	-	-	-	-
Larsen 2015	I: an education programme in addition to health consultations	45	-	-	-	-	-	-
	C: health consultations only	35	-	-	-	-	-	-
Serra-Paya 2015	I: Nereu group	54	-	-	-	-	-	-
	C: counselling group	59	-	-	-	-	-	-
Taveras 2015	I1: computerised point-of-care alerts plus direct-to-parent outreach and support	171	0	0	0	0	0	0
	I2: computerised point-of-care alerts only	194	0	0	0	0	0	0

(Continued)

	C: usual care	184	0	0	0	0	0	0
Taylor 2015	I: tailored package	104	0	0	0	0	0	0
	C: usual care	102	0	0	0	0	0	0
Berry 2014	I: nutrition and exercise education and coping skills intervention	189	0	0	0	0	0	0
	C: waiting-list control	169	0	0	0	0	0	0
Boutelle 2014	I: Regulation of Cues (ROC) programme	22	0	0	0	0	0	0
	C: control group	22	0	0	0	0	0	0
Hamil-ton-Shield 2014	I: standard care plus Mandolean training	26	0	0	0	0	0	0
	C: standard care only	35	0	0	0	0	0	0
Looney 2014	I1: newsletter and growth monitoring plus behavioural counselling	7	0	0	0	0	0	0
	I2: newsletter and growth monitoring	7	0	0	0	0	0	0
	C: newsletter only	8	0	0	0	0	0	0
Maddison 2014	I: SWITCH intervention group	127	-	-	2	1.6	-	-
	C: control group	124	-	-	2	1.6	-	-
Markert 2014	I: telephone-based adiposity prevention for families (TAFF)	154	-	-	-	-	-	-
	C: control group	149	-	-	-	-	-	-
Arauz Boudreau 2013	I: behaviour-changing intervention and coaching on behaviours	23	-	-	-	-	-	-
	C: waiting-list control	18	-	-	-	-	-	-
Davis 2013	I: telemedicine intervention	31	0	0	0	0	0	0

(Continued)

	C: physician-visit intervention	27	0	0	0	0	0	0
Davoli 2013	I: family paediatrician-led motivational interviewing	187	0	0	0	0	0	0
	C: usual care plus a booklet on obesity prevention	185	0	0	0	0	0	0
Lochrie 2013	I: family-based intervention	65	-	-	-	-	-	-
	C: education session	65	-	-	-	-	-	-
Mirza 2013	I: low-glycaemic load dietary group	57	0	0	0	0	0	0
	C: conventional low-fat dietary group	56	0	0	0	0	0	0
O'Connor 2013	I: "Helping Hand" obesity intervention	20	0	0	0	0	0	0
	C: waiting-list control	20	0	0	0	0	0	0
Saelens 2013	I: self-directed approach	43	-	-	-	-	-	-
	C: prescribed treatment approach	46	-	-	-	-	-	-
Siwik 2013	I: "Choices" group office-visit intervention	15	-	-	-	-	-	-
	C: lagged control group	17	-	-	-	-	-	-
Vann 2013	I1: pedometer + DVD group	7	0	0	0	0	0	0
	I2: pedometer group	7	0	0	0	0	0	0
	I3: DVD group	7	0	0	0	0	0	0
	C: control group	7	0	0	0	0	0	0
Wake 2013	I: HopSCOTCH (the shared care obesity trial) intervention	62	0	0	0	0	0	0
	C: usual care	56	0	0	0	0	0	0
Croker 2012	I: family-based behavioural treatment	37	0	0	0	0	0	0

(Continued)

	C: waiting-list control	35	0	0	0	0	0	0
de Niet 2012	I: short message service maintenance treatment and behaviour-changing treatment	73	0	0	0	0	0	0
	C: behaviour-changing treatment only	68	0	0	0	0	0	0
Eddy Ives 2012	I: dietary and physical exercise recommendations during 6 sessions	87	0	0	0	0	0	0
	C: dietary and physical exercise recommendations at 2 sessions only	87	0	0	0	0	0	0
Kirk 2012	I1: low carbohydrate diet plus group exercise/education sessions	35	0	0	-	-	-	-
	I2: reduced glycaemic load diet plus group exercise/education sessions	36	0	0	-	-	-	-
	C: standard portion-controlled diet plus group exercise/education sessions	31	0	0	-	-	-	-
Lison 2012	I1: hospital clinic group exercise-diet programme	45	0	0	0	0	0	
	I2: home-based combined exercise-diet programme	41	0	0	0	0	0	
	C: control group	24	0	0	0	0	0	
Waling 2012	I: family-based intervention	58	0	0	0	0	0	
	C: control group	47	0	0	0	0	0	
Wright 2012	I: Kids N Fitness (KNF) intervention	165	-	-	-	-	-	-
	C: general education (GE)	140	-	-	-	-	-	-
Barkin 2011	I: group physical activity and goal setting	80	-	-	-	-	-	-
	C: standard care counselling and health education session	79	-	-	-	-	-	-

(Continued)

Bryant 2011	I: WATCH IT intervention	35	0	0	0	0	0	0
	C: waiting-list control	35	0	0	0	0	0	0
Coppins 2011	I: multi-component family-focused education package	35	0	0	0	0	0	0
	C: waiting-list control	30	0	0	0	0	0	0
Gunnarsdottir 2011a	I: Epstein's family based behavioural treatment (FBBT)	8	-	-	-	-	-	-
	C: standard care (waiting-list control)	8	-	-	-	-	-	-
Maddison 2011	I: active video game package	160	-	-	2	1.3	-	-
	C: control group	162	-	-	4	2.5	-	-
Wafa 2011	I: low-intensity intervention	52	0	0	0	0	0	0
	C: waiting-list control	55	0	0	0	0	0	0
Bathrellou 2010	I: behavioural intervention with parental involvement	24	-	-	-	-	-	-
	C: behavioural intervention without parental involvement	23	-	-	-	-	-	-
Diaz 2010	I: behavioural curriculum plus registered dieticians and physician consultations	38	0	0	0	0	0	0
	C: physician consultations only	38	0	0	0	0	0	0
Duggins 2010	I: nutrition classes and family YMCA membership	44	-	-	-	-	-	-
	C: nutrition classes only	39	-	-	-	-	-	-
Faude 2010	I: football training programme (FB)	19	-	-	-	-	-	-
	C: established standard sports programme (STD)	20	-	-	-	-	-	-

(Continued)

