NICE Guidance title: Managing overweight and obesity among children and young people: lifestyle weight management services

Review 1: Effectiveness and cost effectiveness of lifestyle weight management services for children and young people

APPENDICES

Produced by Support Unit for Research Evidence (SURE), Cardiff University
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Review Team
Fiona Morgan, SURE, Cardiff University
Alison Weightman, SURE, Cardiff University
Sarah Whitehead, DECIPHer, Cardiff University
Helen Morgan, SURE, Cardiff University
Ruth Turley, SURE, Cardiff University
Sinead Brophy, DECIPHer, Swansea University
James White, DECIPHer, Cardiff University
Ruth Kipping, DECIPHer, Bristol University
William Hollingworth, Bristol University

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APPENDIX A – INCLUDED INTERVENTION STUDIES - EVIDENCE TABLES

Abbreviations used throughout: F = female; I = Intervention; C = Control; WLC = Wait List Control; UC = Usual Care

Banks (COCO)					
First author and year: Banks 2012 COCO (Care of Childhood Obesity Clinic) programme **Aim of study:** to examine the feasibility of undertaking a fully powered RCT and to gauge whether the COCO model could be effective as a nurse-led clinic in primary care settings **Study Design :** RCT **Quality score:** + **External validity score:** +	**Setting:** Bristol Royal Hospital for Children outpatient obesity clinic (BRHC), two primary care clinics (PCC), Bristol UK **Participants:** 86 obese children **Inclusion:** Aged 5–16 years with body mass index (BMI) ≥98th centile **Exclusion:** (reasons listed) Genetic; endocrine; parental Type 2 diabetes; obesity comorbidity; overt eating disorder; iatrogenic **Motivation/referral/ payment:** GP referral with recruitment April 2008 to May 2009.	**Method of allocation:** 'Minimisation method' to balance groups for sex and age (primary or secondary school age at entry). Initial allocation ratio of 1:1, but changed to 2:1 after 5/12 months to assign greater numbers to community settings. Randomisation by independent statistician. **Intervention(s):** PCC: initial visit and offer of four further appointments at 3-monthly intervals for family. Practice nurse discussed progress, followed by sessions with dietician and exercise consultant. BRHC: initial consultation with consultant and offer of 4 further appointments at 3-monthly intervals; also seeing dietician and/or exercise specialist as directed by consultant. Programme used age-specific approaches to behavioural determinants. Dietetic consultations used similar approach and tools including 'Eatwell plate'. **Control:** No 'non-intervention' control. **Sample sizes:** Assessed for eligibility = 152 Randomised: PCC= 45; BRHC=31	**Anthropometry measures:** Change in BMI SDS at 12months (1990 data - Child Growth Foundation) **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Quality of life using Pediatric Quality of Life Scale (PedsQL) **Service satisfaction measures:** Satisfaction with care using adapted instrument and General Practice Assessment Questionnaire. **Cost effectiveness measures:** Not measured **Other measures:** None **Follow-up periods:** 12 months from baseline (end of intervention) **Method of analysis:** Mean (SD) of changes with difference between the mean changes and two-sided 95% CI for difference. Linear models to explore influence on group mean difference. Covariate adjustment for baseline to explore 12-month comparisons of BMI SDS. χ^2 test to compare between-group withdrawal	**Anthropometry results:** 40/52 (77%) children in both arm improved BMI SDS scores. 15/25 (29%) showing reductions > 0.25 BMI SDS. Mean BMI SDS reduction: BRHC = 0.15; PCC= 0.17. Difference in mean 0.02 (two-sided 95% CI = –0.12 to 0.17) **Wellbeing results:** PedsQL scores rose in both arms over 12 months: 10 points in PCC (95% CI = 3 to 18 points, n = 23) and 8 points in BRHC (95% CI = –2 to 18 points, n = 14) **Service satisfaction results:** PCC scored slightly higher for each aspect of satisfaction, although all mean scores were between 1 and 3, equivalent to ratings from 'excellent' to 'good'. **Attrition:** 34/86 (39%) patients from randomisation; 52/68 (24% from baseline data collection) PCC = 29; BRHC = 23	**Limitations (author):** Recruited less than expected. Study not statistically powered and results should be treated with caution. **Limitations (review team):** Small feasibility study with high attrition. No ITT analysis **Evidence gaps:** Full RCT. **Funding sources:** **Applicable to UK?** Yes – UK programme

		Baseline data: PCC= 42; BRHC=26 **Baseline comparisons:** PCC children higher BMI SDS. **Study power:** Feasibility study, so not powered to achieve statistical significance for primary outcome. Anticipated 100 participants could be recruited over 1-year. **Intervention delivery:** PCC: PCT practice nurses (trained by COCO team) plus COCO dietician and exercise specialist. BRHC: Multidisciplinary team: doctor, specialist obesity nurse, dietician, exercise specialist **Target group:** Children and families	rates and two-sample t-test for change in mean PedsQL.		
First author and year: Sabin 2007 COCO (Care of Childhood Obesity Clinic) programme **Aim of study:** To identify factors important in determining whether an obese child achieves significant reductions in Body Mass Index Standard Deviation Score (BMI SDS) **Study Design :** UBA **Quality score:** –	**Setting:** Hospital-based paediatric obesity service; Bristol UK **Participants:** 126 obese children; F = 74; median age 11.7 (2.2-17.8) yrs; 8% non-Caucasian; median Townsend score and Deprivation Index Quintile – 0.47 (-3.61 to + 9.26) & 3 (1-5) respectively. **Inclusion:** All children seen in the clinic. BMI SDS >+2.36 **Exclusion:** None **Motivation/referral/ payment:** Referral between December	**Method of allocation:** Not applicable **Intervention(s):** **Behavioural, diet & physical activity** Each family saw a paediatrician for approx 30 minutes on first consultation and 15 minutes subsequently. Each child offered 3 monthly appointments. Emphasis placed on entire family's lifestyle with changes in family behaviour to facilitate weight control. Also, family appointments with paediatric dietician who encouraged goal setting and practical dietary changes. Advice provided on different forms of physical activity and families invited to	**Anthropometry measures:** BMI is calculated as kg m^{-2} and adjusted for age to give a BMI SDS using British 1990 Growth Reference Data from the Child Growth Foundation **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Townsend Material deprivation	**Anthropometry results:** Of 112 children attending ≥2 appointments, mean reduction in BMI SDS up to most recent recorded 0.24 (range −0.48 to 1.43); BMI SDS fell in 88/126 (70%) with 23/126 (18%) achieved target reduction of 0.5 BMI SDS. In 58/126 attending for ≥1 year, mean reduction in BMI SDS 0.30, range −0.48 to 1.19); 83% (48/58) showed a fall and 28% (16/58) achieved target reduction. Age was most important predictor in younger children achieving larger reductions in BMI SDS. More boys than girls likely to achieve target reductions in BMI SDS, (differences did not reach significance). Significantly more boys among	**Limitations (author):** Not RCT **Limitations (review team):** High attrition rate **Evidence gaps:** Assess engagement of obese children in exercise and what type of exercise is of most benefit. **Funding sources:** No details **Applicable to UK?** Yes

External validity score: +	2001 and May 2005	attend free 2-hour, weekly games session. **Control:** Not applicable **Sample sizes:** 137 offered clinic appointments 11 pre-intervention baseline only 126 took part in programme. 112 attended ≥2 appointments 10 discharged (BMI reduced to normal range in 8/10) 58 seen for ≥1 year (mean 1.7; range 1 to 3.3 years) **Baseline comparisons:** Not applicable **Study power:** Not applicable **Intervention delivery:** Paediatrician, paediatric dietician and a health and exercise specialist **Target group:** Children and families	Scores. **Follow-up periods:** ≥ 1 year (not specified) **Method of analysis:** One-way ANOVAs; continuity-corrected chi-squared tests. Pearson's correlation coefficients Non-parametric tests (Kruskal–Wallis).	'achievers' group vs 'non-achievers', Those with no parental history of obesity were more likely to achieve greater reductions in BMI SDS. Socio-economic status did not appear to impact upon the child's level of success. Only 8/79 children (10%) offered free, weekly exercise programme took up the offer. None achieved reduction of − 0.5 BMI SDS over a median (range) of 1.67 years (0.46 - 2.3 years) follow-up, with the mean (SD) change in BMI SDS being −0.04 (0.34). **Attrition:** 36/126 attendees (26%) dropped out 47/137 from baseline (34%)	
Berkowitz					
First author and year: Berkowitz 2011 [Conference abstract only] **Aim of study:** To examine two models of family-based lifestyle modification programmes (LMP) for use in primary care for medically underserved urban and rural youth. **Study Design :**	**Setting:** Primary care - two sites. USA, Philidelphia? **Participants:** 169 adolescents and their parents/carers. BMI = 36.7 kg/m^2 (SD 5.3) Age 14.6 (SD 1.4) years. F = 77%; 47% Caucasian, 47% African American **Inclusion:** Not reported. **Exclusion:**	**Method of allocation:** Randomisation - no detail. **Intervention(s):** Group LMP with 17 group sessions. **Control:** Self guided LMP via in-home meetings with parental support --- Both groups received same materials, recommendations and met with 'health coach' 6 times in clinic	**Anthropometry measures:** BMI **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures** Not measured	**Anthropometry results:** Mean (SE) percentage change in initial BMI did not differ by condition being -1.31 (0.95)% and -1.17 (0.99)% for the group and self-guided interventions respectively. **Attrition:** 32.5%	**Limitations (author):** None stated **Limitations (review team):** Abstract only. **Evidence gaps:** None stated **Funding sources:** Not reported **Applicable to UK?** Likely, but no detail of setting or intervention.

Quasi-RCT **Quality score:** – **External validity score:** Insufficient information - abstract only	Not reported **Motivation/referral/ payment:** No information provided	**Sample sizes:** 169 in total. Group sizes not reported. **Baseline comparisons:** No significant differences in BMI, age, sex or ethnicity. **Study power:** Not reported. **Intervention delivery:** Not reported. **Target group:** Whole family	**Other measures:** Not measured **Follow-up periods:** 12 months (programme length unclear) **Method of analysis:** Descriptive analyses and repeated measures mixed effects models.		
Braet					
First author and year: Braet 1997 **Aim of study:** To investigate the value of introducing a healthy eating lifestyle programme, instead of a strict diet prescription, in combination the principles of cognitive behavioural therapy (CBT). To evaluate the impact of different forms of therapeutic contact. **Study Design :** Quasi-RCT **Quality score:** + **External validity score:** +	**Setting:** Pediatric outpatient clinic, Belgium (one intervention condition was a summer camp) **Participants:** 259 obese Caucasian children. Age 7-16 years (mean=11.6), F = 162, 20%-100% overweight (mean=51%). All socioeconomic classes represented equally. **Inclusion:** ≥ 20% overweight. Free from other medical problems. Not suffering from any syndromic obesity. **Exclusion:** None stated **Motivation/referral/ payment:** Children recruited by school physicians. No mention of	**Method of allocation:** Not stated **Intervention(s):** 1) Group CBT 2) Individual therapy 3) Summer camp training 4) "Advice in one session" In all conditions children received same package of information. Parents given treatment manual for parents of obese children and each child had own workbook. Outpatient program (group or individual) child-only intensive part of seven 90-minute sessions twice montly and seven monthly family follow-up sessions. Programme comprised cognitive strategies, behavioural strategies, and educational components. In 10-day camp children followed program in the morning. They received balanced healthy food (1500 kcal/day) and daily lifestyle	**Anthropometry measures:** Height and weight, from which percentage overweight calculations were made using Dutch normative data (Van Wieringen 1985) **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** - **Follow-up periods:** 1 year from baseline **Method of analysis:** Analysis of variance with overweight as covariate and	**Anthropometry results:** Mean percent weight loss: After treatment (6 months): Group: 8.44 Individual: 8.34 Advice: - Camp: 15.59 Control: - At 1 year follow-up: Group: 13.08 Individual: 9.84 Advice: 6.84 Camp: 14.67 Control: -2.52 ANCOVA showed significant main difference for treatment conditions *[F*(4.203)=11.73, *p*<.001. Post hoc analysis Camp 6 months mean weight loss for participants significantly higher but non-significant at one year Group program: weight reduction significant at 6 months (t=5.51) and one year (t=7.26) p<.001 for all t-	**Limitations (author):** Lack of a longer follow-up **Limitations (review team):** Lack of description of randomisation process, no ITT analysis. No between group analysis comparing individual intervention arms with control group. **Evidence gaps:** None stated **Funding sources:** Not stated **Applicable to UK?** Yes

	motivation or payment.	exercises (5 hours per day). All families of camp participants requested to attend monthly follow-up sessions. **Control:** No treatment. Children in this group non-clinically obese **Sample sizes:** Group program =45 Individual=48 Camp=55 Advice=57 Control=54 **Baseline comparisons:** No significant differences between intervention groups. Control group percentage overweight lower than intervention groups - taken into account in the analysis. **Study power:** Not reported **Intervention delivery:** Trained therapists **Target group:** Families	paired t-tests were used to evaluate changes in body weight.	values. Individual: weight reduction significant at six months (t=5.38) and one year (t=6.44); p<.001 for all t values. Camp condition weight reduction significant at 6 months (t=9.29) and 1 year (t=8.36): p<.001 for all t-values. Advice group lost 6.8% weight at 1 year (t=3.76; p<.001). Only control group had weight change in the opposite direction (+2.5%; t=-1.64; p<.001). **Attrition:** At one year 50 participants (19%): Outpatient = 15; Advice = 13; Summer Camp = 10; Control = 12	
Bryant (WATCH-IT)					
First author and year: Bryant 2011 **Aim of study:** To conduct a feasibility trial of WATCH IT, a community obesity intervention for children and adolescents.	**Setting:** Clinics located in sports or community centres among disadvantaged communities in Leeds, UK **Participants:** 70 obese children aged 8-16 87% Caucasian 50% of families annual income <£15,000 and 14%	**Method of allocation:** Randomisation via remote automated telephone system, stratified by BMI, gender and maternal education level. **Intervention(s):** A 4-month motivation-enhancing, solution-focused programme with optional extension by 4 or 8 months. Weekly individual	**Anthropometry measures:** BMI, waist circumference and bioimpedence with dual energy X-ray absorptiometry (DXA). **Diet measures:** WATCH IT diet questionnaire, Home Food Availability checklist, Dutch Eating Behaviour Questionnaire (measured but not reported in	**Anthropometry results:** Mean change in BMI SDS = 0.03 (95% CI -0.05 to 0.11) in the intervention group (I) and -0.03 (-0.12 to 0.06) in the control group (C). Change in percent body fat was I=1.40 (0.31 to 2.38); C= 0.20 (-1.41 to 1.72) Mean change in waist circumference	**Limitations (author):** Majority of families were White British – recruitment of a more heterogeneous ethnic sample would warrant further consideration in future research. Feasibility trial only conducted at one centre. Interviewing

Study Design : RCT **Quality score:** + **External validity score:** ++	<£5,000. 60% mothers not educated beyond GCSE. **Inclusion:** Aged 8-16. BMI > 98th percentile. Parent or carer with fluent spoken English. **Exclusion:** Medical cause for obesity, severe learning difficulties, significant medical or psychiatric problems, or siblings already enrolled. **Motivation/referral/ payment:** Recruitment via health professionals (31%) and self-referral (69%).	appointments structured on the Healthy Eating Lifestyle Programme and group physical activity sessions. **Control:** 12 month wait- list. **Sample sizes:** 35 in each group. **Baseline comparisons:** Mean BMI standard deviation score (SDS) greater in the control group which had more severely obese participants (BMI SDS ≥ 3.5). **Study power:** No. Pragmatic choice of numbers for feasibility study. [Power calc for full trial est. as 930 participants] **Intervention delivery:** Non-professional health trainers **Target group:** Child and parents	paper) **Physical activity measures:** Fitness (step test), 7-day physical activity by accelerometry. Physical Activity Questionnaire for Children (PAC-Q), Robinson School-Based Sedentary Behaviour Questionnaire (measured but not reported in paper) **Wellbeing measures** Pediatric Quality of Life (PedsQoL), Strengths and Difficulties Questionnaire (SDQ), Harter Scale of Perceived Social and Cognitive Competence (measured but not reported in paper) **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other:** Glucose tolerance, lipid level, liver function assay, blood pressure. Parental height and weight (data not extracted) **Follow-up periods:** 6 and 12 months **Method of analysis:** Means with 95% CI for primary outcomes and standardised response means for questionnaires. Authors' stress trial not powered to assess effectiveness). BMI and waist circumference converted to	SDS was I= -0.08 (-0.24 to 0.07); C= - 0.03 (-0.16 to 0.11). **Attrition:** 20% at 6 months. 24.3% at 12 months.	children with their parents was problematic. Trial not powered to assess effectiveness. **Limitations (review team):** Small, feasibility study **Evidence gaps:** Definitive RCT needed to confirm results **Funding sources:** Wellcome Trust **Applicable to UK?** Yes – UK based