Reinehr 2010	I: behaviour-changing treatment intervention	39	0	0	0	0	0	0
	C: waiting-list control	32	0	0	0	0	0	0
Sacher 2010	I: MEND programme	60	0	0	0	0	0	0
	C: control group	56	0	0	0	0	0	0
Kalarchian 2009	I: family-based, behavioural weight control group	97	0	0	0	0	0	0
	C: usual care	95	0	0	0	0	0	0
Nowicka 2009	I: summer camp	20	0	0	0	0	0	0
	C: control group	28	0	0	0	0	0	0
Wake 2009	I: LEAP2 behavioural intervention	139	0	0	0	0	0	0
	C: control group	119	0	0	0	0	0	0
Alves 2008	I: exercise programme	39	0	0	0	0	0	0
	C: no care	39	0	0	0	0	0	0
Hughes 2008	I: behavioural programme	69	0	0	0	0	0	0
	C: standard care	65	0	0	0	0	0	0
Weigel 2008	I: active intervention group	37	-	-	-	-	-	-
	C: control group	36	-	-	-	-	-	-
Weintraub 2008	I: after-school team sports programme	9	0	0	-	-	-	-
	C: "Active placebo" control	12	0	0	-	-	-	-
Berry 2007	I: nutrition and exercise education programme plus coping skills training	40	0	0	0	0	0	0
	C: nutrition and exercise education programme only	40	0	0	0	0	0	0

(Continued)

Gillis 2007	I: exercise and diet education with weekly diaries and telephone calls	14	0	0	0	0	0	0
	C: exercise and diet education only	13	0	0	0	0	0	0
Kalavainen 2007	I: family-centred group programme	35	0	0	0	0	0	0
	C: routine treatment	35	0	0	0	0	0	0
McCallum 2007	I: LEAP Intervention	81	-	-	-	-	-	-
	C: control group	82	-	-	-	-	-	-
Rodearmel 2007	I: 'America on the Move' intervention group	116	-	-	-	-	-	-
	C: self-monitoring group	102	-	-	-	-	-	-
Satoh 2007	I: dietary guidance using an easily handled model nutritional balance chart (MNBC)	29	-	-	-	-	-	-
	C: control group	14	-	-	-	-	-	-
Wilfley 2007	I1: behavioural skills maintenance group	51	0	0	0	0	0	0
	I2: social facilitation maintenance group	50	0	0	0	0	0	0
	C: control group	49	0	0	0	0	0	0
Epstein 2005	I: standardised family-based behavioural weight control programme plus reinforcement for increasing alternatives to eating	19	-	-	-	-	-	-
	C: standardised family-based behavioural weight control programme only	22	-	-	-	-	-	-
Nemet 2005	I: combined dietary and exercise programme	30	0	0	0	0	0	0
	C: control group	24	0	0	0	0	0	0
Woo 2004	I1: diet plus supervised structured exercise programme with continuing training	22	0	0	0	0	0	0

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	I2: diet plus supervised structured exercise programme with detraining	19	0	0	0	0	0	0
	C: diet modification only	41	-	-	-	-	-	-
Epstein 2001	I: a combination of reducing sedentary behaviour and increasing physical activity	67	-	-	-	-	-	-
	C: targeting increasing physical activity only		-	-	-	-	-	-
Nova 2001	I: enhanced approach	72	-	-	-	-	-	-
	C: routine approach	114	-	-	-	-	-	-
Epstein 2000a	I1: behavioural weight-control programme plus parent and child problem solving	17	-	-	-	-	-	-
	I2: behavioural weight-control programme plus child problem solving only	18	-	-	-	-	-	-
	C: standard treatment with no additional problem solving	17	-	-	-	-	-	-
Schwingshandl 1999	I: physical activity programme and dietary advice	14	-	-	-	-	-	-
	C: dietary advice only	16	-	-	-	-	-	-
Duffy 1993	I: cognitive self-management training plus behaviour therapy	27	-	-	-	-	-	-
	C: behaviour therapy plus attention placebo control methods		-	-	-	-	-	-
Flodmark 1993	I: family therapy	25	-	-	-	-	-	-
	C: conventional treatment	19	-	-	-	-	-	-
Epstein 1985c	I: behaviourally-orientated programme that emphasised parent management	24	-	-	-	-	-	-
	C: provided equal education and attention but not behavioural principles		-	-	-	-	-	-

(Continued)

Epstein 1985b	I: diet and exercise education	23	-	-	-	-	-	-
	C: diet education only		-	-	-	-	-	-
Epstein 1985a	I1: diet plus programmed aerobic exercise programme	41	-	-	-	-	-	-
	I2: diet plus exercise programme		-	-	-	-	-	-
	C: diet plus low-intensity calisthenic exercise programme		-	-	-	-	-	-
Epstein 1984a	I1: diet-plus-exercise group	18	-	-	-	-	-	-
	I2: diet only	18	-	-	-	-	-	-
	C: waiting-list control	17	-	-	-	-	-	-

- denotes not reported

C: comparator; CBT: cognitive behavioural therapy; I: intervention; MEND: Mind, Exercise, Nutrition, Do it; N: number of participants: SWITCH: Screen-Time Weight-loss Intervention Targeting Children at Home; YMCA: Young Men's Christian Association

Appendix 10. Adverse events (III)

	Intervention(s) and comparator(s)	Participants included in analysis (N)	Participants with a specific adverse event (description)	Participants with at least one specific adverse events (N)	Participants with at least one specific adverse event (%)
NCT02436330	I: exergaming and didactic healthy teaching	60	0	0	0
	C: didactic healthy teaching	24	0	0	0
Ho 2016	I: standard nutrition counselling plus portion control equipment	48	0	0	0
	C: standard nutrition counselling	51	0	0	0
Warschburger 2016	I: parental CBT training group plus child inpatient intervention	336	0	0	0
	C: parental information-only group plus child inpatient intervention	350	0	0	0
Epstein 2015	I: family-based treatment + variety of high energy-dense foods	13	-	-	-
	C: family-based treatment only	11	-	-	-
Larsen 2015	I: an education programme in addition to health consultations	45	-	-	-
	C: health consultations only	35	-	-	-
Serra-Paya 2015	I: Nereu group	54	-	-	-
	C: counselling group	59	-	-	-
Taveras 2015	I1: computerised point-of-care alerts plus direct-to-parent outreach and support	171	0	0	0
	I2: computerised point-of-care alerts only	194	0	0	0
	C: usual care	184	0	0	0
Taylor 2015	I: tailored package	104	0	0	0
	C: usual care	102	0	0	0
Berry 2014	I: nutrition and exercise education and coping skills intervention	189	0	0	0
	C: waiting-list control	169	0	0	0
Boutelle 2014	I: Regulation of Cues (ROC) programme	22	0	0	0