			SDS using UK 1990 growth references.		
First author and year: Rudolf 2006 WATCH-IT **Aim of study:** To evaluate the pilot phase of WATCH IT, a community obesity intervention for children and adolescents. **Study Design :** Process evaluation/ uncontrolled before and after **Quality score:** – **External validity score:** +	**Setting:** Clinics located in sports or community centres among disadvantaged communities in Leeds, UK **Participants:** 94 children (F=49), mean age 12.2 +/- 2.0 years, mean BMI SD 3.09 +/- 0.45. **Inclusion:** Young people aged 8-16 years; BMI above the 98th centile; both parent and child fluent in spoken English. **Exclusion:** Children with significant learning disability **Motivation/referral/ payment:** Recruitment via health professionals or self-referral.	**Method of allocation:** N/A **Intervention(s):** Individual appointments for parents and child (30 minutes, initially weekly) for encouragement, support, and motivational counselling. Weekly 1-hour group activity sessions at a local sports centre. Group parenting sessions as individual appointments reduced). Families committed to attend for 3 months with option to renew 3-monthly for 1 year. Hour long physical activity sessions conducted by trained sports coaches. **Control:** None **Sample sizes:** 94 **Baseline comparisons:** N/A **Study power:** N/A **Intervention delivery:** Part time health trainers with weekly support and supervision from team leader, sports coaches, dietician, psychologist, paediatrician. **Target group:** Child and parents	**Anthropometry measures:** BMI SD (z) score **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Self-image profile (Butler 2001) PedsQL quality of life questionnaire. (Results not reported in paper) **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** None **Follow-up periods:** 3 and 6 months post-baseline **Method of analysis:** Not reported	**Anthropometry results:** 54% of children at 3 months and 71% at 6 months showed decrease in BMI SDS scores. Change in mean BMI SD at 3 months was -0.01 +/- 0.12 (NS). Significant decrease at six months (mean change -0.07 +/- 0.16, p<0.01). Mean change in BMI SD at 6 months was reported as being greater for girls (-0.07 +/- 0.14, p=.02), and participants aged ≤13 years (-0.13 +/- 0.14, p<0.01). **Attrition:** 26/94 (28%) at 3 months 46/94 (49%) at 6 months	**Limitations (author):** None identified **Limitations (review team):** Small uncontrolled study with limited follow-up and high attrition rates **Evidence gaps:** Results need to be confirmed in an RCT **Funding sources:** Department of Health **Applicable to UK?** Yes – UK based

Collins (HIKCUPS)					
First author and year: Collins 2011, 2010 Okely 2010 Burrows 2008, 2010, 2011 Cliff 2011 Jones 2011 **Aim of study:** To evaluate whether a child centred physical activity programme, combined with a parent centred dietary programme, was more efficacious than each treatment alone in preventing unhealthy weight gain in overweight children **Study Design :** RCT **Quality score:** ++ **External validity score:** ++	**Setting:** Universities in Australia. **Participants:** 165 overweight pre-pubertal children aged 5-9. F =97; mean BMI z-score 2.8 **Inclusion:** Overweight or obese children according to International Obesity Task Force cut points; aged 5.5 to 9.9 years; pre-pubertal (Tanner Stage I) and generally healthy. **Exclusion:** Extreme obesity (body mass index z-score >4); known syndromal obesity; chronic illness; following therapeutic diet; taking medications associated with weight gain or long-term steroids. **Motivation/referral/ payment:** Participants recruited from local communities primarily through print media and advertisements placed in school newsletters.	**Method of allocation:** Computer-based random number–producing algorithm stratified by sex and site. **Intervention(s):** Diet: Parent-centred dietary-modification programme to facilitate changes in eating behaviours. Activity: Child-centred physical activity skill development programme (Activity). Parents participated the first session and encouraged to complete weekly homework activities with child. Diet + Activity: combination of the two programmes Each intervention comprised 10 weekly 2-hour face-to-face sessions; homework activities; 3-month relapse prevention program. *Intensity:* 20 hours **Control:** No control group **Sample sizes:** N=165: Diet n=42; Activity n=63; Diet + activity n=60 **Baseline comparisons:** No between group differences **Study power:** For 80% chance of detecting 2-sided 5% significance, 0.26 standard deviation difference from baseline to 12-months (initial end point) in BMI z-score, with anticipated loss to follow-up	**Anthropometry measures:** BMI z-score (reference to UK 1990 reference data) Waist circumference **Diet measures:** The Australian Child and Adolescent Eating Survey **Physical activity measures:** Physical activity was measured for eight consecutive days using accelerometers **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Metabolic profiles; blood pressure (outcomes not reported here) **Follow-up periods:** Baseline, 6 months, 12 months and 24 months **Method of analysis:** Linear mixed models to assess all outcomes for the impact of group, time, and the group-by-time interaction. Adjusted models contained any additional significant effects due to main effects and two-way interactions between base model terms of sex, site, and age. Mixed models were fitted by use of SAS. Kenward-Roger	**Anthropometry results:** All 3 groups reduced BMI z-score and waist circumference z-score at 6 months, and reductions were maintained at 12 months. The mean (95% CI) reduction in BMI z-score at 12 months from baseline was as follows: Diet group -0.39 (-0.51, -0.27), Activity group -0.17 (-0.28, -0.06), and Diet + Activity group -0.32 (-0.42,-0.22). Compared with the Activity group, participants in the Diet group and the Diet + Activity group had a greater reduction in BMI z-score (p=.02). There was a group-by-time difference in BMI *z*-score (adjusted for gender) at 24 months (*P*=.04), with the greatest difference being the reduction for the Diet group compared with the Activity group. The mean (95% CI) reduction in BMI z-score at 24 months from baseline was as follows: Diet group -0.35 (-0.48, -0.22), Activity group -0.19 (-0.30, -0.07), and Diet + Activity group -0.24 (-0.35,-0.13). **Diet results:** All groups achieved significant reductions in dietary intake between baseline and both 6 and 12 months (-37 +/- 5.8 and -61 +/- 6.6 kJ/kg/d respectively, both *P*<.001) No significant differences in reduction in daily energy intake detected between the groups at 6 or 12 months (*P*>.05). Over 24 months, a reduction in	**Limitations (author):** Wide confidence intervals for some of the secondary outcomes. High dropout rates. Results may not be generaliseable to those from other socioeconomic groups. Activity programme may not be generaliseable to those outside the age range in study **Limitations (review team):** Study underpowered with high attrition. No true control group (although authors provide justification for this) **Evidence gaps:** Effectiveness of approach in community settings needs to be examined. Would greater parental involvement in child physical activity programmes enhance treatment outcomes? **Funding sources:** National health and Medical Research Council of Australia. Individual fellowships to researcher from the National Health and Medical Research Council Career Development Award Fellowship and the Heart Foundation of Australia. **Applicable to UK?**

		of 20%, 72 participants in each group required (216 total). **Intervention delivery:** Accredited dieticians. Trained research staff with physical activity and nutrition expertise, PE teachers (physical activity programme). **Target group:** Children and their parents	adjustment for downward bias in the variance-covariance matrix. Differences of means and 95% confidence intervals..	reported daily energy intake in all participants (-85 kJ/kg/d [95% CI: -99 to -72]) (*P*<.001); with group-by-time interaction not significant. **Physical activity results:** No between group differences in objectively measured physical activity at 6, 12 or 24 months. **Attrition:** 31% at 6 months follow-up 36% at 12 months follow-up 44% at 24 months follow-up	Yes
Coppins (Family Project)					
First author and year: Coppins 2011 **Aim of study:** 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. **Study Design :** Quasi-RCT **Quality score:** + **External validity score:** +	**Setting:** Community: schools Jersey; UK **Participants:** 65 overweight and obese children aged 6-14; F=43 **Inclusion:** Children aged 6–14 years with a BMI > 91st centile. Those with intellectual disability included if judged able to participate in activities. **Exclusion:** Not stated. **Motivation/referral/ payment:** Health professional- and self-referral (approx 50% from each).	**Method of allocation:** Not stated. **Intervention(s):** **Behavioural, diet, physical activity** Two Saturday workshops (total 8 hrs) 1–2 weeks apart; twice weekly 1-hour physical activity sessions during term time. Siblings aged 6–14 years and parents/ guardians encouraged to participate. Workshop focus on healthy eating, physical activity, reducing sedentary behaviour, behaviour change and psychological well being. **Control:** Wait list control (WLC) 1 year delay **Sample sizes:** I/C=35; 22 female, 13 male C/I=30; 21 female, 9 male **Baseline comparisons:** Significant differences for age	**Anthropometry measures:** Change in BMI SDS (British 1990 data). Also waist circumference and body fat **Diet measures:** 7-day food diary at baseline and following each 6-month review appointment for 24 months. **Physical activity measures:** 7-day activity diary; electronic pedometer amount of time of low, moderate and high intensity activity. **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** The cost of the project was also calculated and compared against standard dietetic treatment. **Other measures:**	**Anthropometry results:** Over 2 years BMI SDS (z score) fell significantly in intervention but not in WLC. Unadjusted between group difference = 0.3 (95% CI) -0.62 to 0.02, P=0.06). I = 33% and WLC = 12% for reduction of 0.5 BMI SDS. Unadjusted I = BMI SDS : 0-12 months -0.17(-0.26 to -0.08); 12-24 months -0.23 (-0.45 to -0.02); 0-24 months -0.44 (-0.7 to – 0.18) WLC= BMI SDS: 0-12 months -0.08(-0.24 to 0.07); 12-24 months -0.14 (-0.29 to 0.01); 0-24 months -0.14 (-0.0.35 to – 0.06) Adjusted (for baseline measures of age, weight, height, sum at skinfolds, referral source and gender) I = BMI SDS: 0-12 months - 0.13 (-0.26 to -0.008); 12-24 months 0.21 (-0.45 to -0.021); 0-24 months -0.41 (-0.71 to -0.11) WLC = BMI SDS: 0-12 months -	**Limitations (author):** Study under powered. Children did not participate in the twice weekly leisure-centre-based sessions as much as the authors expected. A waiting list control may not have been appropriate. There were a higher percentage of self referrals in the I/C group (60% v 36.7%). Under reporting in food diaries. **Limitations (review team):** High attrition rate in follow-up after 12 months particularly in intervention group **Evidence gaps:** None stated **Funding sources:** Public Health Department & Department of Education, Sports and Culture, States of Jersey;

		(P=0.007), height (P=0.011) and sum of skinfolds (P=0.018). Drop-outs not significantly different from those who stayed in study. **Study power:** Study was originally powered to detect a difference in effect on BMI SDS score of 0.5. After completion actual power was calculated for an effect size of 0.3 for BMI SDS – approx 60% **Intervention delivery:** Dietician, physical activity health promotion officer, educational or clinical psychologist and 2–3 physical activity instructors. **Target group:** Families	None **Follow-up periods:** 6, 12, 18 and 24 months **Method of analysis:** Mean values with 95% CIs. ANOVA for difference between groups.	0.14(0.28 to -0.001); 12-24 months -0.14 (-0.35 to -0.079); 0-24 months 0.16 (-0.43 to 0.11) **Diet results:** No significant between-group differences for average estimates of nutrient intakes. **Physical activity results:** No significant between-group differences except moderate activity/week at 24 months: undertaken per week: I: mean = 182.9 min, 95% CI, - 39.2 to 404.9; WLC: mean=606.9 min, 95% CI, 202.7–1011.0, P=0.038. **Cost effectiveness results:** Cost per child estimated to be £403 (based on running the intervention as a clinical service) compared with £45 for usual care of 1.5 h individual dietetic consultations. **Attrition:** At 6, 12 and 24 months respectively I = 11%, 20%, 40% WLC : 10%, 17%, 23%	Channel Islands Coop for funding. **Applicable to UK?** Yes
Croker (Family-based behavioural treatment - FBBT)					
First author and year: Croker 2012 Edwards 2006 FBBT **Aim of study:** To examine the acceptability and effectiveness of 'family-based behavioural treatment'	**Setting:** UK; Hospital (June 2004-Jan 2008) **Participants:** 72; 10.3 years (SD1.6); 50 girls, 22 boys; 76% of parents educated below college level; 56.9% white, 19.4% black, 13.9% Asian, 9.7% mixed/other	**Method of allocation:** Computer generated random numbers **Intervention(s):** Behavioural, diet and physical activity: FBBT: whole family lifestyle change, with a behavioural weight control programme for overweight child. Children attended group with one parent or carer; maximum of	**Anthropometry measures:** Post-treatment BMI SDS and BMI; post-treatment; post-treatment %BMI, weight, weight SDS, height, height SDS, waist, waist SDS. SDSs for BMI, (UK 1990 reference data). **Diet measures:** Not measured **Physical activity measures:**	**Anthropometry results:** Significant BMI SDS changes (P=0.01) for the treatment (n=33) and control (n=30) groups of - 0.11 (SD 0.16) and -0.10 (SD 1.6). Between-group treatment effects for BMI and body composition not significant. No overall change in BMI or BMI SDSs from 0–12 months for treatment	**Limitations (author):** High attrition rate. Some missing baseline data. ITT analyses for 6-month data only. No 12-month data for control group. **Limitations (review team):** Small sample size. **Evidence gaps:** Identify family

(FBBT) for childhood obesity in an ethnically and socially diverse sample of families in a UK National Health Service (NHS) setting. **Study Design :** RCT (Edwards = UBA) **Quality score:** + **External validity score:** +	**Inclusion:** Children 8–12 years of age; overweight or obese according to International Obesity Task Force (IOTF) definition; at least one parent/guardian willing to participate in treatment; parent and child had sufficient command of English to participate and understand programme materials. **Exclusion:** Identified medical cause for obesity; significant learning difficulties; significant mental health problems in child or parent, or currently receiving psychological or psychiatric treatment, including psychotrophic medication. **Motivation/referral/ payment:** Recruited through local professional networks in primary and secondary care, from schools and through information in local media. Families responding through the media asked to seek a GP referral. Referred children invited to assessment appointment with a study clinicians. Motivational assessment was made, including children and parents' independent ratings of motivation for making lifestyle changes and	8–10 families per group. Aimed to reduce fat and energy intake, increase physical activity and change parent–child interactions. Parents instructed in behaviour management principles to support child's behaviour change and to encourage family-wide uptake of healthy lifestyle behaviours. Cognitive components included advice on managing teasing and general problem-solving. Key dietary targets: (i) follow regular eating pattern; (ii) reduce snacking to ≤ two occasions per day; (iii) consume a balanced diet in appropriate quantities. Key physical activity targets: (i) reduce time spent in sedentary behaviours; (ii) increase time spent in lifestyle or structured activity to 60 mins per day. Duration: 15 sessions over 6 months (10 weekly, 3 fortnightly, 2 monthly), after school (approx 1½hrs). Session: brief review (5–10 min) with individual families for feedback and weighing, followed separate parent and child group sessions. **Control:** 6 month waiting list control **Sample sizes:** I=37 (26 girls, 11 boys); C=35 (24 girls, 11 boys) **Baseline comparisons:** No significant differences between groups except age and height. Treatment group	Not measured **Wellbeing measures:** Psychosocial outcomes: questionnaires completed by parents and children. Self-esteem (Harter scale); mood (Children's Depression Inventory); parent-reported child difficulties (SDQ); quality of life (child- and parent-reported (PedsQL) Children's attitudes towards eating and weight (Children's Eating Attitudes Test. **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** BP and pubertal status (data not extracted). **Follow-up periods:** 6 months from baseline, plus 12 month anthropometric outcomes for treatment group completers. **Method of analysis:** Independent t-tests or Mann–Whitney tests (continuous variables) or w2-tests (categorical variables). All 6-month outcomes analysed on an ITT basis (n=60) tested for normality using Kolmogorov–Smirnov tests and transformations were performed as appropriate. MANCOVA to test group	group For those with follow-up to 12 months (n=19), baseline 3.14 SD 0.72; 6 months: 2.98 SD 0.75; 12 months: 3.03 SD 0.78; p<0.005 - but not ITT. **Wellbeing results:** Treatment group showed significant improvements in quality of life and eating attitudes (P=0.05), with no significant changes for control group. Between-group treatment effects for psychosocial outcomes not significant. **Attrition:** I= 40.5% (15/37); C=22.9% (8/35) at 6 month; at 12 months lost 18/37 for intervention group, no 12 month data for control	characteristics that increase the likelihood of success **Funding sources:** Cancer Research UK, Great Ormond Street Hospital, Weight Concern **Applicable to UK?** Yes

	perceived benefits of and barriers to change. Families in receipt of state benefits reimbursed travel expenses for assessment appointments and treatment sessions, as per hospital policy.	significantly older and taller. **Study power:** Treatment effect of -8.4 (7.1)% of ideal -BMI seen in the pilot groups and an assumed change in the control group of -2.0% with a drop-out rate of 30% after recruitment. Study required 48 subjects to be recruited (and final study sample size of 34 (17 per group) to achieve ≥90% power, α=0.05, using a two-tailed test. **Intervention delivery:** Parents' groups: clinicians (psychologist, family therapist or experienced dietician) Children's groups: dietician and researcher Additional researchers conducted one to-one family reviews. **Target group:** Family	differences for parametric data. Paired t-tests or Wilcoxon signed-rank tests to examine within-group changes over the intervention.		
First author and year: Murdoch 2011 FBBT **Aim of study:** To carry out a service evaluation of a pilot family-based behavioural management group programme for childhood obesity **Study Design :** UBA **Quality score:** –	**Setting:** Community. London,UK **Participants:** 17 families with 28 obese children aged 7.5 to 14 years Mean 10.5 (SD 1.8) F=53% 53% of families had no income from paid employment. 18% parents had no qualifications; 29% had A levels or equivalent. 59% classed their family as white; 12% as black; 17% Asian; 12% mixed heritage. **Inclusion:** ≥98th centile BMI for age and	**Method of allocation:** Not applicable **Intervention(s):** 15 1.5 hour sessions over 6 months (2007/8). The first 10 sessions were delivered weekly and the last 5, fortnightly. A whole family behavioural, diet and physical activity approach with behaviour management support for parents. Children attended with one parent (see Croker 2012 for details). **Control:** No control group	**Anthropometry measures:** BMI z score **Diet measures:** Parent-completed 35-item Food Frequency Questionnaire. **Physical activity measures:** Measure based on HABITS – re (i) physical activity; (ii) sedentary behaviour **Wellbeing measures:** Self perception profile for children; Childhood depression inventory; Dieting and 'bulimia and food preoccupation' subscales of the Children's	**Anthropometry results:** BMI z score maintained. Paired t-test = 1.46 (p=0.16). **Diet results:** Significant reduction in low-fibre foods (paired t test = 2.99, p=0.01) and increase in high-fibre foods (-2.60, p=0.02) recorded but no change in consumption of high and low fat foods. **Physical activity results:** No change in physical activity measured by brief tool although a just significant decrease in sedentary activity (paired t test = 2.06, p=0.05). **Wellbeing results:**	**Limitations (author):** No control group, attendance rates not optimal, no longer-term follow up, all measures except z BMI self reported, staff collecting data also delivered the intervention. **Limitations (review team):** Very small pilot and (as noted by authors) couldn't be considered generalisable. **Evidence gaps:** Large-scale longitudinal RCTs collecting process as