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	C: control group	22	0	0	0
Hamilton-Shield 2014	I: standard care plus Mandolean training	26	0	0	0
	C: standard care only	35	0	0	0
Looney 2014	I1: newsletter and growth monitoring plus behavioural counselling	7	0	0	0
	I2: newsletter and growth monitoring	7	0	0	0
	C: newsletter only	8	0	0	0
Maddison 2014	I: SWITCH intervention group	127	(1) Bowel replacement surgery ("child remained at home, monitored by caregiver.") *Coded as severe* (2) Dislocated left hip. *Coded as moderate severity*	(1) 1 (2) 1	(1) 0.8 (2) 0.8
	C: control group	124	(1) Operation to remove cyst ("participant had operation to remove cyst from a testicle.") *Coded as mild severity* (2) Broken ankle ("child fell off a swing on the playground and broke his ankle. Child is now back at school and is doing fine"). *Coded as moderate severity* (3) Broke 2 fingers on left hand whilst playing rugby, "hand now in cast" *coded as mild severity*	(1) 1 (2) 1 (3) 1	(1) 0.8 (2) 0.8 (3) 0.8

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Markert 2014	I: telephone-based adiposity prevention for families (TAFF)	154	-	-	-
	C: control group	149	-	-	-
Arauz Boudreau 2013	I: behaviour-changing intervention and coaching on behaviours	23	-	-	-
	C: waiting-list control	18	-	-	-
Davis 2013	I: telemedicine intervention	31	0	0	0
	C: physician-visit intervention	27	0	0	0
Davoli 2013	I: family paediatrician-led motivational interviewing	187	0	0	0
	C: usual care plus a booklet on obesity prevention	185	0	0	0
Lochrie 2013	I: family-based intervention	65	-	-	-
	C: education session	65	-	-	-
Mirza 2013	I: low-glycaemic load dietary group	57	0	0	0
	C: conventional low-fat dietary group	56	Experienced a feeling of faintness during the blood draw at the 3-month post-intervention assessment	1	1.8
O'Connor 2013	I: "Helping Hand" obesity intervention	20	0	0	0
	C: waiting-list control	20	0	0	0
Saelens 2013	I: self-directed approach	43	-	-	-
	C: prescribed treatment approach	46	-	-	-
Siwik 2013	I: "Choices" group office-visit intervention	15	-	-	-
	C: lagged control group	17	-	-	-
Vann 2013	I1: pedometer + DVD group	7	0	0	0
	I2: pedometer group	7	0	0	0
	I3: DVD group	7	0	0	0
	C: control group	7	0	0	0
Wake 2013	I: HopSCOTCH (the shared care obesity trial) intervention	62	0	0	0

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	C: usual care	56	0	0	0
Croker 2012	I: family-based behavioural treatment	37	0	0	0
	C: waiting-list control	35	Very high reduction in BMI (28.8) and BMI SDS (4.2)	1	2.9
de Niet 2012	I: short message service maintenance treatment and behaviour-changing treatment	73	0	0	0
	C: behaviour-changing treatment only	68	0	0	0
Eddy Ives 2012	I: dietary and physical exercise recommendations during 6 sessions	87	0	0	0
	C: dietary and physical exercise recommendations at 2 sessions only	87	0	0	0
Kirk 2012	I1: Low carbohydrate diet plus group exercise/education sessions	All: BP = 84 TG = 74 LDL = 86 Glucose = 86	(1) Elevated BP (2) Elevated TG (3) Elevated LDL (4) Elevated Glucose	(1) 3 (2) 9 (3) 3 (4) 3	(1) 3.6 (2) 12.2 (3) 3.5 (4) 3.5
	I2: reduced glycaemic load diet plus group exercise/education sessions				
	C: standard portion-controlled diet plus group exercise/education sessions				
Lison 2012	I1: hospital clinic group exercise-diet programme	45	0	0	0
	I2: home-based combined exercise-diet programme	41	0	0	0
	C: control group	24	0	0	0
Waling 2012	I: family-based intervention	58	0	0	0
	C: control group	47	0	0	0
Wright 2012	I: Kids N Fitness (KNF) intervention	165	-	-	-
	C: general education (GE)	140	-	-	-
Barkin 2011	I: group physical activity and goal setting	80	-	-	-
	C: standard care counselling and health education session	79	-	-	-
Bryant 2011	I: WATCH IT intervention	35	0	0	0
	C: waiting-list control	35	0	0	0

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Coppins 2011	I: multi-component family focused education package	35	0	0	0
	C: waiting-list control	30	0	0	0
Gunnarsdottir 2011a	I: Epstein's family-based behavioural treatment (FBBT)	8	-	-	-
	C: standard care (waiting-list control)	8	-	-	-
Maddison 2011	I: active video game package	322	(1) Hospitalisation because of seasonal influenza (2) Hip surgery related to a chronic condition (3) A blood clot (4) Observation after a fall (5) Diagnosis with type 1 diabetes (6) An ankle injury	(1) 3 (2) 1 (3) 1 (4) 1 (5) 1 (6) 1	(1) 0.9 (2) 0.3 (3) 0.3 (4) 0.3 (5) 0.3 (6) 0.3
	C: control group				
Wafa 2011	I: low-intensity intervention	52	0	0	0
	C: waiting-list control	55	0	0	0
Bathrellou 2010	I: behavioural intervention with parental involvement	24	-	-	-
	C: behavioural intervention without parental involvement	23	-	-	-
Diaz 2010	I: behavioural curriculum plus registered dieticians and physician consultations	38	0	0	0
	C: physician consultations only	38	0	0	0
Duggins 2010	I: nutrition classes and family YMCA membership	44	-	-	-
	C: nutrition classes only	39	-	-	-
Faude 2010	I: football training programme (FB)	19	-	-	-
	C: established standard sports programme (STD)	20	-	-	-
Reinehr 2010	I: behaviour-changing treatment	39	0	0	0
	C: waiting-list control	32	0	0	0

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Sacher 2010	I: MEND programme	60	0	0	0
	C: control group	56	0	0	0
Kalarchian 2009	I: family-based, behavioural weight control group	97	0	0	0
	C: usual care	95	0	0	0
Nowicka 2009	I: summer camp	20	0	0	0
	C: control group	28	0	0	0
Wake 2009	I: LEAP2 behavioural intervention	139	0	0	0
	C: control group	119	0	0	0
Alves 2008	I: exercise programme	39	0	0	0
	C: no care	39	0	0	0
Hughes 2008	I: behavioural programme	69	0	0	0
	C: standard care	65	0	0	0
Weigel 2008	I: active intervention group	37	-	-	-
	C: control group	36	-	-	-
Weintraub 2008	I: after-school team sports programme	9	(1) Skin rash (2) Car collision (3) Newly diagnosed hypothyroidism	(1) 1 (2) 1 (3) 1	(1) 11 (2) 11 (3) 11
	C: "Active placebo" control	12	(1) Foot injury (2) Knee pain while ice skating (3) Eye pain and headaches (4) Ingrown toenail (5) Ear infection (6) Skin rash	(1) 1 (2) 1 (3) 1 (4) 1 (5) 1 (6) 1	(2) 8.3 (3) 8.3 (4) 8.3
Berry 2007	I: nutrition and exercise education programme plus coping skills training	40	0	0	0
	C: nutrition and exercise education programme only	40	0	0	0
Gillis 2007	I: exercise and diet education with weekly diaries and telephone calls	14	0	0	0

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	C: exercise and diet education only	13	0	0	0
Kalavainen 2007	I: family-centred group programme	35	0	0	0
	C: routine treatment	35	0	0	0
McCallum 2007	I: LEAP Intervention	81	-	-	-
	C: control group	82	-	-	-
Rodearmel 2007	I: 'America on the Move' intervention group	116	-	-	-
	C: self-monitoring group	102	-	-	-
Satoh 2007	I: dietary guidance using an easily handled model nutritional balance chart (MNBC)	29	-	-	-
	C: control group	14	-	-	-
Wilfley 2007	I1: behavioural skills maintenance group	51	0	0	0
	I2: social facilitation maintenance group	50	0	0	0
	C: control group	49	0	0	0
Epstein 2005	I: standardised family-based behavioural weight control programme plus reinforcement for increasing alternatives to eating	19	-	-	-
	C: standardised family-based behavioural weight control programme only	22	-	-	-
Nemet 2005	I: combined dietary and exercise programme	30	0	0	0
	C: control group	24	0	0	0
Woo 2004	I1: diet plus supervised structured exercise programme with continuing training	22	0	0	0
	I2: diet plus supervised structured exercise programme with detraining	19	0	0	0
	C: diet modification only	41	-	-	-
Epstein 2001	I: a combination of reducing sedentary behaviour and increasing physical activity	67	-	-	-
	C: targeting increasing physical activity only		-	-	-
Nova 2001	I: enhanced approach	72	-	-	-
	C: routine approach	114	-	-	-
Epstein 2000a	I1: behavioural weight-control programme plus parent and child problem solving	17	-	-	-

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	I2: behavioural weight-control programme plus child problem solving only	18	-	-	-
	C: standard treatment with no additional problem solving	17	-	-	-
Schwingshandl 1999	I: physical activity programme and dietary advice	14	-	-	-
	C: dietary advice only	16	-	-	-
Duffy 1993	I: cognitive self-management training plus behaviour therapy	27	-	-	-
	C: behaviour therapy plus attention placebo control methods		-	-	-
Flodmark 1993	I: family therapy	25	-	-	-
	C: conventional treatment	19	-	-	-
Epstein 1985c	I: behaviourally-orientated programme that emphasised parent management	24	-	-	-
	C: provided equal education and attention but not behavioural principles		-	-	-
Epstein 1985b	I: diet and exercise education	23	-	-	-
	C: diet education only		-	-	-
Epstein 1985a	I1: diet plus programmed aerobic exercise programme	41	-	-	-
	I2: diet plus lifestyle programme		-	-	-
	C: diet plus low-intensity calisthenic exercise programme		-	-	-
Epstein 1984a	I1: diet-plus-exercise group	18	-	-	-
	I2: diet only	18	-	-	-
	C: waiting-list control	17	-	-	-

- denotes not reported

BP: blood pressure; C: comparator; CBT: cognitive behavioural therapy; I: intervention; LDL: low-density lipoprotein; MEND: Mind, Exercise, Nutrition, Do it; N: number of participants: SWITCH: Screen-Time Weight-loss Intervention Targeting Children at Home; TG: triglycerides; YMCA: Young Men's Christian Association

Appendix 11. Survey of study investigators providing information on included trials

	Date trial author contacted	Summary of information asked for	Date trial author replied	Trial author provided data (short summary)
NCT02436330	16 September 2016	To ask if results were published	16/09/16	Response from author: "We are awaiting a final response after two cycles of edits and reviews with a journal"
Ho 2016	Not contacted: study identified from latest update search (July 2016) and no further information was required	N/A	N/A	N/A
Warschburger 2016	22 April 2016	Allocation concealment, ethnic groups, adverse events, additional papers	22 April 2016	Answered all questions – no additional papers
Epstein 2015	14 January 2016 Reminder 03 February 2016	Adverse events, blinding, allocation concealment, randomisation method, setting, additional papers	03 February 2016	Answered general questions about all of their studies included in this review but not necessarily specific questions related to this study
Larsen 2015	19 February 2015	Adverse events, blinding, additional papers	No reply	N/A
Serra-Paya 2015	21 April 2016	Allocation, blinding, adverse events, ethnic group, dropout reasons, additional papers	28 April 2016	Answered all questions – no additional papers available yet
Taveras 2015	21 April 2016	Allocation, adverse events, additional papers	25 April 2016	Answered all questions – no additional papers currently available
Taylor 2015	14 January 2016	Adverse events, number of study centres, baseline differences and additional papers	17 January 2015	Answered all questions and no more additional papers published
Berry 2014	12 January 2016	Blinding, adverse events, number of participants measured at each time point, additional papers	14 January 2016	Answered questions but still unsure about number followed up at each time point (assume it must be 304 and 290). Additional papers provided are the ones already obtained
Boutelle 2014	12 January 2016 Reminder- 03 February 2016	Allocation concealment, blinding, adverse events, setting, ITT, additional papers	03/02/2016	Answered all questions and no additional papers published
Hamilton-Shield 2014	Did not contact as study was terminated and no	N/A	N/A	N/A

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	more information was required			
Looney 2014	13 January 2016	Allocation concealment, blinding, adverse events, additional papers	13 Janauary 2016	Answered all questions and confirmed no other papers had been published
Maddison 2014	12 January 2016 Reminder 03 February 2016	Study centres, adverse events, additional papers	17 February 2016	Answered all questions above – provided extra adverse events information. No other published papers but they do have a process paper currently under review (accepted but not published)
Markert 2014	13 January 2016 Reminder email 03 February 2016	Study centres, blinding, adverse events, ethnic groups, additional papers	No reply	N/A
Arauz Boudreau 2013	11 December 2015 Reminder email 03 February 2016	Randomisation, allocation concealment, adverse event, ITT, additional papers	No reply	N/A
Davis 2013	13 January 2016	Study centres, allocation concealment, blinding, setting, adverse events, additional papers	19 January 2016	Answered all questions and said there were no additional papers
Davoli 2013	13 January 2016	Baseline differences, ethnic groups, adverse events, additional papers	18 January 2016	Gave all answers and provided an additional paper with 24-month follow-up results
Lochrie 2013	13 January 2016 Asked for SEM/SDs – 26 January 2016	Definition of obesity, funding, blinding, allocation concealment, ethnic groups, additional papers	20 January 2016 No response to the second email	Answered questions to first email – no additional papers
Mirza 2013	12 January 2016 Reminder 03 February 2016	Allocation concealment, additional papers	No reply	N/A
O'Connor 2013	12 January 2016	Study centres, allocation concealment, blinding, adverse events, ITT, baseline data, more papers	16 January 2016	Answered all questions and gave an additional paper
Saelens 2013	13 January 2016	Study centres, allocation concealment, setting, adverse events, additional papers	13 January 2016	Answered questions but still unclear if there were adverse events. No additional papers published
Siwik 2013	13 January 2016 Reminder 03 February 2016	Allocation, blinding, number randomised, setting, adverse events, ITT and additional papers	No reply	N/A