External validity score: +	sex, based on the British 1990 Growth Reference Data. **Exclusion:** Type 2 diabetes; Medical cause for obesity; Being in receipt of any other obesity treatment. **Motivation/referral/ payment:** Recruited mainly from community dietetics waiting list. Also advertisements via local newspapers, GP practices, school health advisors and other healthcare professionals	**Sample sizes:** 28 children No information on the number of refusals. **Baseline comparisons:** N/A **Study power:** Not reported **Intervention delivery:** 6 trained facilitators – community dieticians, clinical psychologists, volunteers **Target group:** Whole family	Eating Attitude Test. **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Not measured **Follow-up periods:** 6 months (programme end) **Method of analysis:** Paired t-tests to explore post-programme versus baseline outcome measures and p values only.	Significant reduction in depression (3.35, p=0.006) and improvement in self-perception relating to physical appearance (-2.39, p=0.03). Also in measures of abnormal dieting behaviour (2.00, p=0.05) and bulimia/food preoccupation (3.34, p=0.004). **Attrition:** Mean attendance = 10.24 sessions (SD 1.79) out of 15. No information on attrition.	well as outcome data. **Funding sources:** No information provided. **Applicable to UK?** Yes
Daley (SHOT – Sheffield Obesity Trial)					
First author and year: Daley 2006 SHOT (Sheffield Obesity Trial) **Aim of study:** To investigate the effects of supervised exercise therapy on psychopathologic outcomes in obese adolescents **Study Design :** RCT **Quality score:** ++ **External validity score:** +	**Setting:** UK university, with intervention sessions taking place in a dedicated project exercise therapy room. **Participants:** 81 adolescents, mean age 13.1. 78% obese; 22% morbidly obese. 44% male, 83% white, 10% black, 7% South Asian. **Inclusion:** Clinically obese (BMI centile > 98th UK standard), aged 11-16 years, no medical condition that would restrict ability to be active three times per week for eight weeks, not diagnosed with insulin dependent diabetes or	**Method of allocation:** Computer generated random list **Intervention(s):** 1) Exercise therapy. Range of moderate intensity aerobic exercise activities for 30 minutes three times per week for eight weeks. Exercise counselling for behaviour change provided in line with Transtheoretical Model. 2) Exercise placebo: 24 sessions over eight weeks, but participants asked to perform light body conditioning and stretching with heart rate maintained at < 40% of HR reserve. No exercise counselling or behavioural change advice. Both intervention groups given six week home programme to	**Anthropometry measures:** Height and weight, from which BMI was calculated. All values were express as SD scores (*z* scores) relative to current UK standards. **Diet measures:** Not measured **Physical activity measures:** Physical Activity Questionnaire for Adolescents [Kowalski et al 1997]. **Wellbeing measures:** Physical self-worth measured using the Children and Youth Physical Self-Perception Profile [Whitehead 1995]. Children's Depression Inventory [Kovacs et al 199]. Self-Perception Profile for Adolescents, including Global	**Anthropometry results:** No significant changes in BMI among any group at any time point. **Physical activity results:** Adjusted mean physical activity scores between exercise therapy and usual care at 8 weeks (mean difference: 5.9; p=.06); significant difference at 14 weeks (mean difference: 8.24; p=.02) and 28 weeks (mean difference: 9.84; p=.002). Significant difference between exercise therapy and exercise placebo groups at 28 weeks (mean difference: 9.81; p=.0016). **Wellbeing results:** Significant differences in adjusted mean physical self-worth scores between the exercise therapy and usual care groups at 8 weeks (mean difference: 0.21; p=.02), 14 weeks	**Limitations (author):** Blinding of the assessments not possible but not considered a major limitation due to the self-administered nature of the questionnaires. Trial underpowered. Possibility of a type I error due to multiple statistical testing. **Limitations (review team):** Short follow-up. **Evidence gaps:** None stated **Funding sources:** Research grant from the Health Foundation **Applicable to UK?** Yes – UK based study

	receiving oral steroids. **Exclusion:** Unwillingness to attend supervised exercise sessions three times a week for eight weeks, major psychiatric or cognitive impairments **Motivation/referral/ payment:** Participants were referred to trial by paediatricians from a children's hospital in England for evaluation of obesity or responded to a community advertisement. Motivation not reported although authors discuss high rates of adherence. They suggest participants provided with right opportunities to increase motivation to engage in regular physical activity. No indication that participants had to pay.	follow after end of intervention. **Control:** Continue with lives as normal. Group given opportunity to attend exercise therapy sessions at the trial centre after follow-up assessments. **Sample sizes:** Exercise therapy n=28 Exercise placebo n=23 Usual care n=30 **Baseline comparisons:** All groups comparable **Study power:** Physical self-worth = primary outcome with predicted effect size of 0.6, 80% power and 5% significance, calculation indicated 30 participants per group to detect a difference between interventions and usual care. **Intervention delivery:** All exercise therapy sessions were delivered by one of the study authors. **Target group:** Children	Self Worth (GSW) [Harter 1995] Affect: items used by Ebbeck and Weiss (1998) **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Aerobic fitness: the poorly fit category of the modified Balke protocol (Rowland 1993) **Follow-up periods:** 8, 14 and 28 weeks from baseline **Method of analysis:** Repeated measures mixed ANCOVA to compare outcomes between groups at assessment, points. Data analysed on an ITT basis. Trial statistician blinded to group codes.	(mean difference: 0.26; p=.03), and 28 weeks (mean difference: 0.23; p=.04). Also, significant difference between the exercise placebo and usual care groups at 8 weeks (mean difference: 0.20; p=.02). Significant difference in adjusted mean GSW scores between exercise therapy and exercise placebo at 14 weeks (mean difference: 0.49; p=.002) and 28 weeks (mean difference: 0.42; p=.003). Also between exercise placebo and usual care at 14 weeks (mean difference: 0.36; p=.008). **Attrition:** 4/28 exercise therapy, 1/23 exercise placebo, 5/30 usual care at 28 week follow-up.	
DeBar					
First author and year: De Bar 2012 **Aim of study:** To evaluate a primary care-based multi-component lifestyle intervention specifically tailored for overweight adolescent	**Setting:** Primary care - health management organisation (HMO), Pacific North West USA. **Participants:** Adolescent girls aged 12 - 17 (mean age 14.1 (SD 1.4), mean BMI percentile 97.09	**Method of allocation:** Random allocation, by computer programme that balanced for age and obesity severity **Intervention(s):** 16 x 90-minute group educational sessions for teens (weekly for the first 3 months, bi-weekly thereafter) including diet,	**Anthropometry measures:** Age-adjusted BMI z score; weight; BMI. **Diet measures:** Eat breakfast day/wk, family meals times/wk, fast food times/wk, sugar sweetened beverages times/wk, total kcal/day (ESHA), % of calories	**Anthropometry results:** Decrease in BMI z score over time significantly greater for intervention compared with usual care: I = −0.15; UC = −0.08 P=0.012). BMI z score (SD) Baseline: I = 2.00 (0.34); UC = 2.00 (0.33) 6 months:	**Limitations (author):** Participants had high overall BMI at study onset (>97 percentile for age and gender on average) and may have been treatment resistant. Lack of racial/ ethnic and socioeconomic diversity among study

females. **Study Design :** RCT **Quality score:** ++ **External validity score:** ++	(SD 2.27). **Inclusion:** Female HMO members aged 12 to 17, with age and gender adjusted BMI 90th percentile or more. **Exclusion:** Significant cognitive impairment or psychosis; severe obesity (BMI>45); using medications that affect body weight; pregnancy. **Motivation/referral/ payment:** Potential participants identified by primary care providers (PCPs) from medical records. Trial also advertised for volunteers.	physical activity, addressing issues associated with obesity in adolescent girls. 12 group sessions for parents to support behavioural weight management goals collaboratively. *Intensity:* 24 hours [teens]; 18 hours [parents] **Control:** Usual care – including educational materials and, parents guide to help make health lifestyle changes, resources. Also participants met with their PCP for general advice. **Sample size:** 208 adolescents randomized (I = 105, C = 103). **Baseline comparisons:** Intervention group reported higher use of professional weight management services during previous 6 months and more regular breakfast eating. **Study power:** Study was designed for power of 0.98 to detect difference between mean 3% increase in BMI z score in both groups by recruiting 100 participants in each condition. **Intervention delivery:** Masters level nutritionists and health educators and doctoral level clinical psychologists. **Target group:** Children and parents	from fat (24-h dietary recall) **Physical activity measures:** Physical activity min/day average total MET/day, screen time h/wk **Wellbeing measures:** Psychosocial self-esteem (RSE), body satisfaction (BSS), appearance attitudes (SATAQ-3), Quality of life (PedsQL), % with disordered eating (QEWP-A), % with mood disorder (PHQ-A) **Service satisfaction measures:** Not assessed. **Cost effectiveness measures:** Not assessed. **Other:** Cholesterol, HDL, LDL, triglycerides, fasting glucose (not extracted) **Follow-up periods:** 6 and 18 months from baseline. Intervention took place over first 5 months. **Method of analysis:** Mean changes from baseline and 95% confidence intervals (CIs). ITT analysis.	I = 1.88 (0.41) vs UC =1.94 (0.38) 18 months I = 1.85 (0.46); UC =1.92 (0.39) **Diet results:** At 18 months, intervention participants reported less reduction in frequency of family meals and less fast-food intake. Family meals times/wk, I = 3.51 (2.60), UC = 3.29 (2.49) P = 0.028. Fast food times/wk, I = 1.00 (1.01), UC = 1.55 (1.39) P = 0.021. **Physical activity results:** At 18 months the two groups did not differ significantly on any outcome. **Wellbeing results:** At 18 months groups did not differ in any psychosocial outcomes except: Body satisfaction: I = 2.93 (0.66), UC = 2.74 (0.74), p = 0.026 Appearance attitudes: I = 2.18 (0.93), UC = 2.43 (0.96) p = 0.019 **Attrition:** 6 months: I= 5/105; UC = 8/103 18 months: I = 15/105; UC = 20/103 (for anthropometric data)	participants, particularly given known health disparities related to obesity. **Limitations (review team):** Moderate attrition at 12 months, but ITT used. **Evidence gaps:** Future research should consider more intensive models, namely whether adoption of specific caloric and activity guidelines as well as more active participation of parents and other family members may enhance teen outcomes. **Funding sources:** National Institutes of Health **Applicable to UK?** Likely to be applicable

Duckworth 2009 – see Gately					
Edwards 2006 – see Croker					
Estabrooks (Family Connections)					
First author and year: Estabrooks 2009 Family Connections **Aim of study:** To evaluate the relative effectiveness of three interventions to support parents of overweight or at-risk children to change the home environment to foster more healthful child eating and activity behaviours, thereby reducing child BMI and BMI z-scores. **Study Design :** RCT **Quality score:** + **External validity score:** +	**Setting:** Community receiving care from Kaiser Permanente Colorado; USA **Participants:** 220 families of overweigh children identified through medical records; enrolled between May 2004-Jan 2006 mean age 10.7 yrs; 54% male; 63% white, 26% Hispanic **Inclusion:** Children aged 8–12 years with a BMI ≥ 85th percentile for their age. **Exclusion:** Plans to move out of the state during the course of the study or a request by the child's paediatrician that the family not be contacted. **Motivation/referral/ payment:** Identified via medical records	**Method of allocation:** Random numbers table **Intervention(s):** **Behaviour, diet, physical activity Family Connections workbook for parents (FC-workbook):** 61-page workbook to promote increased physical activity and consumption of fruits and vegetables plus decreased sugared-drink consumption and screen time. Workbook had five days of intervention with specific homework assignments; parents encouraged to complete all 5 days across a single week. Homework assignments intended to encourage lasting behaviour changes. **Workbook plus 2 small-group sessions with a registered dietician (FC-group):** 2-hour small-group behavioural sessions, 1 week apart) for 10–15 parents utilising FC workbook. **Workbook, 2 small group sessions & 10 automated interactive voice response- (IVR) tailored counselling sessions (FC-IVR):** After completing group program, parents received 10 follow-up sessions delivered via IVR commencing 1 week later. Calls 7–10 reinforced information delivered in first six calls.	**Anthropometry measures:** BMI z-scores. Height and weight measures. BMI scores calculated based on value of 50th-percentile BMI ranking and SD attributable to appropriate age and gender samples (CDC growth charts). **Diet measures:** Fruit, vegetable and sugared-drink consumption using Block Kids Questionnaire **Physical activity measures:** Physical activity and sedentary behaviour (Youth Behavioural Risk Survey questions). Sedentary behaviour based on the numbers of hours of screen time during school days. **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Eating disorder symptoms using Kids' Eating Disorders Survey (KEDS) **Follow-up periods:** 6 and 12 months from baseline. **Method of analysis:** ITT at 3 time points. Mixed models for BMI z-scores. Non-	**Anthropometry results:** Only children assigned to FC-IVR intervention decreased BMI z-scores from baseline to 6 months (2.03 SD 0.04 to 1.96 SD 0.04, $p<0.05$) and from baseline to 12 months (2.03 SD 0.04 to 1.95 SD 0.04, $P<0.05$). FC-workbook group significantly reduced BMI z-scores from baseline to 12 months only (2.04 SD 0.02 to 1.98 SD 0.03, $p<0.05$), 6 months = 1.99 SD 0.03. FC-group significantly reduced BMI z-scores from baseline to 6 months (2.06 SD 0.04 to 2.03 SD 0.04, $p<0.05$) but not to 12 months - 2.04 (0.04). Children of parents completing ≥ six of the ten IVR calls decreased BMI z-scores to a greater extent than children in the other groups at both 6 months ($p<0.05$) and 12 months ($p<0.01$). **Diet results:** No consistent pattern of change in fruit, vegetable, and sugared-drink consumption within or among groups. **Physical activity results:** FC-IVR group reported significant increase in number of days moderate physical activty from baseline to 6 and 12 months. **Other results:** Children in all groups reported healthy behaviours and no increases	**Limitations (author):** Parents not assigned randomly to a higher or lower frequency of FC-IVR so those parents who completed all of the calls could have been more motivated than those who did not. **Limitations (review team):** High attrition rate **Evidence gaps:** None **Funding sources:** Garfield Memorial Fund **Applicable to UK?** Possibly

		Control: No control group **Sample sizes:** FC-workbook: 50; 39% male; FC-group: 85; 58% male; FC-group & FC-IVR: 85; 59% male **Baseline comparisons:** No reported differences. **Study power:** Sample size calculations completed, varying detectable effect sizes from small to medium with power of 0.8 resulting in 42 participants per intervention to detect a medium effect and 64 to detect a small effect. **Intervention delivery:** FC-workbook: study research assistants; FC-group: small group sessions given by dietician. **Target group:** Families	linear random-effects models for physical activity and sedentary behaviour.	in unhealthy behaviours detected during study. **Attrition:** FC-workbook: 24% at 6 months; 28% at 12 months FC-group: 25% at 6 months; 34% at 12 months FC-IVR: 20% at 6 months; 26% at 12 months	
Ford (Mandometer)					
First author and year: Ford 2010a, 2010b **Aim of study:** To determine whether modifying eating behaviour with use of a feedback device facilitates weight loss in obese adolescents. **Study Design :** RCT **Quality score:** ++ **External validity score:**	**Setting:** Hospital outpatient obesity clinic. Bristol, UK **Participants:** 106; 9 to 17 yrs old; 59 (56%) female, 47 (44%) male; 93 (88%) white **Inclusion:** Age 9-<18 at recruitment, BMI >95th centile; minimal or no learning difficulties, no underlying medical problem; no medication for insulin resistance. Participants were	**Method of allocation:** Computer generated random numbers. **Intervention(s):** Computerised device (Mandometer), providing real time feedback to participants to slow down speed of eating and reduce total intake. Participants saw a research nurse (trained in Mandometer technology) weekly for six weeks, fortnightly for a further six weeks, and then every sixth week (with additional	**Anthropometry measures:** Body weight, height, BMI calculated as weight (kg/m^2). Waist circumference. BMI was adjusted for age and sex to give a BMI SDS (British 1990 growth reference data from Child Growth Foundation). Change in % body fat/body fat SDS. **Diet measures:** Not measured **Physical activity measures:** Not measured	**Anthropometry results:** Of the 91 participants with a 12 month assessment, those in the Mandometer arm had significantly lower mean BMI SDS at 12 months (I:2.86 (0.72), C:3.07 (0.57). The baseline adjusted mean difference was 0.27, 95% confidence interval 0.14 to 0.41; P<0.001). Results were similar all last available measurements for all patients in the study were used (BMI SDS I: 2.93 (0.72), 3.07 (0.56)) (baseline adjusted mean difference 0.24, 0.11 to 0.36;	**Limitations (author):** Blinding of participants not possible. Different dieticians for each group **Limitations (review team):** No ITT analysis **Evidence gaps:** Explore use in younger children, other settings and different group of patients **Funding sources:** BUPA foundation. Two authors each have 28.35% stock in Mando