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Vann 2013	14 January 2016 Asked for SDs – 26 January 2016	Adverse events, allocation concealment, randomisation method, blinding, definition of obesity, ITT and additional papers	20 January 2016	Answered questions– no additional papers. Unable to provide SD values
Wake 2013	13 January 2016 Reminder 03 February 2016	Ethnic groups, adverse events, additional papers	01 March 2016	Provided answers and an additional paper provided
Croker 2012	13 January 2016	Allocation concealment, additional papers	13 January 2016	Allocation was concealed and no additional papers available
de Niet 2012	12 January 2016 Reminder 03 February 2016	Allocation concealment, blinding, adverse events, ITT, imputation method, BMI SDS data error, additional papers	18 February 2016	Answered all questions
Eddy Ives 2012	20 April 2016	Adverse events, additional papers, allocation concealment, blinding, details of intervention	20 April 2016	Answered all questions and confirmed no additional publications were available
Kirk 2012	12 January 2016 Reminder 03 February 2016	Baseline differences, setting, adverse events, missing data method, raw BMI data, additional papers	No reply	N/A
Lison 2012	12 January 2016	Ethnic groups, adverse events, SDs, additional papers	12 January 2016	Author answered questions and confirmed no additional papers were published
Waling 2012	13 January 2016	Allocation concealment, ethnic groups, adverse events, additional papers	22 January 2016	Answered questions - also provided links to 2 papers
Wright 2012	Email provided in the publication did not work. Emailed co-authors, only one address worked (13 January 2016) Reminder 03 February 2016	Study centres, randomisation method, allocation concealment, blinding, adverse events, additional papers	No reply	N/A
Barkin 2011	11 December 2015 Reminder - 03 February 2016	Randomisation, allocation concealment, blinding, ethnic group, adverse events, BMI data, additional papers	No reply	N/A
Bryant 2011	Yes (12 January 2016)	Allocation concealment, adverse events, ITT, additional papers	Yes (12 January 2016)	Answered all the questions above and provided an additional paper
Coppins 2011	16 December 2015 Reminder 03 February 2016	Randomisation, allocation concealment, ethnic groups, adverse events, data in table 3, additional papers	15 March 2016	Answered all questions – no additional papers

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Gunnarsdottir 2011a	No – email address in publication did not work	N/A	N/A	N/A
Maddison 2011	12 January 2016 Reminder 03 February 2016	Sample size at follow-up, sample size for mean change in BMI, additional papers	17 February 2016	Provided sample size data No additional papers
Wafa 2011	13 January 2016	Blinding, adverse events, ethnic groups, additional papers	2 January 2016	Answered questions and gave additional papers
Bathrellou 2010	14 December 2015 Reminder - 03 February 2016	Randomisation, allocation concealment, blinding, BMI data, adverse events, ethnic groups, setting, ITT, additional papers	No reply	N/A
Diaz 2010	12 January 2016	Funding source, allocation concealment, blinding, ethnic groups, adverse events, additional papers	21 January 2016	Answered all questions and gave additional paper
Duggins 2010	12 January 2016 Reminder 03 February 16	Ethnic groups, adverse events, ITT, number of participants who completed the study, SDs for raw BMI change, additional papers	21 March 2016	Was unable to provide BMI data, unclear if adverse events occurred. No ITT analysis, did not record ethnic groups, no additional papers
Faude 2010	No – email address provided in the publication did not work	N/A	N/A	N/A
Reinehr 2010	12 January 2016	Allocation concealed, setting, ethnic groups, how were adverse events measured, additional papers	12 January 2016	Answered questions and said they were performing 5-7 year follow-up so paper likely at the end of 2016
Sacher 2010	12 January 2016	Allocation, blinding, adverse events, ITT, additional papers	12 January 2016	Answered all questions above and gave references to additional papers
Kalarchian 2009	12 January 2016	Allocation concealment, blinding, adverse events, additional papers	13 January 2016	Answered all questions above and said there we no additional papers
Nowicka 2009	12 January 2015	Funding, randomisation, allocation, blinding, ethnic groups, baseline data, adverse events, ITT, additional papers	28 January 2015	Answered questions but did not provide any additional baseline data. No additional published papers
Wake 2009	13 January 2016 Reminder 03 February 2016	Missing data, ITT, additional papers, ethnic groups, type of control	01 March 2016	Answered questions – no relevant additional papers identified
Alves 2008	11 December 2015	Allocation concealment, blinding, dropout rates, imputation method, ad-	11 December 2015	Answered all questions and no additional papers published relating to this study

(Continued)

		verse events, funding source, additional papers		
Hughes 2008	12/01/2016	Ethnic groups, adverse events, median (IQR) reasons, additional papers	12/01/2016	Answered the questions and give links to additional publications
Weigel 2008	Email address provided in the publication did not work	N/A	N/A	N/A
Weintraub 2008	13 January 2016 Remainder 03 February 2016	Blinding, % girls in each group, number of participants who suffered at least 1 adverse event, additional papers	No reply	N/A
Berry 2007	12 January 2016	Blinding, adverse events, ITT, number randomised and followed up, additional papers	14 January 2016	Answered questions above but still unclear about number of dropouts. Did not provide any additional papers but said the study was the basis of the family partners for health R01 study
Gillis 2007	12 January 2016	Funding, randomisation, allocation concealment, blinding, ethnic groups, % girls, adverse events, ITT, additional papers	12 January 2016	Author answered questions– no additional papers reported
Kalavainen 2007	12 January 2016	Adverse events, missing data method, additional papers	12 January 2016	Answered all questions above and said there we no additional papers
McCallum 2007	12 January 2016 Reminder 03 February 2016	Ethnic groups, adverse events, additional papers	No reply	N/A
Rodearmel 2007	12 January 2016 Reminder 03 February 2016	Randomisation, allocation, blinding, setting, adverse events, ITT, additional papers	08February 2016	Answered all questions but wasn't sure if any adverse events
Satoh 2007	No – email address provided did not work	N/A	N/A	N/A
Wilfley 2007	13 January 2016 Reminder 03 February2016	Allocation concealment, blinding, how adverse events were measured, additional papers	No reply	N/A
Epstein 2005	14 January 2016 Reminder 03 February 2016	Randomisation method, allocation concealment, blinding, number randomised to each group, ethnic groups, additional papers, adverse events	03 February 2016	Answered general questions about all of their studies included in this review but not necessarily specific questions related to this study