+	recruited from new patients referred to obesity clinic. **Exclusion:** None **Motivation/referral/ payment:** Referred	fortnightly telephone calls). Dietary advice in based on the Food Standards Agency "eatwell plate" and four dietetic consultations over 12 months. Four-monthly clinician consultation emphasising the need to change eating habits and improve physical activity as advocated in the standard clinic. **Control:** Standard lifestyle modification therapy. Initial one hour meeting with family. Emphasis on increasing levels of enjoyable physical activity to national recommended levels (60 minutes of exercise a day) alongside a balanced diet based on eatwell plate. Families encouraged to set dietary goals and targets, with practical advice and guidance from dietician. Motivational interviewing techniques used. **Sample sizes:** Control: 52 (29 female, 23 male) ; Intervention: 54 (30 female, 24 male) **Baseline comparisons:** Children who dropped out before 12 months had a slightly higher initial mean BMI SDS than the others. **Study power:** Power calculation for anticipated difference in mean absolute fall of BMI SDS at 12 months. To yield 80% power with 5% significance estimated total 80 children to complete the study (40 in each	**Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Fasting glucose and insulin concentrations, lipid profile, high sensitivity C reactive protein, blood pressure (results not extracted) **Follow-up periods:** 12 and 18 months from baseline **Method of analysis:** ANCOVA to adjust for baseline values in comparisons between 12 month means. Analysis of secondary outcomes only for those who completed 12 months. Analysis of 18 month data only for those completing 12 month study.	P<0.001). **Attrition:** At 12 months 14% (15/106); at 18 months 18% (19/106)	Group AB; one of whom is . Two further authors funded by Mando Group AB to attend investigator meetings in Stockholm. Lead author Mandometer training funded by Mando Group AB **Applicable to UK?** Yes

		arm). Recruitment inflated to reflect withdrawal of participants, which was 26% in the standard clinic over one year. **Intervention delivery:** Mandometer training and support from research nurse; dietary advice from paediatric dietician not involved with standard clinic, clinician. **Target group:** Obese children 9-17 yrs old			
Gately (Carnegie International Camps now MoreLife)					
First author and year: Gately 2005 (main) Walker 2003 Barton 2004 **Aim of study:** To evaluate the effectiveness of a residential weight-loss camp program for overweight and obese children **Study Design :** CBA **Quality score:** – **External validity score:** ++	**Setting:** UK community (residential weight loss camps) **Participants:** Gately 2005: 223 overweight children **I =** 185; mean age 13.9 years, 44.3% boys, 14% overweight and 86% obese. C = 38; mean age = 13.6 years, 76.3% boys. No ethnicity or parental employment status data, but states majority of children were white. Walker 2003: 58 residents in July/Aug 2000 (compared to the same control group). Barton 2004: campers from Summer 1999 and 2000 not compared to a control group. **Inclusion:** BMI above cut-off values for overweight (Cole 2000) and	**Method of allocation:** Not random allocation **Intervention(s):** Residential weight-loss camp, which children attended for 2-6 weeks. Campers stayed at boarding school premises, which provided catering, residential, educational and high-quality indoor and outdoor sports facilities. Children divided into groups according to age. Program included daily schedule of six 1-hour, skill-based, fun, physical activity sessions, moderate dietary restriction (energy intake of 1,300 to 3,300 kcal per day based on approx basal metabolic rate), and group-based educational sessions. **Control:** Non-campers: comparison children engaged in unmonitored summer vacation activities during time camp was taking place. Data	**Anthropometry measures:** BMI and BMI SD; body mass to nearest 0.01kg; height to nearest 1cm; waist and hip circumference; % body fat. **Diet measures:** Not assessed **Physical activity measures:** Sports Skills – evaluated in intervention group only and aerobic fitness. **Wellbeing measures:** Self-esteem (Self-Perception Profile for Children). Worries (salience of Weight-Related Issues Scale), body shape preferences (Pictorial Figure Silhouette Scale [0 = satisfaction, negative = desire to be thinner, positive = desire to be fatter). (Walker 2003) **Service satisfaction measures:** Not assessed **Cost effectiveness measures:**	**Anthropometry results:** MANCOVA revealed significant group differences across all measures (smallest *F(2,244) = 8.61,* p<0.001). Significant group-time interactions showed campers reduced body mass, decreased BMI SD scores, lost body fat and reduced both waist and hip circumferences (smallest *F*(2,2444) = 28.87; p<0.001). Duration of stay significantly (*P* <.01) associated with positive changes in a range of variables (body weight: *r* =-0.69 [*n* = 185]; BMI: *r* =-0.76; BMI SD score: *r* = -0.58. Longer the stay at camp, greater the improvement in these measures. BMI mean (SD): I = baseline 33.5(6.3); end 31.2 (5.9); C= 28.1 (17.5); end 28.6 (4.8) BMI SD score mean (SD): I = baseline 3.03 (0.61); end 2.74 (0.67) / C= 2.39 (0.72); end 2.48 (0.70) **Physical Activity results** Significant group-time interactions	**Limitations (author):** Lack of RCT design. Camp program format – only possible during extended school vacation period, are limited in size, have a demanding staff/student ratio and appear expensive. **Limitations (review team):** No power calculation, non-comparable groups at baseline. High risk of selection bias. Attrition levels unclear. **Evidence gaps:** How do differences in program structure/content, environment, participant background, and expectations affect outcomes? Can the intervention be adapted to a non-residential setting or delivered during the school

	undergoing health screening performed by the child's family physician. Control group recruited from schools. **Exclusion:** None stated **Motivation/referral/ payment:** Parents paid for their children's attendance (£370 per week) but approx 20% were funded by their PCT or social services department.	for third group of non-camping healthy not extracted. **Sample sizes:** Gately 2005: I = 185, C = 38. Walker 2003: I = 58, C= 38 Barton 2004: I = 61 **Baseline comparisons:** Campers differed significantly from control on nearly every anthropometric measure. They had greater body mass, BMI, BMI SD scores, percentages of body fat, fat mass, and waist and hip circumferences. **Study power:** Not reported. **Intervention delivery:** Not reported. **Target group:** Children.	Not assessed **Other measures:** Blood pressure (not extracted) **Follow-up periods:** End of camp attendance – ranged between 2-6 weeks from baseline **Method of analysis:** Means and standard deviations. MANCOVA.	were found for aerobic fitness changes [$F(2,204) = 8.97$; $P<0$ .001]. Sports skills (Campers only) significant ($P<$ .05) improvements in all measures. **Wellbeing results:** Self-esteem: Significant group-time interaction $F(2,213) = 4.15$; $p<0.012$] showing that campers improved in self-esteem, Self esteem score mean (SD): I baseline = 2.56 (0.63); end 2.77(0.58) / C = 2.86 (0.54); 2.89 (0.67) Worries: Campers worried significantly more frequently and intensely about appearance than comparisons (frequency F(6,88)=7.30, P=0.001; intensity F(6,87)=8.49, P=0.001). Main effect of time on intensity of appearance worries (F(6,86)=2.86, P=0.05), worries decreased from pre- to post-camp but no significant group by time interaction. Main effect of gender with females reporting a higher frequency and intensity of worry about their appearance (F(6,88)=3.75, P=0.01; F(6,86)=2.33, p=0.05). **Attrition:** Not reported	term? **Funding sources:** National Heart Research Fund (Leeds, UK) **Applicable to UK?** Yes
First author and year: Gately 2007 **Aim of study:** To evaluate the effect of a high-protein diet on anthropometry, body composition,	**Setting:** Residential weight loss camp, Leeds, UK. **Participants:** 98 children mean age 14.2. F = 60 **Inclusion:**	**Method of allocation:** Stratified block procedure (energy group, age, and duration of stay) into one of the two diet groups (protein or standard). **Intervention(s):** All children (including control)	**Anthropometry measures:** BMI SDS. BMI, body mass, height, % body fat, fat mass, waist and hip circumference **Diet measures:** Not assessed. **Physical activity measures:**	**Anthropometry results:** No main effect of diet group or any time-by-diet group interaction (P-Value< 0.05). Combining all children from both diet groups, significant reductions in BMI SDS - 0.27 (SD 0.1) P-Value<0.001.	**Limitations (author):** Some imprecision in monitoring foods consumed - inevitable given cafeteria-style presentation of meals and free-living nature of the intervention. Meal portion sizes

subjective appetite, and mood sensations in overweight and obese children attending a residential weight-loss camp. **Study Design :** Quasi-RCT **Quality score:** – **External validity score:** ++	Aged 11-17 with BMI above cut-off values for overweight (Cole 2000) and had undergone health screening performed by the child's family physician. **Exclusion:** Learning disability and taking prescribed medication. **Motivation/referral/ payment:** Not reported – but in other weight-loss camp papers by the same authors, parents paid for their children's attendance (£370 per week) and approx 20% were funded by their PCT or social services department.	attending residential multidisciplinary weight-loss camp for 2-6 weeks). Programme included daily schedule of six 1-hour, skill-based, fun, physical activity sessions, dietary restriction (energy intake of 1,300 to 3,300 kcal per day based on approx basal metabolic rate), and group-based educational sessions. Intervention group received a high protein diet (22.5% protein, 30% fat, and 47.5% carbohydrate. **Control:** Standard camp diet of 15% protein, 30% fat, and 55% carbohydrate that followed the food choice principles. **Sample size:** 120 of whom 98 were randomised. Anthropometry outcomes for 80/98 and sub sample of 50/62 for subjective appetite measures. **Baseline comparisons:** N/A. **Study power:** Not reported. **Intervention delivery:** Led by physical education teachers as well as a range of activity leaders, including qualified sports coaches. Diets designed by registered dietician **Target group:** Children.	Not assessed. **Wellbeing measures:** Not assessed. **Service satisfaction measures:** Not assessed. **Cost effectiveness measures:** Not assessed. **Other measures:** Subjective appetite (hunger) and mood assessed using EARS (Electronic Appetite Rating System). Cholesterol, triacylglycerol, HDL, LDL and blood pressure. (Data not extracted) **Follow-up periods:** End of camp attendance – 2-6 weeks from baseline (depending on how long children attended camps). **Method of analysis:** Means and standard deviations. ANOVA.	BMI SDS (SD) pre vs post: I = 3.1 (0.5) to 2.84 (0.58); C=2.83 (0.42) to 2.54 (0.44). **Other results:** Subjective sensations of hunger increased significantly over the camp duration, but no other changes in appetite or mood were observed. Hunger rating (SD) pre vs post: I = 34.8(12.1) to 41.0 (12.8); C=34.3 (12.1) to 39.7(12.8). P-Value for pre to post, both diets combined = 0.001. No significant differences between the two diets on any physical or subjective measures. **Attrition:** 10/98 (10.2%) for main group	estimated rather than weighed due to time constraints. **Limitations (review team):** No power calculation. Industry-sponsored study, ITT not reported. Unclear if significant differences in baseline characteristics. No data on actual length of stay of participants (varied between 2-6 weeks). **Evidence gaps:** Further work to investigate whether higher levels of dietary protein are feasible or effective in longer term weight loss interventions. **Funding sources:** Glaxo Smith Kline. **Applicable to UK?** Yes.

First author and year: King 2007 **Aim of study:** To assess the subjective appetite responses to an imposed activity and diet induced energy deficit during a residential intervention programme for obese children. **Study Design :** UBA **Quality score:** – **External validity score:** +	**Setting:** Community (residential camp). UK **Participants:** 38 obese children who attended the camps between 2001 and 2003. Mean age 13.9 +/- 1.57; 17 boys 21 girls. (Data was only analysed for 32 with complete data). **Inclusion:** Children with a BMI above the International Obesity Task Force cut-off value for overweight and a letter from their general practitioner recognising their participation. **Exclusion:** None reported **Motivation/referral/ payment:** Majority paid for intervention, with approx 20% referred by PCT or social services department.	**Method of allocation:** Not randomised. **Intervention(s):** Fixed, reduced dietary intake (energy intake of 1,300 to 3,300 kcal per day based on approx basal metabolic rate) and 6 hrs/day of skill-based physical activity while resident at a weight-loss camp for 6 weeks. **Control:** N/A **Sample sizes:** 38 children. **Baseline comparisons:** N/A **Study power:** Not reported **Intervention delivery:** Education team at the camp. **Target group:** Children	**Anthropometry measures:** BMI (kg $m^{-2)}$ in weeks 1 and 6 of the camp and BMI standard deviation scores. Body weight and fat (data not extracted). **Diet measures:** Not measured **Physical activity measures:** Not reported. **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Subjective appetite (Electronic Appetite Rating System using visual analogue scale) **Follow-up periods:** 6 weeks from baseline (i.e. immediately after end of intervention) **Method of analysis:** ANOVA, means and standard deviations (SDs).	**Anthropometry results:** Boys BMI SDS scores (SD): wk1 3.17 (0.49); wk6 2.80 (0.58) (calculated reduction = 0.37) Girls BMI SDS (SD): wk1 3.22 (0.49); wk6 2.88 (0.62) (calculated reduction = 0.34) Boys BMI (SD): wk1 34.8 (5.68); wk6 31.5 (5.38) Girls BMI (SD): wk1 35.1 (5.39); wk6 31.8 (4.98) P values not reported, but authors state significant difference in body mass between wk1 and 6 ($F(1,30)=320.8$ $P<0.0001$. **Other results:** Subjective appetite: in wk6, morning ratings of hunger were higher than in wk1 ($t=3.83$, d.f. = 31, $P<0.005$). Therefore on waking immediately before breakfast the children experienced greater hunger in wk6 compared with wk1 (mean values 65.4 vs 43.2mm respectively). **Attrition:** 16% attrition (data for 32/38) – unclear whether missing data were children dropping out of the programme or just incomplete data.	**Limitations (author):** Difficult to quantify relative contribution of reduction in energy intake and increase in energy expenditure to the change in subjective appetite sensations. **Limitations (review team):** Small sample size. No power calculation. No control group to determine causality of diet on subjective appetite. **Evidence gaps:** None reported – but states it is first study to assess effect of physical activity, dietary and education interventions on subjective appetite sensations in obese children. **Funding sources:** Not reported **Applicable to UK?** Yes – UK study
First author and year: Duckworth 2009 **Aim of study:** This study aimed to evaluate the weight loss and hunger motivation effects of an energy-restricted	**Setting:** UK community (residential weight loss camps). **Participants:** Children aged 9 to 18 years old. 61 girls, 34 boys. Mean age: I = 14.3, C = 14.5 years.	**Method of allocation:** Stratified block procedure (energy group, age, and duration of stay) into one of the two diet groups (protein or standard). **Intervention(s):** All children (including control) attending residential weight-loss	**Anthropometry measures:** BMI SDS. BMI, body mass, height, % body fat, fat mass, waist and hip circumference, **Diet measures:** Not assessed. **Physical activity measures:**	**Anthropometry results:** HP diet had no greater effect on weight loss or changes in appetite or mood when compared to the SP diet. Overall, campers lost 5.2 ± 3.0kg in body weight and reduced their BMI standard deviation score (SDS) by	**Limitations (author):** Study sample size determined by camp attendees rather than a power calculation. **Limitations (review team):** No power calculation, potential conflict of

high-protein (HP – 25%) diet in overweight and obese children. **Study Design :** Quasi-RCT **Quality score:** + **External validity score:** ++	Mean stay: 31 days. **Inclusion:** BMI above cut-off values for overweight (Cole 2000) and had undergone health screening performed by child's family physician. **Exclusion:** Not reported. **Motivation/referral/ payment:** Not reported – but in other papers of weight-loss camps by the same authors, parents paid for their children's attendance (£370 per week) and approx 20% were funded by their PCT or social services department.	camp for 2-6 weeks. Programme included daily schedule of six 1-hour, skill-based, fun, physical activity sessions, dietary restriction, and group-based educational sessions. Intervention: high protein (HP) diet (25% protein, 30-35% fat, and 40-45% carbohydrate. **Control:** Standard camp diet was 15% protein, 30-35% fat, and 50-55% carbohydrate. **Sample size:** 100 overweight children randomised; 5 withdrew, 95 included in analysis. **Baseline comparisons:** N/A. **Study power:** Not reported. **Intervention delivery:** Led by physical education teachers and activity leaders, including qualified sports coaches. Registered dietician designed diets. **Target group:** Children.	Not assessed. **Wellbeing measures:** Not assessed. **Service satisfaction measures:** Not assessed. **Cost effectiveness measures:** Not assessed. **Other measures:** Subjective appetite (hunger) and mood. The following states were assessed: relaxed, happiness, hunger, sadness, tiredness, tenseness, fullness, desire to eat, energy, and meal palatability. Cholesterol and blood pressure (data not extracted). **Follow-up periods:** End of camp attendance – ranged between 2-6 weeks from baseline (depending on how long the children attended the camps). **Method of analysis:** Means and standard deviations. ANOVA.	0.25. Mean BMI SDS (SD) pre vs post: I = 3.00 (0.72) to 2.75 (0.77); C = 3.03 (0.51) to 2.78 (0.61). Main effect of time P-Value = 0.001. **Other results:** Ratings of desire to eat increased significantly over the duration of the intervention, irrespective of diet. Mean desire to eat (SD) pre vs post: I = 37.4 (20.3) to 46.9 (25.1); C = 43.7 (28) to 51.8 (22.8). **Attrition:** 5%	interest, no ITT and unclear if baseline characteristics were statistically significantly different. Whilst several components of subjective appetite and mood were measured, the study only reported results for one. **Evidence gaps:** Further work is warranted into the management of hunger motivation as a result of negative energy balance. **Funding sources:** Glaxo Smith Kline. **Applicable to UK?** Yes.
Goldfield					
First author and year: Goldfield 2001 Raynor 2002 **Aim of study:** To compare the cost-effectiveness of two protocols for the	**Setting:** Not clear. Authors based at university in Buffalo, USA. **Participants:** 31 families with obese 8 - 12 year old children. 24 families provided follow-up data and	**Method of allocation:** Not stated **Intervention(s):** Mixed treatment comprising both individual and group treatment: 15-20 minute individual sessions with a therapist and 40 minutes	**Anthropometry measures:** Height, weight, BMI, z-BMI (US 2000 standards), percentage overweight. **Diet measures:** 24-hour dietary recalls, in which a family member was	**Anthropometry results:** Analyses of variance showed a highly significant change in percent overweight ($F(2,88)=18.01$, $P<.001$) and Z-BMI ($F(2,88)=19.16$, $P<.001$) over time. There were no main effects or interactions due to group	**Limitations (author):** Possible self-selection bias. Various limitations in relation to cost-effectiveness analysis also presented in separate data extraction sheet

delivery of family-based behavioural treatment (obesity related outcomes also provided) **Study Design :** Quasi-RCT **Quality score:** – **External validity score:** +	so were included in the analyses. Mixed treatment group: age=9.8 +/- 1.3 years, 50% female, group treatment: age=10.3 +/- 1.3 years, 75% female. The sample was 100% white. **Inclusion:** a) Child between 20 and 100% overweight, b) neither parent greater than 100% overweight, c) one parent willing to attend treatment meetings, d) no family member participating in an alternative weight control program, e) no child or parent having current psychiatric problems, and f) no dietary or exercise restrictions on the participating parent or child. **Exclusion:** - **Motivation/referral/ payment:** Recruitment was via newspaper advertisements and physician referrals. No mention of motivation or payment.	of group therapy. **Control:** Group treatment only: participants received an additional 20 minutes of group therapy in order to equate time in treatment across groups. Across both conditions group treatment took place over 13 sessions (5 months), and separate parent and child groups were conducted. A mastery approach to teaching was used to teach families how to change eating and activity habits. Participants received manuals divided into modules, and were given instructions on various activities to do at home. Several types of reinforcement were used. Participants were instructed to follow the Traffic Light Diet, to consume between 1000 and 1200 calories a day, and to reduce red foods to no more than 15 per week. Participants received information through their manuals on the positive effects of increasing physical activity and the negative effects of sedentary behaviours. They were given goals to increase their physical activity and were reinforced for any such increases. **Sample sizes:** Mixed treatment n=12, group treatment n=12 (12 parents in each group also)	interviewed 3 times (2 weekdays and 1 weekend day) in a 1-week period, at baseline, 6 months, and 1 year **Physical activity measures:** Not measured **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** See separate data extraction sheet **Other measures:** Demographics: age, gender, SES using the Hollingshead Four Factor Index (Hollingshead, 1975). Costs to families of adopting healthy diets (Raynor 2002, data not reported here) **Follow-up periods:** 6 and 12 months post-randomisation **Method of analysis:** One-way analyses of variance (ANOVAs) were conducted to explore between group differences at baseline for parent and child data. Group differences in percentage overweight and z-BMI were analyzed using a mixed ANOVA, with Group and Generation (child=parent) as the between factors, and Time (baseline, 6, 12 months) as the within factor. Comparisons between	or generation. **Diet results:** No significant differences between groups in dietary intake at any time point **Cost effectiveness results:** See separate data extraction sheet **Attrition:** 24 of the recruited 31 families provided complete anthropometric data and analyses were carried out on these 24 families only. Only 20 families (10 in each arm) provided complete dietary data, dietary analyses were carried out for these 20 families only.	**Limitations (review team):** Small sample size with no power calculation, method of randomisation not reported. Analysed data for those available for follow-up data - no ITT analysis. **Evidence gaps:** The population in this study was mildly to moderately obese and further research is needed to determine if the findings generalise to more obese children, who may require more individualised treatment. **Funding sources:** Grants from the National Institutes of Diabetes and Digestive Diseases and the National Institute of Health. **Applicable to UK?** Potentially, although sample sizes were very small and to implement this sort of approach at a community level could be expensive

		Baseline comparisons: No differences between groups, except for parent height, where parents of mixed treatment participants were taller than those of group only participants (p=.05) **Study power:** Not reported **Intervention delivery:** The meetings were all led by therapists. These therapists were a mixture of those with several years experience and those who were new. **Target group:** Obese children and their parents	groups in the rate of change over time were determined using linear contrasts based on the general linear model.		
Golley (Triple P)					
First author and year: Golley 2007 Golley 2011 **Aim of study:** To evaluate the relative effectiveness of parenting-skills training as a key strategy for the treatment of overweight children. **Study Design :** RCT **Quality score:** ++ **External validity score:** ++	**Setting:** Community. Delivered from two teaching hospitals in Adelaide, Australia. **Participants:** 111 overweight prepubertal children 8.2±1.1 years; 64% female. Mean index of relative advantage = 997±73 (South Australian mean = 960). 98% white ancestry. **Inclusion:** Overweight children (International Task Force definition) aged 6-9; Tanner Stage 1; Caregiver willing to attend sessions and able to read and understand English. **Exclusion:**	**Method of allocation:** Computer generated randomization schedules with 3-block design stratified by gender and recruitment site, allocation concealed in opaque envelopes. **Intervention(s):** 1. Parenting-skills training + intensive lifestyle education (P+DA)**:** Triple P Positive Parenting Programme. 4 weekly 2-hour sessions, then 4 weekly, followed by 3 monthly 15-20 minute individual telephone sessions. Triple P Programme followed by 7 intensive lifestyle support group sessions focused on diet, activity, managing appetite, self-esteem and teasing. While	**Anthropometry measures:** BMI z score (UK reference data); Waist circumference z score **Diet measures:** Food intake via validated 54-item parent completed dietary questionnaire. **Physical activity measures:** Parent-reported 20-item activity questionnaire **Wellbeing measures:** Not assessed **Service satisfaction measures:** Formal programme evaluation **Cost effectiveness measures:** Not assessed **Other measures:**	**Anthropometry results:** At 12 months BMI z score reduced by 9% (range -85 to 18%) in P+DA group, 6% (-48% to 49%) in P group and 5% (-78% to 16%) in WLC group. No statistically significant difference between groups. Absolute differences: -0.24±0.43, -0.15±0.47 and -0.13±0.40 respectively. Boys had significantly lower BMI z scores at 6 and 12 months compared with baseline in both intervention groups but not the control group. For girls, the only significant time change was a reduction in BMI z score in the WLC group. No association between change in BMI z score from baseline to 12 months and indicators of SES.	**Limitations (author):** Study power, intervention adherence and dilution of effect size with ITT procedures may have prevented a statistically significant result. **Limitations (review team):** ITT for those who did not attend all sessions but analysis only on those assessed at each time point. Dietary and physical activity measures self report and potentially subject to desirability bias. **Evidence gaps:** Future studies should be powered for adiposity

	BMI z score > 3.5; diagnosed with a syndromal cause of obesity; using medications that influence weight gain or loss; diagnosis of physical or developmental disability or chronic illness; sibling enrolled in the study. **Motivation/referral/ payment:** Recruitment from July 2002 to August 2003 via media publicity and school newsletters.	parents at lifestyle sessions children had structured physical activity sessions. General 'healthy lifestyle' pamphlet 2. Parenting-skills only (P): Triple P Programme and pamphlet **Control:** Wait list control (WLC): Healthy lifestyle pamphlet only - telephone contact during 12 month wait list period as retention strategy. **Sample sizes:** P+DA: 38 P: 37 WLC: 36 91.3% of eligible participants randomised to treatment. **Baseline comparisons:** No significant differences. **Study power:** 80% power to detect 12 month mean BMI z score from baseline of 0.26±0.49. **Intervention delivery:** Research dietician. **Target group:** Parent only.	Metabolic health outcomes - cholesterol, triacyglycerol, blood pressure, glucose, insulin (not extracted) **Follow-up periods:** 6 months (programme completion) and 12 months. **Method of analysis:** Means±SD and proportions. chi-squared to explore effect of baseline measures weight status, parental weight status, ethnicity, age,SES. Baseline differences between those who did and did not attend follow up explored by t tests. Secondary analyses with gender as a factor and per protocol analysis for families attending ≥75% of the sessions.	Waist circumference z score fell significantly over 12 months in both intervention groups but not WLC group. Absolute differences -0.31±0.53, -0.17±0.0.50 and -0.02±0.58 in the P+DA, P and WLC groups. **Diet results:** At 6 and 12 months, most reported measures of food intakes unchanged other than energy-dense nutrient-poor foods which were lower in both intervention groups. 12 months mean difference from control in P+DA group was -1.0 (95% CI -2.0 to -0.5) and -1.0 (-1.5 to 0.0) in P group. **Physical activity results:** Reported reductions in small screen use and increases in active play across all groups but no between group differences. **Service satisfaction results:** At 12 months all 36 respondents rated service quality provided as 'good to excellent'. All parents in P and 24/26 parents in P+DA group responded that the study had 'helped somewhat' to 'helped a great deal' to make changes to family lifestyle. **Attrition:** 24% at 6 months (post-treatment) and 20% at 12 months (Golley 2011 reports 18% at 12 months). Programme attendance did not differ between the two groups.	reduction in control groups and include gender sub analysis. **Funding sources:** Australian Health Management Group Assistance to Health and Medical Research Fund. Australian National Health and Medical Research Council. **Applicable to UK?** Yes, likely.

Hughes (SCOTT – Scottish Childhood Overweight Treatment Trial)					
First author and year: Hughes 2008 'Scottish Childhood Overweight Treatment Trial (SCOTT)' **Aim of study:** To determine whether a generalisable best-practice individualized behavioural intervention reduced BMI z score relative to standard dietetic care among overweight children. **Study Design :** RCT **Quality score:** + **External validity score:** ++	**Setting:** Hospital outpatient, Glasgow and Edinburgh **Participants:** 134 overweight children aged 5-11 Mean age 9.1 (I) 8.5(C) M:F 30/39 (I) 29/36 (C) Deprived 59.4 % (I) 53.8% (C) **Inclusion:** BMI ≥ 98th centile relative to the UK 1990 reference data for children. Attending standard elementary school; At least one parent perceived the child's weight as a problem and was willing to make lifestyle changes **Exclusion:** Underlying medical cause for overweight; serious comorbidity requiring urgent treatment; received treatment for overweight in past year. **Motivation/referral/ payment:** Referred from hospitals, family physicians, school nurses, dietetic waiting lists, community paediatricians. Recruited June 2003-June 2004. At least one motivated parent.	**Method of allocation:** Computer generated randomization in blocks of 10 (ratio 1:1) stratified by gender and study centre. Statistician informed research dieticians of group allocation they informed participants. **Intervention(s):** Practical best practice programme delivered by paediatric dieticians to families. 8 appointments (7 out-patient, 1 home visit) over 26 weeks with 5 hours contact time. Focus on behavioural change in physical activity, sedentary behaviour, motivation, lifestyle monitoring. **Control:** Standard dietetic care for overweight individual; 3-4 outpatient appointments over 6 to 10 months with total contact time of about 1.5 hours. Largely weight management approach directed towards parents with minimal focus on physical activity or sedentary behaviour. **Sample sizes:** 134 randomised, 69 (I) and 65 (C). 66 (I) and 65(C) received allocated treatment. **Baseline comparisons:** No significant differences between groups. **Study power:** Calculated based on 80% chance	**Anthropometry measures:** BMI z score; Weight; Weight circumference; Height z score (all relative to UK reference data) **Diet measures:** Not assessed **Physical activity measures:** Accelerometer (CSA/MTI WAM-7164). Total activity (counts per minute). Intensity of activity (% sedentary, light intensity, moderate, vigorous). **Wellbeing measures:** Quality of life (Pediatric Quality of Life Inventory 4.0; validated) **Service satisfaction measures:** Not assessed **Cost effectiveness measures:** Economic costs **Follow-up periods measures:** 6 and 12 months from baseline **Method of analysis:** Group differences using Mann-Whitney test or Chi-squared tests. Intention to treat involving all who attended follow-up (no imputation for missing data). Per-Protocol using participants who attended ≥75% of scheduled appointments. Assessors were blinded to randomisation status. Instances of unblinding were reported and occurred in	**Anthropometry results:** No between group differences in BMI z score using both ITT and per protocol analyses. Median difference at 6 and 12 months (ITT analysis) was 0.03 (-0.05 to 0.11) and -0.04 (-0.17 to 0.07) respectively. BMI z score decreased significantly and weight increased significantly in both groups from baseline to 6 and 12 months. **Physical activity results:** Significant between-group differences for change in total activity (mean counts per minute) and % of time spent in sedentary behaviour and light intensity activity in favour of intervention group. Control group showed greater sedentary behaviour (3.60, 0.80 to 6.30) and less light activity (-2.5, -0.04 to 0.13) but difference in moderate to vigorous activity not significant (-0.8, -1.7 to 0.1). Compliance with wearing the accelerometer very poor at 12 months so no data. **Wellbeing results:** No significant between-group differences in QoL scores for the child self-report or parent proxy report from baseline to 6 months, though parent proxy report scores improved significantly in both groups to 6 months. **Cost effectiveness results:** Cost (for 1 patient) of delivering the novel intervention was £108 and £29	**Limitations (author):** Both treatments may need to be compared to a no-treatment group. Being on a waiting lists and being 'identified' may motivate people to make changes. Chosen children very overweight (BMI z score >3) and may have been resistant to treatment. **Limitations (review team):** Only patients who attended follow-up were analysed. No sensitivity analysis was conducted on the lost to follow-up, who are likely not to have improved or to have gained weight. High attrition though ITT analysis used. **Evidence gaps:** None stated **Funding sources:** Scottish Executive Health Department. **Applicable to UK?** Yes, UK based.

		at two-sided 5% significance level for estimated change of 0.4 in BMI z score - observed change = 0.21 and achieved power = 0.9999 for detection of difference of -0.25 over 6 months. **Intervention delivery:** Research dieticians trained in behaviour change counselling (and assessed by independent experts). **Target group:** Whole family	<5% of participants.	for the standard treatment. **Attrition:** 6 months: 20 (29%) (I): 17 (26.2%) (C) 12 months: 24 (34.8%) (I): 24 (36.9%) (C)	
Janicke (Project STORY)					
First author and year: Janicke 2008a and 2008b **Aim of study:** To assess the effectiveness of parent-only vs family-based interventions for pediatric weight-management in underserved rural settings. Project STORY. **Study Design :** RCT **Quality score:** + **External validity score:** ++	**Setting:** Community. Cooperative Extension Service offices; 4 rural counties, USA **Participants:** 93 overweight or obese children (8-14 years old) and their parents **Inclusion:** BMI >85th centile; physician approval to join study. **Exclusion:** Child or parent had medical condition contraindicating mild energy restriction or moderate physical activity; use of prescription weight-loss drugs; enrolled in another weight loss programme. **Motivation/referral/ payment:** Recruitment through direct	**Method of allocation:** Randomisation via computer assignment based on ability to attend one or the two weeknights for the intervention or wait list condition. Two siblings from same family assigned to same condition. **Intervention(s):** 1. Behavioural family-based [FB] Weekly group sessions (90 mins) for 8 weeks, then bi-weekly for 8 weeks (24 weeks total). Guidance via treatment manuals = changes in dietary habits via Stoplight diet; increased physical activity via pedometer based programme. Parent group based on strategies and discussion. Child group based on review of progress, a physical activity and preparation of healthy snack. Simultaneous but	**Anthropometry measures:** BMI z score; Parental BMI **Diet measures:** Child caloric intake **Physical activity measures:** Not measured **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** See Jannike 2009 (cost effectiveness analysis) **Other measures:** None measured. **Follow-up periods:** 10 months from baseline. **Method of analysis:** ITT used. Analysis of covariance (ANCOVA).	**Anthropometry results:** At 4 months, children in parent-only interventiongroup vs control demonstrated greater decrease in BMI z score (mean difference 0.127, 95% CI 0.027 to 0.226). No significant difference between family-based and control condition (0.065, -0.027 to 0.158). At 10 months, children in the parent-only and family-based intervention groups had greater decreases compared to baseline than the control group; Mean differences in BMI z score = 0.115 (0.003 to 0.220) and 0.136 (0.018 to 0.254) respectively. No difference between the parent-only and family-based groups at either time point. No significant differences in parental BMI change across any of the treatment conditions.	**Limitations (author):** Clinical significance of findings unclear. Measures of physical activity and dietary intake not objective. Measures of satisfaction with the study not derived from children in PO condition. Median income of intervention families, below national averages, but higher than that commonly seen in rural communities. Unlike other FB interventions parents did not experience significant decreases in weight status. **Limitations (review team):** More of those who did not attend baseline were assigned to WLC and three families assigned to WLC pulled out before baseline

	mailing, brochures at local schools, community presentations. Families received $50 for each assessment.	separate groups with parents and children brought together to discuss goals and plans. 2. Behavioural parent-only [PO] Similar to parent group above. Emphasis on activity targets to work with children to achieve goals. **Control:** Wait list control (WLC) **Sample sizes:** 111 completed screening; 93 (from 64 families) randomised to groups: Family based: 33 Parent only: 34 Wait list control: 26 **Baseline comparisons:** No significant differences. **Study power:** Post-hoc calculation only. 80% power to detect z score shift from 0.022 to -0.145 in FB vs WLC; and from 0.022 to –0.135 in PO vs WLC. **Intervention delivery:** Family and Consumer Sciences agents in collaboration with postdoctoral psychologist and graduate students in clinical psychology. All received 2 days training before and 6 hours booster training midway through intervention, plus weekly supervision. **Target group:** Parent/carer only and family in two separate arms.		**Diet results:** Although there were statistically significant within-group decreases from baseline to follow up in the FB and PO groups, there were no statistically significant between group differences. **Service satisfaction results:** No statistically significant between group differences in parent-reported measures of 'changes in child life style habits' and 'overall programme satisfaction'. 91% of parents in the FB condition and 88% in the PO condition answered yes when asked if they would join the program again. 85% of children in the FB group responded 'really true', 12% 'sort of true' and 3% 'sort of not true' to the statement 'overall this was a good program'. **Attrition:** Post-treatment = 13% (81/93 completed). 10 months = 24% (71/93 completed) Only three families had both parents regularly attending treatment sessions and completing both assessments.	assessment. **Evidence gaps:** Whether benefits of PO and FB interventions delivered in rural settings through CFS offices can be maintained for a longer follow-up period; Whether additional maintenance sessions can enhance efficacy; Include measures of physiological outcomes to assess clinical significance; Examine relative cost effectiveness of the two approaches; Most effective strategy for training FCS agents as group leaders. **Funding sources:** National Institute for Diabetes and Digestive and Kidney Diseases. Institute for Child and Adolescent Research and Evaluation at the University of Florida. **Applicable to UK?** Yes, likely