(Continued)

Nemet 2005	12 January 2016 Reminder 03 February 2016	Allocation concealed, blinding, ethnic groups, ITT, follow-up time point, more papers	No reply	N/A
Woo 2004	13 January 2016	Randomisation, allocation, blinding, baseline differences, number of dropouts, setting, ethnic groups, ITT, adverse events, additional papers	14 January 2016	Answered all questions but still unclear about dropout at end of study. Additional paper given
Epstein 2001	14 January 2016 Reminder 03 February 2016	Study centres, randomisation, allocation concealment, baseline differences, blinding, number of participants randomised and completing the study, setting, adverse events, ITT, raw data BMI, additional papers	03 February 2016	Answered general questions about all of their studies included in this review but not necessarily specific questions related to this study
Nova 2001	No – email address provided in the publication did not work	N/A	N/A	N/A
Epstein 2000a	14 January 2016 Reminder 03 February 2016	Allocation concealment, randomisation method, blinding, adverse events, number randomised in each group, ITT and additional papers	03 Februray 2016	
Schwingshandl 1999	No – email address provided did not work	N/A	N/A	N/A
Duffy 1993	No – unable to find an email address	N/A	N/A	N/A
Flodmark 1993	12 January 2016 Reminder 03 February 2016	Study centres, allocation concealed, blinding, setting, ethnic groups, adverse events, contact during follow-up period, additional papers	No reply	N/A
Epstein 1985c	14 January 2016 Reminder 03 February 2016	Randomisation method, allocation concealment, blinding, number of participants randomised in each group and number which completed, setting, ethnic group, mean age at baseline, adverse events, ITT, additional papers	3 February 2016	Answered general questions about all of their studies included in this review but not necessarily specific questions related to this study
Epstein 1985b	14 January 2016 Reminder 03 February 2016	Allocation concealed, blinding, ethnic groups, setting, number randomised in each group and number completed, mean age at baseline, adverse events, additional papers	03 February 2016	Answered general questions about all of their studies included in this review but not necessarily specific questions related to this study
Epstein 1985a	14 January 2016 Reminder 03 February 2016	Study centres, blinding, randomisation method, allocation concealment, baseline differences, number randomised, mean age, setting, adverse	03 February 2016	Answered general questions about all of their studies included in this review but not necessarily specif-

(Continued)

		events , ethnic groups, additional papers		ic questions related to this study
Epstein 1984a	14 January 2016 Reminder 03 February 2016	Study centres, blinding, randomisation method, allocation concealment, baseline differences, % girls, setting, adverse events, ITT, ethnic groups, additional papers	03 February 2016	Answered general questions about all of their studies included in this review but not necessarily specific questions related to this study

BMI: body mass index; IQR: interquartile range; ITT: intention to treat; N/A: not applicable; SD: standard deviation; SDS: standardised

Appendix 12. Checklist to aid consistency and reproducibility of GRADE assessments

		(1) Changes in body mass index (BMI)/BMI z score)	(2) Body weight	(3) Adverse events (serious adverse events)	(4) Health-related quality of life (caregiver/child)	(5) All-cause mortality	(6) Morbidity	(7) Socioeconomic effects
Trial limitations (risk of bias)[a]	Was random sequence generation used (i.e. no potential for selection bias)?	Yes/Yes	Yes	Yes	Yes/Yes	N/A	N/A	N/A
	Was allocation concealment used (i.e. no potential for selection bias)?	Yes/Yes	Yes	Yes	Yes/Yes			
	Was there blinding of participants and personnel (i.e. no potential for performance bias) or outcome not likely to be influenced by lack of blinding?	No (↓)/No (↓)	No (↓)	No (↓)	No (↓)/No (↓)			
	Was there blinding of outcome assessment (i.e. no potential for detection bias) or was outcome measurement not likely to be influenced by lack of blinding?	No (↓)/No (↓)	No (↓)	No (↓)	Yes/Yes			
	Was an objective outcome used?	Yes/Yes	Yes	No (↓)	No (↓)/No (↓)			
	Were more than 80% of participants enrolled in trials included in the analysis (i.e. no potential reporting bias)?[b]	Yes/Yes	Yes	Unclear	Yes/Yes			
	Were data reported consistently for the outcome of interest (i.e. no potential selective reporting)?	Unclear/Unclear	Unclear	Unclear	Unclear/Unclear			
	No other biases reported (i.e. no potential of other bias)?	No (↓)/No (↓)	No (↓)	No (↓)	Unclear/Unclear			
	Did the trials end up as scheduled (i.e. not stopped early)?	Yes/Yes	Yes	Yes	Yes/Yes			
Inconsistency[c]	Point estimates did not vary widely?	Yes/Yes	Yes	Yes	No (↓)/No (↓)			

(Continued)

	To what extent did confidence intervals overlap (substantial: all confidence intervals overlap at least one of the included studies point estimate; some: confidence intervals overlap but not all overlap at least one point estimate; no: at least one outlier: where the confidence interval of some of the studies do not overlap with those of most included studies)?	Some/Substantial	Substantial	Substantial	Substantial/Some
	Was the direction of effect consistent?	No (↓)/No (↓)	No (↓)	Yes	No (↓)/No (↓)
	What was the magnitude of statistical heterogeneity (as measured by I^2) - low (I^2 < 40%), moderate (I^2 40%-60%), high I^2 > 60%)?	High(↓)/ Moderate	Low	Low	Low/High (↓)
	Was the test for heterogeneity statistically significant (P < 0.1)?	Statistically significant (↓)/Statistically significant (↓)	Not statistically significant	Not statistically significant	Not statistically significant/Statistically significant (↓)
Indirectness	Were the populations in included studies applicable to the decision context?	Applicable/Applicable	Applicable	Applicable	Applicable/Applicable
	Were the interventions in the included studies applicable to the decision context?	Applicable/Applicable	Applicable	Applicable	Applicable/Applicable
	Was the included outcome not a surrogate outcome?	Yes/Yes	Yes	Yes	Yes/Yes
	Was the outcome timeframe sufficient?	Sufficient/Sufficient	Sufficient	Sufficient	Sufficient/Sufficient
	Were the conclusions based on direct comparisons?	Yes/Yes	Yes	Yes	Yes/Yes
Imprecision[d]	Was the confidence interval for the pooled estimate not consistent with benefit and harm?	Yes/Yes	Yes	Yes	Yes/Yes

(Continued)