Jelalian					
First author and year: Jelalian 2010 Jelalian 2011 Sato 2011 **Aim of study:** To examine the effects of a group-based behavioural weight control intervention on decreasing BMI and z-BMI and on adolescent social functioning **Study Design :** RCT **Quality score:** + **External validity score:** +	**Setting:** Community; USA **Participants:** 118 overweight adolescents; 13-16 years, mean 171.92 14.33 months (SD 12.19); 68% female; 76% Caucasian; 13.6% African-American; other/multiracial 10.3%. **Inclusion:** 13-16 years; 30% to 90% overweight (vs median BMI for age and sex); at least one parent available to participate; English speaking **Exclusion:** Major psychiatric disorder; already enrolled in weight loss program; condition preventing them from participating **Motivation/referral/ payment:** Recruited via local newspaper advertisements and referral from local paediatricians. Participants were offered monetary compensation for completing initial ($50) and follow-up evaluations ($75 end of treatment and $100 one-year follow-up)	**Method of allocation:** Urn (restricted) randomization **Intervention(s):** Behavioural, diet, physical activity CBT+EXER: CBT with supervised aerobic exercise and review of weekly physical activity goals. CBT +PEAT: CBT with peer-enhanced adventure therapy. Physical activity followed by the primary challenge for the group (physical and mental challenges designed to develop social skills, problem-solving abilities, and self-confidence). --- Both groups received 16 one-hour weekly concurrent sessions for parents and adolescents followed by 4 bi-weekly maintenance sessions; balanced deficit diet (1400-1600 calories); gradual increase to 60 minutes physical activity most days. Following group sessions, bimonthly activities to 12 months. Plus additional weekly activity sessions for adolescents. *Intensity:* 23 hours [teens]; 23 hours [parents] **Control:** None **Sample sizes:** CBT + EXER: n= 56, (69% female) CBT + PBST: n=62, (66% female) ---	**Anthropometry measures:** Height and weight to calculate BMI (kg/m2), standardized BMI score (z-BMI), percent over BMI. Waist circumference. **Diet measures:** Weekly records to monitor daily dietary intake. **Physical activity measures:** Weekly records monitoring of number of minutes engaged in daily physical activity. Participation in physical activity assessed by ACTIVITYGRAM. **Wellbeing measures:** Self-Perception Profile for Adolescents Jelalian 2011: Revised 15-item version of Peer Experiences Questionnaire (PEQ) to assess peer rejection; Social Anxiety Scale for Adolescents **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Sato 2011: Parental behaviour **Follow-up periods:** 16 weeks (end of intervention) and 12 months post baseline. **Method of analysis:** Mixed factor analysis of variance (ANOVA) ITT analyses assumed return to baseline values for non-	**Anthropometry results:** Significant reductions with time, with no significant group by time interactions. Significant decreases in BMI ($P < .01$), z-BMI: CBT + PEAT: baseline 1.63 SD 0.40, end of treatment 1.42 SD 0.4, 12 month 1.46 SD 0.050; CBT + EXER: baseline 1.61 SD 0.035, end of treatment 1.45 SD 0.46, 12 month 1.50 SD 0.52; $P < .01$) Follow-up analyses indicated that significant changes primarily relate to reductions from baseline to end of treatment. **Wellbeing results:** Both groups demonstrated significant improvements in self-concept with time ($P < .01$), with no significant differences between groups. Improvements in global self-worth and physical appearance-related self-worth both related to significant reductions in BMI at end of treatment ($r = –0.25$ and $r = –0.28$, respectively). Jelalian 2011: significant decrease on PEQ total score over time, F (2, 174) = 4.33, $p<0.05$, with no effect of group. Reductions in social anxiety also observed over time, $p<0.01$. **Physical activity results:** No significant changes in amount of moderate to vigorous physical activity reported with time ($F[1,85] = 0.66$) and no significant time by group interaction ($F[1,85] = 0.15$). **Other results:**	**Limitations (author):** No treatment control, follow-up limited to 12 months (from baseline), physical activity self-reported; measure of adherence limited. Sato 2011: participating parents almost exclusively mothers **Limitations (review team):** As above **Evidence gaps:** Studies examining extent to which subgroups of adolescents may respond better to one or another intervention. Jelalian 2011: How peer-interactions within weight control intervention impact relationships with friends, evaluation of intervention directly intervening with an adolescent's existing peer group to enhance social functioning. Sato 2011: Influence of fathers on adolescent weight control. **Funding sources:** National Institute of Diabetes and Digestive and Kidney Diseases and the National Institutes of Health and the National Heart, Lung, and Blood

		Jelalian 2011: CBT + EXER: n=44; CBT + PBST: n=45 Sato 2011 n=89 (70.9% female) **Baseline comparisons:** No significant differences **Study power:** With anticipated number of 120, power 0.82 to detect difference as small as 5.4% in percent overweight between groups or approximately 1/3 SD. **Intervention delivery:** Treatment groups led by master- and doctoral-level psychologists with experience in adolescent weight management, plus registered dietician **Target group:** Overweight child and parent(s)	completers No ITT analysis for Jelalian 2011 and Sato 2011	Sato 2011: Higher baseline levels of parental concern about adolescent weight (r=0.28, p<.05) and pressure to eat (r=0.25, p<.05) associated with smaller decreases in adolescent BMI. Only independently significant predictor of adolescent BMI change (p<.01) was parent BMI change. Greater parent self-monitoring (p<.01) predicted greater adolescent weight loss. Greater parent pressure to eat predicted less adolescent weight loss (p<.01). **Attrition:** 18/118 at end of treatment (15%) = 7/56 CBT+EXER; 11/62 CBT+PBST 25/118 at 12 months (21%) = 11/56 CBT+EXER; 14/62 CBT+PBST	Institute. **Applicable to UK?** Likely – community based
Kalarchian					
First author and year: Kalarchian 2009 **Aim of study:** To evaluate the efficacy of family-based behavioural weight control in the management of severe paediatric obesity **Study Design :** RCT **Quality score:** ++ **External validity score:** +	**Setting:** USA. University medical centre **Participants:** 192 children aged 8.0-12.0 years, mean 10.2 +/- 1.2, 56.8% female; 73.4% white, 26% Black / African-American **Inclusion:** Age 8-12; BMI ≥97th percentile; adult willing to participate in the program with the child. **Exclusion:** Mental retardation, pervasive developmental disorder, or psychosis; psychiatric	**Method of allocation:** Participants assigned randomly to study conditions (1:1) through permuted block randomization stratified according to race, with block size of 2, 4, or 6. **Intervention(s):** 20 1-hour group meetings during months 0- 6. Adult and child groups met separately and presented with complementary material. Adult and child weighed and met with a lifestyle coach to review self-monitoring records and set weekly goals. Six booster sessions (3 group sessions and 3 telephone calls) between months 6 and 12. Modified version of	**Anthropometry measures:** Child percent overweight, calculated as percent over median BMI for age and sex (against US standards) Waist circumference, body composition using dual energy x-ray absorptiometry; adult BMI. (Outcomes not extracted) **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Adults completed General Health Perceptions and Global Health subscales of the Child	**Anthropometry results:** INTERVENTION was associated with significant decreases in child percent overweight relative to USUAL CARE at 6-months, but differences were not significant at 12- or 18-months. Children who attended ≥ 75% of INTERVENTION sessions maintained decreases in percent overweight through 18-months. Lower baseline percent overweight, better attendance, higher income, and greater parent BMI reduction were associated with significantly greater reductions in child percent overweight at 6-months among INTERVENTION participants.	**Limitations (author):** Study design did not control for time and attention so can't attribute outcomes to specific intervention components. Youth participating in university based programmes may not be representative of those in the community. **Limitations (review team):** 3 **Evidence gaps:** None stated **Funding sources:** National Institutes of

	symptoms requiring alternative treatment; genetic obesity syndrome; current obesity treatment; inability to engage in prescribed daily activity; medical conditions contraindicating usual care; use of medication known to affect body weight (stable doses of stimulant or antidepressant medication allowed). **Motivation/referral/ payment:** Referral method, motivation and payment not mentioned.	Stoplight Eating Plan with daily energy range based on body weight. Families taught behavioural strategies to increase physical activity and decrease sedentary behaviours. Instruction provided in setting realistic expectations, promoting body image, minimizing emotional eating, and coping with teasing. Adults instructed to set goals for and to model healthy changes in eating and physical activity. *Intensity:* 23 hours [children]; 23 hours [parents] **Control:** Two nutrition consultations to develop individual plan **Sample sizes:** I=97; C=95 **Baseline comparisons:** No significant differences between groups **Study power:** Power computations assumed a 2-tailed significance level of .05. Authors planned to enrol 100 participants per arm for power of 0.8 to detect approximate treatment effect sizes of 0.5, with projected dropout rates of 30%. **Intervention delivery:** Not stated **Target group:** Families	Health Questionnaire, Parent Version, to assess health-related quality of life **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Follow-up periods measures:** 6, 12 and 18 months from baseline **Method of analysis:** Independent t-tests or chi-square analyses (or Fisher's exact tests). Series of mixed models to test the effects of the intervention on the various outcomes. Effect sizes calculated using Cohen's d. Multivariate linear regression model.	<u>Baseline BMI percentile:</u> I=99.17 +/- 0.60, C=99.19 +/- 0.84 <u>Percent overweight change</u> 6 months I = -7.58 +/-1.59 C= -0.66 +/-1.17. p=.0005. 12 months I = -3.91 +/-1.69 C= -0.62 +/-1.24. p=.12. 18 months I = -1.16 +/-1.66 C= -0.17 +/-1.12. p=.62. <u>BMI change</u> 6 months I = -0.68 +/-0.29 C= 0.54 +/-0.21. p=.0007. 12 months I = 0.48 +/-0.30 C= 1.09 +/-0.23. p=.11. 18 months I = 1.50 +/-0.30 C= 1.72 +/-0.21. p=.56. **Wellbeing results:** <u>Global health parent rating change</u> 6 months I = 6.55 +/- 2.10 C= -0.28 +/-2.39. p=.032. 12 months I = 4.13 +/-2.49 C= 0.48 +/-2.84. p=.33. <u>General health perceptions parent rating change</u> 6 months I = 6.88 +/- 1.54 C= 0.46 +/-1.71. p=.006. 12 months I = 5.71 +/-1.81 C= 1.83 +/-1.96. p=.15. **Attrition:** 6 months: I=13.4%, C=26.3% 12 months: I=26.8%, C=36.8% 18 months: I=22.7%, C=17.9%	Health, University of Pittsburgh Obesity and Nutrition Research Center, Children's Hospital of Pittsburgh General Clinical Research Center, and University of Pittsburgh Clinical and Translational Science Institute. **Applicable to UK?** Yes

Kalavainen					
First author and year: Kalavainen 2007, 2011 & 2012 **Aim of study:** To compare the efficacy of group treatment stressing a health-promoting lifestyle with routine counselling in the treatment of childhood obesity **Study Design :** RCT **Quality score:** ++ **External validity score:** +	**Setting:** Finland, health centres and outpatient clinics **Participants:** 70 families with 7-9 year old obese children, F =42 Mean age 8.1 +/- 0.8 years, mean weight for height 142 +/- 14.4%. Families mostly middle or high social class. **Inclusion:** The presence of weight for height from 120 to 200% **Exclusion:** Disease or a medication causing obesity; obvious movement disturbance; major mental problems in either children or parents, family member participating in alternative weight management program **Motivation/referral/ payment:** Recruitment via schools and newspaper articles. Authors indicate participants more aware and motivated and indicated this limited generalisability. No mention of payment.	**Method of allocation:** Children stratified on basis of weight for height in four blocks and then randomly allocated within each block, using closed envelopes. **Intervention(s):** 15 sessions of 90 min duration held separately for parents and children, except one session on making healthy snacks. Group program based on behavioural and solution-oriented therapy and focused on promoting healthy lifestyle and well-being instead of weight management. Material modified from national Magnificent Kids and Magnificent Teens materials and CBT workbook, supplemented with self-developed material. **Control:** Treatment modified from current counselling practice for obese children in Finnish school health care. Two appointments for each child with school nurses and booklets families with info on weight management, eating habits and physical activities. Children completed workbooks partly with school nurses and partly at home with parents. **Sample sizes:** Group treatment n=35, F=19 Routine counselling n=35, F=23 **Baseline comparisons:**	**Anthropometry measures:** Weight for height, based on Finnish national growth charts BMI, BMI-SDS (UK 1990 reference) **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Not measured **Service satisfaction measures:** Parents evaluated each group session immediately afterward on scale from 0 (very poor) to 10 (very excellent). **Cost effectiveness measures:** See separate economic evaluation (Kalavainen 2009) **Other measures:** None **Follow-up periods:** End of 6 month treatment period and 6, 18 and 30 months post-intervention **Method of analysis:** Univariate analyses with independent samples t-tests for continuous variables and χ^2 test or Fisher's exact test for discrete variables. MANOVA for continuous variables. Logistic regression analysis. Correlation of change in weight for height with change in BMI and BMI-SDS evaluated using Pearson's	**Anthropometry results:** There were no significant differences between the treatment arms in the changes of outcome measures from baseline to 2- or 3-years follow-up visits, Kalavainen 2011. Intervention group lost more weight for height (6.8%) than control (1.8%) (P=0.001). Difference significant when analyzed in four groups by cut-off limits of 0, -5 and -10% for change in weight for height. Respective decreases in BMI 0.8 vs 0.0 (P=0.003) and in BMI-SDS 0.3 vs 0.2 (P=0.022). Six months post-intervention, beneficial effects partly lost, but for changes in weight for height and BMI, the differences between the two treatment programs still were significant, and for BMI-SDS, there was a trend (Kalavainen 2007) Baseline BMI-SDS: Group = 2.6 +/- 0.6, routine = 2.5 +/- 0.6 Change in BMI-SDS: End of treatment: group = -0.3 +/- 0.3, routine = -0.2 +/- 0.3, p=.022 6 month follow-up: group = -0.2 +/- 0.3, routine = -0.1 +/- 0.3, p=.081 18 month follow-up: group = -0.2 +/- 0.3, routine = -0.2 +/- 0.4, p=.840 30 month follow-up: group = -0.3 +/- 0.4, routine = -0.3 +/- 0.6, p=.916 Post-intervention, gender significantly associated with change of weight for height (average 4.8% decrease in girls vs 0.9% in boys;	**Limitations (author):** Results not generaliseable as families more aware and motivated than would be typical across population. Sample size not achieved. Weight and height measured at inconsistent times throughout day. Lack of no intervention control group. Data on pubertal status not registered during follow-up **Limitations (review team):** As above **Evidence gaps:** None stated **Funding sources:** 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 and Social Insurance Institution. **Applicable to UK?** Yes

		No differences between groups **Study power:** Power analysis assumed mean baseline weight of 50 kg and 10% difference in beneficial outcomes with 7.5 kg standard deviation. For 80% power and 0.05 significance estimated sample size was 37 children per group. **Intervention delivery:** Parents' groups run by dietician and children's groups by two nutrition students. **Target group:** Families	linear correlation coefficients.	p<.016), but not for BMI-SDS (average 0.3 decrease in girls vs 0.1 decrease in boys).At 6 month follow-up, significant association between gender and BMI-SDS change (on average, a 0.2 decrease in girls and no change in boys. p=.05). **Service satisfaction results:** Parents evaluated group sessions positively. Mean scores out of 10 being 8.9+/-0.7 in autumn and 8.8 +/-0.8 in spring. **Attrition:** The attrition rate <3%. 69/70 at 6 and 18 months 68/70 at 30 month	
King 2007 – see Gately					
Magarey (Peach - Triple P +**)**					
First author and year: Magarey 2011 **Aim of study:** To evaluate a healthy lifestyle intervention to reduce adiposity in children aged 5-9 years and assess whether adding parenting skills training would enhance this effect. Parenting Eating and Activity for Child Health [PEACH] **Study Design :** RCT **Quality score:** ++ **External validity score:**	**Setting:** Children's Hospital Sydney and Flinders Medical Centre Adelaide, Australia **Participants:** 169 overweight children aged 5 to 9. 56% girls. 22% overweight; 78% obese. Mean SES index higher for Sydney (1055±80) than Adelaide (999±66) as expected where the mean is 1000±100 and low score = relative disadvantage. **Inclusion:** Overweight children (Obesity Task Force definition); pre-pubertal; caregiver willing to attend sessions and able to speak English.	**Method of allocation:** Computer generated randomization schedules stratified according to gender and recruitment site, allocation concealed in opaque envelopes. **Intervention(s):** Parenting skills with healthy lifestyle (P+HL). Positive Parenting Program (Triple P) before healthy lifestyle program. Information consistent with traditional nutrition and clinical advice approaches. **Control:** Healthy lifestyle without specific parenting skills (HL). All sessions audiotaped and audited to confirm treatment fidelity. 12 (P+HL) or 8 (HL) 90-	**Anthropometry measures:** BMI z score; Waist circumference z score **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Programme impact via the Parenting Sense of Competence Scale; Alabama Parenting Questionnaire **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** None	**Anthropometry results:** At 24-months overall reductions in BMI z score (0.26, 95% CI 0.22 to 0.30) and waist z score (0.33, 0.26 to 0.40) across both groups but no significant between group differences. 10% reduction in z scores from baseline to 6 months (end of intervention) was maintained to 24-months with no additional intervention. For BMI z score only, boys had higher values than girls at baseline (p<0.001) but changes over time did not vary by gender. In contrast, for waist z score there was a greater decrease in boys compared with girls. Reductions by gender for BMI z score: 0.31 (95% CI 0.25 to 0.38) or	**Limitations (author):** Lack of group difference may be attributable to the generic (rather than obesity specific) nature of the Triple P intervention. **Limitations (review team):** ITT for those who did not attend all sessions but analysis only on those assessed at each time point. **Evidence gaps:** To explore whether comprehensive and weight control specific parenting skills training **Funding sources:** Australian National Health and Medical Research

++	**Exclusion:** BMI z score >4.0; a syndromal cause of obesity; using medications that influence weight; physical or developmental disability; chronic illness; sibling enrolled in the study. **Motivation/referral/ payment:** Recruitment May 2004 - March 2005 via media publicity and school newsletters in Adelaide and Sydney.	120-minute group sessions (open to both parents but usually attended by mothers) and 4 telephone sessions over 6 months tapered (weekly, bimonthly, then monthly). During parental sessions, children attended optional (physically) active child care. **Sample sizes:** I: 85 C: 84 Of 237 screened, consent obtained from 171 = 72%. **Baseline comparisons:** No significant differences. **Study power:** Reported. 80% to detect a reduction in BMI z score of 0.26 ± **Intervention delivery:** Dieticians from medical centre (Adelaide) or children's hospital (Sydney) with accredited training. **Target group:** Parents only	All assessments blinded. **Follow-up periods:** 6 months (end of intervention), 12, 18 and 24 months. **Method of analysis:** Means ± SD and proportions for normally distributed variables. Linear mixed models to explore effects of time, group, gender, site. ITT analysis used and second per protocol analysis of only those who attended 75% or more of program sessions.	12% (range -5% to 45%) in boys and 0.22 (0.16 to 0.27) or 9% (22% to 60%) in girls. Waist z score reductions were 0.44 (0.33 to 0.54) or 14% (-9% to 47%) in boys and 0.21 (0.12 to 0.30) or 7% (-29 to 74%) in girls. In those lost to follow up, tendency to greater BMI z score at last measurement. **Wellbeing results:** Parenting outcome scores in both groups improved from baseline to 6 months ($p<0.05$) and generally remained stable after that to 24 months. There were no between group differences. There was a gender effect for satisfaction, involvement and positive parenting, and better scores for boys in the HL group compared to girls. No adverse events were reported. **Attrition:** Post-intervention (6 months), 12 months and 24 months respectively: Parenting skills: 22.4%, 30.6%, 38.8% Comparator: 16.7%, 23.8%, 35.7%	Council. **Applicable to UK?** Yes, likely.
McCallum (LEAP 1)					
First author and year: McCallum 2007, McCallum 2005 'Live, Eat and Play Trial (LEAP) 1' **Aim of study:** To reduce gain in body mass index (BMI) in overweight/mildly obese children in the	**Setting:** Primary care. Volunteer GPs from 29 general practices, Melbourne, Australia **Participants:** 163 overweight or obese children aged 5-9 Mean age: 7.5(I), 7.4 (C) % Female: 49% I: 54% C Deprived (SES 5) I=21%;	**Method of allocation:** Randomisation stratified by GP and overweight versus obese status. Randomization performed by a third party biostatistician using pre-generated computerised sequence. **Intervention(s):** Four standard consultations over 12 weeks. A 'solution focused' approach to set and record	**Anthropometry measures:** BMI, BMI z-scores [using the US CDC 2000 gender-specific BMI-for-age growth charts **Diet measures:** Parent reported child nutrition (nutrition score, range 0-28 [higher score=better nutrition], calculated from a 4-day food diary)	**Anthropometry results:** UK BMI z score: No significant difference. At 9 months unadjusted difference (I-C) 0.04 (95% CI: -0.16 to 0.23) and adjusted difference (I-C)-0.09 (95%CI: -0.20 to 0.02) At 15 months unadjusted difference (I-C) 0.08 (95% CI: -0.12 to 0.29) and adjusted difference (I-C) -0.03	**Limitations (author):** Dose of intervention may have been too low, more sessions may be needed. Solution focused approach may have lead to goals that were not addressing BMI. Lack of quality control on GP consultations, no objective monitoring of GP consultations.

primary care setting **Study Design :** RCT nested within a baseline cross-sectional BMI survey **Quality score:** ++ **External validity score:** ++	C=31% **Inclusion:** Aged 5-9 years; classified as overweight/mildly obese according to the international Obesity Task Force cut-off points. Not receiving ongoing weight management in secondary or tertiary care. Parents provided contact details. **Exclusion:** Chromosomal, endocrine or medical condition/ disability/medication that could impact on weight or growth. Very obese children (BMI z score >3) **Motivation/referral/ payment:** Families invited following involvement in BMI survey conducted at GP practice.	lifestyle goals targeting change in nutrition, physical activity, and sedentary behaviour, supported by purpose designed family materials in form of personalised 20 page family folder. *Intensity:* 4 hours **Control:** No intervention [GP records audited to assess any contamination] **Sample sizes:** 505 assessed for eligibility 163 randomised: I=82; C=81 **Baseline comparisons:** Comparable although better representation of higher SES groups in intervention arm (49% vs 36% in groups 1&2). **Study power:** Calculated based on 80% chance at two-sided 5% significance level to detect a halving of mean BMI increase to +0.4 kg/m^2. **Intervention delivery:** GPs **Target group:** Whole family	**Physical activity measures:** Parent-reported physical activity [score 1 [sedentary] to 7 [intense activity) from 4-day activity diary] **Wellbeing measures:** Parent-reported health status (PedsQL parent proxy); Child reported health status (PedsQL child self-report), body satisfaction (Collins body figure perception) physical appearance and self-worth (modified Harter scale). **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Detailed separately in Wake 2008, Moodie 2008 **Other measures:** None **Follow-up periods:** 9 and 15 months post-randomization **Method of analysis:** Mean differences (with 95% CI and p values) adjusted for age, sex and socio-economic status (based on the Australian Bureau of Statistics Socio-Economic Indexes for Areas, SEIFA). Assessors blinded to randomisation status.	(95%CI: -0.17 to 0.1) **Diet:** Relative improvement in nutrition scores in intervention arm at both 9 and 15 months. Adjusted mean differences 2.1 (1.3 to 2.9) and 1.6 (0.9 to 2.3) respectively. **Physical activity results:** Weak evidence of an increase in daily physical activity in the intervention arm. Adjusted mean differences 0.2 (-0.0 to 0.4) and 0.2 (-0.0 to 0.3) at 9 and 15 months. **Wellbeing results:** Health status and body image same in the trial arms. **Cost effectiveness results:** Intervention cost: $57 812 in 34 GP practices Per child: $873 (I), $64 (C) **Attrition:** At randomization: 3/82 (I) At 9 month follow-up: 9 (I) and 1 (C) lost to follow up At 15 months follow up: 3 (I) and 4(C) lost to follow up.	**Limitations (review team):** May have been an optimistic power calculation for a brief intervention. Fairly high refusal rate to join trial - 249/505 = 49% Low compliance 41% attended all 4 GP visits. **Evidence gaps:** None stated **Funding sources:** Australian Health Ministers' Advisory Council Priority Driven Research Project Grant; National Health and Medical Research Council Postgraduate Scholarship **Applicable to UK?** Yes, likely.
Murdoch 2011 – see Croker					
Nguyen 2012 – see Shrewsbury					

Norton (Activ8)					
First author and year: Norton 2011 (conference abstract) Activ8 **Aim of study:** To evaluate the effect of the Activ8 intervention on anthropometry and body composition. **Study Design :** UBA (routinely collected data) **Quality score:** – **External validity score:** Insufficient information - abstract only	**Setting:** Community. UK, East London **Participants:** 133 children mean age 10.62 (SD: 2.97) attending in 2009. F=52.9%; 86.7% from ethnic minority backgrounds. Note: this area has large low SES population, but no data provided. **Inclusion:** Overweight children and young people aged 5-18 **Exclusion:** Participants with only single measurements, missing birth date or attending siblings with BMI <91st percentile for age. **Motivation/referral/ payment:**	**Method of allocation:** Not applicable **Intervention(s):** 6-week group intervention consisting of weekly 1-h sessions combining game based physical activities and nutritional education sessions **Control:** Not applicable **Sample sizes:** 133 children **Baseline comparisons:** Not applicable **Study power:** Not applicable **Intervention delivery:** Dieticians and physiotherapists **Target group:** From background info it appears to be a family-based programme http://embed.policyreview.tv/media/documents/SH255_A3_LINDA_BECKETT.pdf	**Anthropometry measures:** BMI, BMI z score, percentage body fat. **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** None identified **Follow-up periods:** 6 weeks from baseline (end of intervention) **Method of analysis:** Comparison of anthropometric and body compositional variables before and after attendance and examining the effect of age and gender on outcomes.	**Anthropometry results:** At 6 weeks, average absolute BMI decreased by −0.29 kg m^{-2} (SD = 0.49, P = 0.000, CI = 95%), which remained significant when converted to z-scores and percentiles. Reduction in z-BMI significantly greater (P = 0.046) in boys compared with girls. Younger age groups achieved significantly greater reductions z-BMI (P = 0.000) and BMI centile (P = 0.009). **Attrition:** 63/133 (47%)	**Limitations (author):** Possible confounding from ethnicity and comorbidities. **Limitations (review team):** Routinely collected data with limited follow-up. High attrition. **Evidence gaps:** Longer term RCT study required to see if outcomes maintained. Examination of high drop-out and low uptake. **Funding sources:** Not stated **Applicable to UK?** Yes – UK programme
Nova					
First author and year: Nova 2001 **Aim of study:** To compare two types of intervention intended to reduce weight in obese children that can be carried out in the	**Setting:** Community; Italy **Participants:** 186 obese children; aged 3-12 years; 104 males; 81 females **Inclusion:** Obese children aged 3-12	**Method of allocation:** Randomised by paediatrician. No details of method provided. **Intervention(s):** **Behavioural, diet and physical activity** Diet (1400 calories); detailed guidelines regarding physical activity and active parental	**Anthropometry measures:** Variation in percentage overweight; height, weight, BMI **Diet measures:** In group adherence to diet **Physical activity measures:** Changes in behaviour: hours of	**Anthropometry results:** Compared with starting values, reduction in percentage overweight was observed in both groups. Reduction significantly higher in group B (–8.8% at 6 months; –8.5% at 12 months) than in group A (–2.9% at 6 months; –2.9% at 12 months). In group B, observed reduction in	**Limitations (author):** Intervention group was smaller and contained children who were more overweight. **Limitations (review team):** No details of randomisation, high

family paediatricians (FPs) office. **Study Design :** Quasi-RCT (cluster) **Quality score:** + **External validity score:** +	(EID index ≥20%) attending FP office between 15 Nov 1997 and 31 March 1998. **Exclusion:** None specified **Motivation/referral/ payment:** Enrolled by paediatrician.	commitment, and a food diary with instructions for use supplied to families. Diary reviewed with child and parents at follow-up visits. FP reported subjective evaluation of the accuracy of filling in the diary with aim of reinforcing family's compliance with changes in eating behaviour, and to provide elements to judge degree of parental commitment. FPs 'subjectively' rated level of parental commitment using the information collected during interview. *Intensity:* 0 hours (information and regular assessment only) **Control:** General information leaflets regarding obesity and associated risks, general advice on healthy eating, and invitation to practice some physical activity. **Sample sizes:** Group A (routine care): 114, (66 male, 47 female) Group B (enhanced care): 72, (38 male, 36 female) **Baseline comparisons:** The two groups were comparable for sex, age, scholastic and behavioural variables. Intervention smaller than control group, contained children who were more overweight and with a higher propensity for snacking. **Study power:** No power calculation but authors state that the minimum number	physical activity per week; hours using TV and PC per day. **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Level of parental commitment - good/sufficient/poor (intervention group only) **Follow-up periods:** Intervention: 1, 2, 4, 6, 9, 12, 15, 18, 24 months Control: 6, 12 and 24 months (Paper presents 6 and 12 month results) **Method of analysis:** Univariate differences using Fisher's exact test and Wilcoxon rank-sum tests. Change versus baseline using two-way analyses of covariance using the treatment as factor, Analyses of covariance for repeated measures. Trend for variables on >2 levels based on Cochran–Armitage test. All tests and p-values two-tailed. .	weight associated with changes in dietary behaviour and with level of parental involvement. Mean (SD) BMI at baseline, 6 and 12 months respectively: Intervention: 23.8 ± 2.7, 22.5 ± 2.5, 23.0 ± 2.4 Control: 22.4 ± 1.9; 22.2 ± 1.9; 22.7 ± 2.1 **Diet results:** 'Good' parental commitment positively related to child's compliance. 73% and 88% respectively at 6 and 12 months. 'Poor' parental commitment associated with almost total loss of compliance with 0% and 11% at 6 and 12 months respectively. **Physical activity results:** No significant variations in physical activity, PC or TV use noted within either group from 0 to 12 months. **Other results:** Reduction in % overweight significantly correlated with good (vs sufficient or poor) parental commitment (intervention only) At 6 and 12 months respectively: Intervention: 70.8% and 69.4% Control: 80.7% and 70.2% P-value for trend 0.005 and 0.02 for intervention and control respectively) **Attrition:** Intervention: 6 months 29% (21/72), 12 months 31% (22/72) Control:6 months 19% (22/114), 12 months 30% (34/114)	attrition rate. **Evidence gaps:** FPs should be given more effective tools to control excess weight in a paediatric primary care setting. **Funding sources:** No details **Applicable to UK?** Likely – community setting

		of children required for the study was achieved **Intervention delivery:** Family paediatricians **Target group:** Families			
Okely 2010 – see Collins					
Petty					
First author and year: Petty 2009 **Aim of study:** To test the dose response effects of an exercise program on depressive symptoms and self worth in children. **Study Design :** RCT **Quality score:** + **External validity score:** ++	**Setting:** Community, Augusta, USA – intervention in research centre gymnasium **Participants:** 207 overweight children. Age : 9.3 (1.0) years F = 58% Parent education: 73% had some college education. 122 Black (59%): 85 White (41%) **Inclusion:** Overweight children aged 7-11 (≥85th percentile BMI). No medical condition that would affect results or limit activity; not participating in regular physical activity programme for >1 hr/week; attend school participating in study; willing to provide a blood sample. **Exclusion:** None stated. **Motivation/referral/ payment:** Volunteers responding to flyers and presentations in	**Method of allocation:** Assigned by statistician using computer-generated randomization sequence balanced by race and gender; concealed until interventions were assigned. **Intervention(s):** For 12.8 ± 1.6 weeks 1) low dose exercise (LDE) 20 minutes per school day 2) high dose exercise (HDE) 40 minutes per school day In gym (at research centre) for exercise classes. **Control:** No exercise provided. **Sample sizes:** 840 assessed 222 randomized: LDE = 71; HDE = 73; C = 78 **Baseline comparisons:** No difference between groups, but differences by ethnicity (so results stratified by ethnicity). Black children had higher BMI, parents reporting unmarried status and lower educational level.	**Anthropometry measures:** BMI z score **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Reynolds Child Depression Scale. **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** SPPC (Scholastic Competence, Social acceptance, athletic competence, physical appearance, Behavioural conduct, global Self worth). **Follow-up periods:** 13 weeks from baseline **Method of analysis:** Analysis of variance and correlation. Linear contrasts for pre- and post- pair wise comparisons. Intent-to-treat analyses of covariance compared groups' adjusted	**Anthropometry results** BMI z score at 13 weeks follow-up: Black – baseline : 2.3 (C), 2.2 (LDE), 2.1 (HDE); follow up: 2.3 (C), 2.1 (LDE), 2.0 (HDE) White – baseline: 1.9 (C), 2.0 (LDE), 1.9 (HDE); follow up: 1.9 (C), 1.9 (LDE), 1.8 (HDE). Adjusting for baseline, race, gender, cohort showed a dose response reduction in BMI z score with intervention ($p<0.001$). There was no interaction of group with race or gender. **Wellbeing results:** Depression score at 13 weeks: Black – baseline: 48.3 (C), 54.5 (LDE), 50.8 (HDE); follow up: 48.9 (C), 51.5 (LDE), 48.0 (HDE). White – baseline: 53.1 (C), 51.3 (LDE), 48.0 (HDE); follow up: 51.7 (C), 47.5 (LDE), 45.4 (HDE). Dose response benefit of the intervention for RCDS (depression): Not significant for LDE and HDE dose, or LDE and C, but significant in HDE and C. **Other results:** HDE group showed improved SPPC	**Limitations (author):** Children in the sample were not depressed to start with. Results cannot be generalised to lean children, other races or to clinically depressed children. **Limitations (review team):** Paid volunteers from specific contributing schools makes this sample less representative than other designs. **Evidence gaps:** None stated **Funding sources:** National Institutes of Health. **Applicable to UK?** Yes.