	What is the magnitude of the median sample size (high: 300 participants, intermediate: 100-300 participants, low: < 100 participants)?[b]	Low (↓)/Low (↓)	Low (↓)	Low (↓)	Low (↓)/Low (↓)
	What was the magnitude of the number of included studies (large: > 10 studies, moderate: 5-10 studies, small: < 5 studies)?[e]	Large/Large	Large	Large	Moderate/Small (↓)
	Was the outcome a common event (e.g. occurs more than 1/100)?	Not applicable/Not applicable	Not applicable	No (↓)	Not applicable/Not applicable
Publication bias[e]	Was a comprehensive search conducted?	Yes/Yes	Yes	Yes	Yes/Yes
	Was grey literature searched?	No (↓)/No (↓)	No (↓)	No (↓)	No (↓)/No (↓)
	Were no restrictions applied to study selection on the basis of language?	Yes/Yes	Yes	Yes	Yes/Yes
	There was no industry influence on studies included in the review?	No (↓)/No (↓)	No (↓)	No (↓)	Yes/Yes
	There was no evidence of funnel plot asymmetry?	No (↓)/Unclear	Unclear	Unclear	Unclear/Unclear
	There was no discrepancy in findings between published and unpublished trials?	Unclear/Unclear	Unclear	Unclear	Unclear/Unclear

[a]Questions on risk of bias are answered in relation to the majority of the aggregated evidence in the meta-analysis rather than to individual trials.
[b]Depends on the context of the systematic review area.
[c]Questions on inconsistency are primarily based on visual assessment of forest plots and the statistical quantification of heterogeneity based on I^2 (Higgins 2002).

[d]When judging the width of the confidence interval it is recommended to use a clinical decision threshold to assess whether the imprecision is clinically meaningful.
[e]Questions address comprehensiveness of the search strategy, industry influence, funnel plot asymmetry and discrepancies between published and unpublished trials.

(↓): key item for potential downgrading the quality of the evidence (GRADE) as shown in the footnotes of the 'Summary of finding' table(s)

BMI: body mass index; BMI z score ("A BMI z score or standard deviation score indicates how many units (of the standard deviation) a child's BMI is above or below the average BMI value for their age group and sex. For instance, a z score of 1.5 indicates that a child is 1.5 standard deviations above the average value, and a z score of -1.5 indicates a child is 1.5 standard deviations below the average value" (NOO NHS 2011))

Appendix 13. Health-related quality of life: instruments

Instrument	Dimensions (subscales) (no. of items)	Validated instrument	Answer options	Scores	Minimum score Maximum score	Weighting of scores	Direction of scales	Minimal clinically important difference (MCID)
Warschburger 2016 **KID-KINDL-R** (Ravens-Sieberer 2000)	On the basis of 4 subscales (psychological well-being, self-esteem, family and peer relationship), a sum score was composed	Yes	5-point Likert Scale	Scores given for general and weight-related	-	-	Larger scores indicating better QoL	-
Taylor 2015 **PedsQL 4.0** (Varni 2003)	Physical functioning, emotional functioning, social, school functioning, psychosocial score	Yes	Scales range from 0-100	5-point rating scale	-	-	Higher scores indicating better HRQoL	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
Hamilton-Shield 2014 **PedsQL** (Varni 2003)		Yes	Scales range from 0-100	5-point rating scale	-	-	Higher scores indicating better HRQoL	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
CHU9D (Stevens 2010)	9 items Worry, sadness, pain, tiredness, annoyance, school, sleep, daily routine and activities	Yes	5 response categories	Scored 1–5	-	-	Higher scores indicating better HRQoL	-
EQ-5D-Y (Wille 2010)	5 items Mobility, looking after myself, doing usual activities, having pain or discomfort, feeling worried, sad or unhappy	Unclear	Responses: no problems/slight problems/moderate problems/severe problems/extreme problems	-	-	-	-	-

(Continued)

Markert 2014 **KINDL-R** **(**Ravens-Sieberer 2000**)**	Total score	Yes	5-point Likert Scale	Scores given for all subscales All scores transformed to values between 0-11	-	-	Larger scores indicating better QoL	-
Arauz Boudreau 2013 **PedsQL** **(**Varni 2003**)**	1) PedsQL child self-report Physical, emotional, social, and school-related aspects 2) Caregiver proxy report PedsQL generic core scales Physical, emotional, social, and school-related aspects	1) Yes 2) Yes (among Spanish and English speaking Hispanic groups)	1) Scale 0-100 2) Scale 0-100	5-point rating scale	-	No	Higher values means better assessment	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
Lochrie 2013 **PedsQL** **(**Varni 2003**)**	Total score – parent and youth	Yes	Scales range from 0-100	5-point rating scale	-	-	Higher scores indicating better HRQoL	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
Wake 2013 **PedsQL 4.0** **(**Varni 2003**)**	Total scores: child and parent reports	Yes	Scales range from 0-100	5-point rating scale	-	-	Higher scores indicating better HRQoL	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
Croker 2012 **PedsQL** **(**Varni 2003**)**	PedsQL total score (parent-reported) PedsQL total score (child-reported)	Yes	Scale 0-100	Scores given for total score only	-	No	Higher values means better assessment	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
de Niet 2012 **Dutch validated CHQ-PF50** **(**Raat 2002**)**	CHQ physical CHQ psychosocial	Yes	Scale 0-100	Scores given for CHQ physical	-	No	Higher values reflect best possible health state	-

(Continued)

				CHQ psychosocial				
Bryant 2011 **PedsQL** **(**Varni 2003**)**	Social functioning	Yes	Scales range from 0-100	5-point rating scale	-	No	Higher scores indicating better HRQoL	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
Wafa 2011 **PedsQL 4.0** **(**Varni 2003**)**	Total scores – parent and child reports	Yes	Scales range from 0-100	5-point rating scale	-	-	Higher scores indicating better HRQoL	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
Faude 2010 **KINDL-R questionnaire** **(**Ravens-Sieberer 2000**)**	Total Physical well-being Emotional well-being Self-esteem Family Friends School	Yes	5-point Likert Scale	Scores given for all subscales	All scores transformed to values between 0-11	No	Larger scores indicating better QoL	-
Reinehr 2010 **KINDL-R** **(**Ravens-Sieberer 2000**)**	Total, physical, emotional, self-esteem, friends, family, school	Yes	5-point Likert Scale	Scores given for all subscales All scores transformed to values between 0-11	-	-	Larger scores indicating better QoL	-
Kalarchian 2009 **CHQ-PF50** **(**Landgraf 1999**)**	Parent Version Physical and psychosocial concepts	Yes	-	-	-	-	-	-

(Continued)

Wake 2009 **PedsQL 4.0** **(**Varni 2003**)**	Physical, psychosocial: parent and child reports	Yes	Scales range from 0-100	5-point rating scale	-	-	Higher scores indicating better HRQoL	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
Hughes 2008 **PedsQL 4.0** **(**Varni 2003**)**	Physical health, psychosocial health	Yes	Scales range from 0-100	5-point rating scale	-	-	Higher scores indicating better HRQoL	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)
McCallum 2007 **PedsQL** **(**Varni 2003**)**	Parent Proxy and Child Self-report	Yes	Scales range from 0-100	5-point rating scale	-	-	Higher scores indicating better HRQoL	Child self-report (MCID = 4.36) and parent proxy report (MCID = 4.50)

CHQ: Child Health Questionnaire; CHU9D: Child Health Utility 9-Dimensions; EQ-5D-Y: European Quality of Life 5-Dimensions – youth; HRQol: health-related quality of life; MCID: minimal clinically important difference; PedsQL: Pediatric Quality of Life Inventory; S: specific; SF: short-form health survey

WHAT'S NEW

Date	Event	Description
2 March 2017	New search has been performed	This is an update of the former Cochrane Review 'Interventions for treating obesity in children and adolescents.'
2 March 2017	New citation required and conclusions have changed	Given the rapid growth in the treatment of child and adolescent obesity, we have split the original review ('Interventions for treating obesity in children and adolescents') into six separate reviews, with a specific intervention and age focus • Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in adolescents aged 12 to 17 years • Diet, physical activity, and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years • Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in preschool children up to the age of 6 years • Drug interventions for the treatment of obesity in children and adolescents • Parent-only interventions for childhood overweight or obesity • Surgery for the treatment of obesity in children and adolescents

HISTORY

Review first published: Issue 6, 2017

Date	Event	Description
11 October 2008	New citation required and conclusions have changed	This review concludes that combined behavioural lifestyle interventions compared to standard care or self-help can produce a significant and clinically meaningful reduction in overweight in children and adolescents. The search was updated to May 2008. Some amendments were made to update the search strategies. No changes have been made to other aspects of the methodology. Forty-six new studies have been included. These included information on drug interventions for treating obesity in adolescents. The added evidence suggests that lifestyle interventions appear to have positive effects in the treatment of child and adolescent obesity. Furthermore, orlistat and sibutramine were found to have beneficial effects on adiposity in obese adolescents. However, a range of adverse effects was noted.
3 July 2008	Amended	Converted to new review format. Authorship changed with new authors and new contact person.

CONTRIBUTIONS OF AUTHORS

All review authors read and approved the final review draft.

Emma Mead (EM): acquiring trial reports, trial selection, data extraction, data analysis, data interpretation, review draft and future review updates.

Tamara Brown (TB): acquiring trial reports, trial selection, data extraction, data analysis, data interpretation, review draft and future review updates.

Karen Rees (KR): acquiring trial reports, trial selection, data extraction, data analysis, data interpretation, review draft and future review updates.

Liane Azevedo (LA): acquiring trial reports, trial selection, data extraction, data analysis, data interpretation, review draft and future review updates.

Victoria Whittaker (VW): data analysis, data interpretation, review draft.

Dan Jones (DJ): acquiring trial reports, data extraction, data interpretation, review draft.

Joan Olajide (JO): acquiring trial reports, data extraction, data interpretation, review draft.

Giulia M Mainardi (GM): data extraction, data interpretation, review draft.

Eva Corpeleijn (EC): trial selection, data extraction, data interpretation, review draft and future review updates.

Claire O'Malley (CM): acquiring trial reports, trial selection, data extraction, data interpretation, review draft.

Elizabeth Beardsmore (EB): data extraction, data interpretation, review draft.

Lena Al-Khudairy (LA-K): acquiring trial reports, trial selection, data extraction, data interpretation, review draft and future review updates.

Louise Baur (LB): protocol draft, data interpretation, review draft and future review updates.

Maria-Inti Metzendorf (MIM): search strategy development.

Alessandro Demaio (AD): data interpretation, review draft.

Louisa J Ells (LE): protocol draft, acquiring trial reports, trial selection, data extraction, data analysis, data interpretation, review draft and update draft.

DECLARATIONS OF INTEREST

EM: none known.

TB: none known.

KR: none known.

LA: none known.

VW: none known.

DJ: none known.

JO: none known.

GM: none known.

EC: none known.

CM: none known.

EB: none known.

LA-K: none known.

LB: is a co-author on two of the included studies (McCallum 2007; Wake 2009).

MIM: none known.

Disclaimer: Alessandro Demaio is currently a staff member of the World Health Organization. The author alone is responsible for the views expressed in this publication and they do not necessarily represent the decisions, policy or views of the World Health Organization.

LE: is seconded to Public Health England part-time as a specialist obesity advisor. The author received funding from WHO to complete this review. Louisa Ells also has a part time secondment to Public Health England, but undertook this review within her role at Teesside University.

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Internal sources

- University Medical Center, Groningen, Netherlands.
- The Children's Hospital at Westmead, Sydney, Australia.
- Centre for Food Physical Activity and Obesity Research, University of Teesside, UK.
- The Wolfson Research Institute, University of Durham, UK.
- Evidence and Programme Guidance Unit, Department of Nutrition for Health and Development, World Health Organization, Switzerland.

  Alessandro Demaio is a full time staff of the World Health Organization.

External sources

- Evidence and Programme Guidance Unit, Department of Nutrition for Health and Development, World Health Organization, Switzerland.

  Dr Louisa Ells worked as a consultant for WHO during the preparation of this work.
- The Bill & Melinda Gates Foundation, USA.

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  Donors do not fund specific guidelines and do not participate in any decision related to the guideline development process including the composition of policy questions, membership of the guideline groups, the conduct and interpretation of systematic reviews, or the formulation of recommendations.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

Given the rapid growth in the treatment of child and adolescent obesity, we have split the original review ('Interventions for treating obesity in children and adolescents') into six separate reviews, with a specific intervention and age focus:

- Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in adolescents aged 12 to 17 years.
- Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in children from the age of 6 to 11 years.
- Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in preschool children up to the age of 6 years.
- Drug interventions for the treatment of obesity in children and adolescents.
- Parent-only interventions for childhood overweight or obesity.
- Surgery for the treatment of obesity in children and adolescents.

NOTES

Portions of the background and methods sections, the appendices, additional tables and figures 1 to 3 of this review are based on a standard template established by Cochrane Metabolic and Endocrine Disorders.

INDEX TERMS

Medical Subject Headings (MeSH)

*Behavior Therapy; *Body Mass Index; *Exercise; Combined Modality Therapy; Overweight [diet therapy] [*therapy]; Pediatric Obesity [diet therapy] [*therapy]; Quality of Life; Randomized Controlled Trials as Topic

MeSH check words

Child; Humans