	local public schools. Incentive of $50 saving bond for baseline and $200 at post test for completion testing procedures.	**Study power:** Not reported. **Intervention delivery:** Not stated **Target group:** Children	post-test values.	compared to control (p=0.02) **Attrition:** C = 10/78 ; LDE = 2/71; HDE = 3/73	
Pittson (Y W8)					
First author and year: Pittson 2011 Pittson 2010 Upton 2010 (evaluation inc cost effectiveness) **Y W8** **Aim of study:** To develop and evaluate results of a weight management programme **Study Design:** UBA **Quality score:** – **External validity score:** ++	**Setting:** Community – local education college in Telford and Wrekin, West Midlands **Participants:** 48 families with overweight children **Inclusion:** Overweight children (BMI >91st centile - UK 1990 reference charts) aged 8-13. At least one parent/carer to attend. **Exclusion:** None stated **Motivation/referral/ payment:** Self-referral or heath professional referral (GP, school nurse)	**Method of allocation:** N/A **Intervention(s):** 12 weekly two-hour after school sessions involving interactive workshops and activity sessions. Mix of balanced diet (all family), behavioural coaching (parent), physical activity (child) **Control:** None **Sample sizes:** 48 families **Baseline comparisons:** Not applicable **Study power:** Not applicable **Intervention delivery:** Weight loss mentors from PCT obesity services team. **Target group:** Families	**Anthropometry measures:** BMI – child and parent **Diet measures:** Not reported **Physical activity measures:** Not reported **Wellbeing measures:** Evaluation form **Service satisfaction measures** Evaluation form as above **Cost effectiveness measures:** Reported in Upton 2010 **Other measures:** None reported **Follow-up periods:** 12 weeks from baseline (end of intervention. **Method of analysis:** Paired sample T-test to analyse pre- and post-data. Missing data managed using pairwise deletion.	**Anthropometry results:** Both children (mean pre-BMI = 28.48 (±4.44), mean post-BMI = 27.48 (±4.45; p= .001) and parents (mean pre-BMI = 30.77 (±6.21), mean post-BMI = 30.41 (±6.17; P = 0.017) decreased their BMI over 12 week programme **Wellbeing/Service satisfaction results:** 90% of children reported feeling healthier, happier, fitter and more confident, as well as making new friends. Children also reported increased confidence and ability to play sports and try new activities. Parents found all aspects useful in helping them to support their child **Cost effectiveness results:** Cost per child £555-£845 (data from Upton 2010) **Attrition:** 9/48 = 19% at 12 weeks	**Limitations (author):** None stated **Limitations (review team):** Small scale uncontrolled study with no follow-up beyond programme end. **Evidence gaps:** RCT – currently in progress **Funding sources:** Sport England and Big Lottery. **Applicable to UK?** Yes – UK programme
Raynor 2002 – see Goldfield					
Rennie (BeeZee Bodies)					
First author and year: Rennie 2010 [Conference abstract]	**Setting:** Community; UK, Bedfordshire. (No information given)	**Method of allocation:** Not applicable **Intervention(s):** 17 weekly group sessions	**Anthropometry measures:** BMI z score (British 1990 growth reference data) **Diet measures:**	**Anthropometry results:** At end of programme, significant decrease in z score in girls but not in boys. Mean changes –0.12 (SEM	**Limitations (author):** Further evaluation required in larger participant sample with more accurate body

BeeZee bodies **Aim of study:** To investigate changes in body weight measurements between the start and end of the BeeZee bodies programme. **Study Design :** UBAs (three pilots) **Quality score:** – **External validity score:** Insufficient information - abstract only Additional info from BeeZee Bodies website: http://www.beezeebodies.co.uk/	**Participants:** 53 young people aged 6-15 F = 60.4%. Baseline mean z score M = 3.01 (SEM 0.11); F =3.06 (SEM 0.10). **Inclusion:** Not reported **Exclusion:** Not reported **Motivation/referral/ payment:** Self-referred or referred by a health professional	focusing on behaviour change to improve physical activity, diet and self-efficacy. Modelled on "Do Something Different Programme" **Control:** No control group **Sample sizes:** 53 **Baseline comparisons:** N/A **Study power:** Not reported **Intervention delivery:** Multidisciplinary team including dieticians. **Target group:** Family	Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Not measured **Follow-up periods:** 17 weeks (programme end) **Method of analysis:** Not reported	0.03, p<0.001) and –0.08 (SEM 0.04, p=0.08) respectively. **Attrition:** 9 did not complete and 2 with missing anthropometric data = 11/53: 20.8%	composition measures and longer follow-up. **Limitations (review team):** No control group. Very small sample size. Written up in abstract form only. **Evidence gaps:** See author limitations. **Funding sources:** Sport England Community Investment Fund, Bedford Borough Council and NHS Bedfordshire **Applicable to UK?** Yes
Resnicow (Go Girls)					
First author and year: Resnicow 2005 Go Girls **Aim of study:** To develop and test a culturally tailored intervention program for overweight 12 to 16 year old African American adolescents and their parents. **Study Design :** Quasi-RCT (cluster) **Quality score:** – **External validity score:**	**Setting:** Aftican-American churches. Atlanta, USA **Participants:** 123 African-American girls (and parents – mostly mothers attended). Mean age 13.6 (SD 1.43). Churches middle and upper income. **Inclusion:** Aged 12 – 16; BMI > 90th percentile for age and gender. **Exclusion:** Outside age or BMI range reported above. **Motivation/referral/**	**Method of allocation:** Allocation by church (clustered) but randomisation method not reported. **Intervention(s):** High-intensity intervention: Go-Girls (church-based) nutrition and physical activity programme. Weekly group behavioural sessions at participating churches (range 20- 26 sessions over 6 months). Sessions included ≥30 minutes moderate to vigorous exercise and preparation and/or consumption of low fat, portion controlled meals or snacks. At start, girls attended a 1-day	**Anthropometry measures:** BMI. Blood pressure, % body fat, waist and hip circumferences serum measure of lipids, insulin and glucose and fitness also measured but not extracted for review. **Diet measures:** Not measured **Physical activity measures:** Not measured **Wellbeing measures:** Not measured **Service satisfaction measures:** Not measured **Cost effectiveness measures:**	**Anthropometry results** Net difference between high and moderate intensity groups 0.5 BMI units - not significant (p=0.20). Mean BMI baseline vs 6 months (SD): I= 32.0 (5.8) to 31.9 (5.5); C= 33.2 (7.3) to 33.6 (7.8); p = 0.20 1 year follow-up results mirrored those at 6 months. Mean BMI baseline vs 1 year (SD): I= 32.6 (5.7) to 33.3 (5.9); C= 33.2 (7.7) to 33.7 (8.4); P-Value = 0.76 Girls in high-intensity condition, attending >75% of sessions had significantly lower BMI relative than those attending fewer sessions. Mean BMI baseline vs 6 months (SD):	**Limitations (author):** Insufficient power, with difficulties enrolling eligible girls. Intervention required large number of staff, resulting in higher costs than anticipated. Intervention could only be delivered in three sites at one time which meant staggering it over three years. Selection bias likely as girls who dropped out significantly less overweight at baseline. Favourable changes among high attendees may reflect differences in motivation

+	**payment:** Self-referred (responded to advert). Churches received incentive of $500 if 15 eligible participants completed baseline assessment. Additional $200 provided if 20 eligible participants completed baseline assessment.	retreat at a national park. Also received two-way paging device that sent messages/reminders about eating or physical activity. 4-6 motivational interviewing (MI) sessions also provided. *Intensity:* Estimated 29-35 hours [high intensity] vs 6 hours [low intensity] **Control:** Moderate intensity intervention – six session programme delivered monthly. Topics included some education. ---------- In both groups, parents invited and encouraged to attend every other session (separate group for behavioural activity) then convened with daughters for physical activity and food tasting. **Sample sizes:** 147 at baseline Data reported for 123 girls. **Baseline comparisons:** Values appear similar, but paper doesn't report if there are statistically significant differences. **Study power:** Insufficient power (the study was powered to detect a difference of 1.5 BMI units and an effect size of 0.3). **Intervention delivery:** Group sessions led by 2 trained staff (masters level), including dietician and exercise psychologist plus 2 or 4 support	Not reported **Other measures:** None reported. **Follow-up periods:** 6 months (end of intervention) and 1 year from baseline **Method of analysis:** ANOVA, ITT and a dose-response effect for girls who attended more than ¾ of the total sessions to those completing fewer.	High attenders: 31.6 (5.8) to 32.1 (5.8); Low attenders: 32.5 (5.9) to 31.7 (5.3); P = 0.01 **Attrition** 20% attrition at 12 months from baseline. ITT performed.	leading to greater attendance or behaviour changes. **Limitations (review team):** Intervention was clustered, yet analysis is based on individuals with no adjustment for clustering effect reported. Precision of effects may be overestimated. Participating churches required intervention in both arms. **Evidence gaps:** None reported. **Funding sources:** Not reported. **Applicable to UK?** Focused population – with potential applicability to ethnic minority (African) groups.

		staff. Counsellors provided MI **Target group:** Children and parents.			
Robertson (Families for Health)					
First author and year: Robertson, 2011 Robertson 2008 "Families for Health" **Aim of study:** To undertake a 2-year follow-up of families who attended 'Families for Health' in Coventry, to assess long-term outcomes and costs. **Study Design :** UBA **Quality score:** – **External validity score:** +	**Setting:** Community. Leisure Centre in Coventry, England **Participants:** 27 overweight or obese children aged 7-13 years (18 girls, 9 boys) and their parents, from 21 families. Mean age 9.3 (1.7) SES: Never worked 9%; routine manual 43%; intermediate 24%; managerial 24% 82% white: 18% Asian/mixed race. 43% two-parent, 43% single-parent and 14% step families. 57% with at least one parent obese. **Inclusion:** Overweight children aged 7-13 (BMI 91st to 97th centile) or obese (BMI ≥ 98th centile). **Exclusion:** Family did not speak English; medical cause for obesity. **Motivation/referral/ payment:** Health professional- and Self- referral (responding to press releases). Primary school distribution of flyers	**Method of allocation:** NA **Intervention(s):** 12-week 'manualised' programme with a 2.5 h session each week comprising parallel groups for children and parent(s) or carer(s); Groups meeting mid-session for activity and healthy snack. Programme comprises evidence based elements: Parenting advice from the UK based Family Links Nurturing Programme, healthy eating components from the Food Standards Agency. **Control:** No control group. **Sample sizes:** 27 **Baseline comparisons:** N/A **Study power:** No. Pragmatic choice of sample size. **Intervention delivery:** Programme developer a person from local services (health visitor, school nurse) **Target group:** Family	**Anthropometry measures:** BMI z score; Waist circumference z-score. Percentage fat measured by bio-impedance (BMI z scores only extracted). **Diet measures:** Child's eating habits in home via 'Day in the Life Questionnaire'. 'Family Eating and Activity Questionnaire' **Physical activity measures:** 'Family Eating and Activity Questionnaire' 7 day recording with uniaxial accelerometer with step function (ActiGraph). Activity diary **Wellbeing measures:** Children's QoL (PedsQL); Parents' mental health (Short Depression-Happiness Scale) and the Child-Parent Relationship Scale. **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Costs of the programme via parental questionnaire (costs to attend, additional food and clothes, time and child care) and direct costs (facilitators' time, hire of venue,	**Anthropometry results:** At 3 and 9 months and 2 years mean reductions in BMI z-score from baseline −0.18 (−0.30 to −0.05), 0.21 (-0.35 to -0.07) and -0.23 (-0.42 to -0.03; p=0.027). **Diet results:** At all time points less exposure to unhealthy foods in the home and improved eating style. Results at 3, 9 months and 2 years respectively were (Golan questionnaire, lower is better): -3.1 (-4.6 to -1.6); -3.3 (-5.0 to -1.5) and -2.0 (-3.5 to -0.5) No statistically significant difference in eating related to hunger or fruit and vegetable consumption. **Physical activity results:** Significant reduction in sedentary behaviour at all time points. Inactivity/activity ratios for 3, 9 months and 2 years (Golan, lower is better): -8.5 (-13.9 to -3.2), -6.8 (-12.1 to -1.4), -9.6 (-14.7 to -4.6). **Wellbeing results:** Children's quality of life improved significantly from both the children's and parents' perspectives at 2 years: 11.8 (4.0 to 19.7) and 11.9 (4.8 to 19.0) respectively (range 0-100). **Cost effectiveness results:** Costs of the programme were £517	**Limitations (author):** No control group. Assessment of dietary and physical activity measures self reported. Potential for desirability bias (although subjects were not told their previous scores). Noted that an RCT now indicated. **Limitations (review team):** Small sample size of motivated people. Few participants were low SES and all self referred. Programme may be less effective in harder to reach communities. **Evidence gaps:** RCT required. **Funding sources:** Department of Health (Public Health Initiative); Coventry Teaching PCT. **Applicable to UK?** Yes, UK study

	(no families came through this method)		consumables). **Other measures:** Not measured **Follow-up periods:** 3 months, 9 months and 2 years from baseline. **Method of analysis:** Linear mixed models with random family effects for differences in scores between both (1) baseline and 3 months (end of programme) and (2) base line and 9 month follow-up. Intention to treat analysis	per family (£402 per child), equivalent to £2,440 per unit reduction in BMI z-score at 9 months and £2,543 at 2 years. **Attrition:** 18.5% at 3 and 9 months. 30% at 2 years. 22 (81.5%) children were followed to 3 & 9 months and 19 (70%) to 2 years.	
Rudolf 2006 – see Bryant					
Sabin 2007 – see Banks					
Sacher (MEND 7-13)					
First author and year: Sacher 2010 **Aim of study:** To evaluate the effectiveness of the Mind, Exercise, Nutrition, Do it (MEND) Program, a multi-component community-based childhood obesity intervention **Study Design :** RCT **Quality score:** + **External validity score:** ++	**Setting:** London, UK. MRC Childhood Nutrition Centre at University College London. **Participants:** 116 obese children. 50% non-white ethnic background; approx 60% parents in manual occupations. Mean age: I = 10.2; C = 10.3. Gender (F) I=63%; C= 45%. **Inclusion:** Children aged 8-12; BMI ≥98th percentile, UK (1990); no clinical problems, co-morbidities, physical/learning difficulties, that would interfere with participations. Parent/ carer able to attend	**Method of allocation:** Computer-generated random permuted block design. **Intervention(s):** Multi-component healthy lifestyle program of 18 2-hour sessions delivered early evenings over 9 weeks followed by 12 week free family swim oass Nutrition: customised healthy eating advice. Guided family supermarket tour and provision of healthy recipes. Sessions included preparation of healthy meals and fruit and vegetable sampling. "Non-dieting" philosophy advocated throughout. Behaviour change: teaching parents and children to apply	**Anthropometry measures:** Change in waist circumference from baseline to 6 months; change in BMI and % body fat. **Diet measures:** Not measured **Physical activity:** Self-reported hours per week (non-validated questionnaire) **Wellbeing measures** Self-report using Harter self-perception profile (self-esteem) **Service satisfaction measures:** Not measured **Cost effectiveness measures:** Not measured **Other measures:** Not measured **Follow-up periods:**	**Anthropometry results:** Children were followed up 12 months from baseline (0 and 6 months post-intervention for the control and intervention group, respectively). Participants in the intervention group had a reduced waist circumference z-score (−0.37; P < 0.0001) and BMI z-score (−0.24; P < 0.0001) at 6 months when compared to the controls. At 12 months, children in the intervention group had reduced their waist and BMI z-scores by 0.47 (P < 0.0001) and 0.23 (P < 0.0001), respectively. All outcome measures at six months from baseline. Except where stated: n=37 (I); n=45 (C). Waist circumference and BMI significantly less in intervention	**Limitations (author):** Outcome assessment not blinded. Selective drop-out. Short follow-up – six months; 12 months for intervention only **Limitations (review team):** Significant attrition. Close financial links with MEND Central Ltd. **Evidence gaps:** Effectiveness on a larger scale (being addressed by follow-up study. **Funding sources:** Financial and non-financial support (staff and venues): National Institute for Health Research, Sainsbury's Supermarkets

	each program session. **Exclusion:** None stated **Motivation/referral/ payment:** Combination of healthcare professional- and self-referral. Numbers not stated. Externally funded study; no indication participants were required to pay.	techniques such as stimulus control, goal setting, reinforcement, and response prevention. Exercise: included 1 h of land and water-based exercise for children only. **Control:** 6-month waiting list for intervention **Sample sizes:** Eligible: not stated Recruited: 117 (1 excluded) I = 60 C = 56 **Baseline comparisons:** Broadly similar at baseline **Study power:** 40 children per group for 80% power to detect 3cm difference in waist circumference. **Intervention delivery:** Teams of health, social, education, and exercise professionals. **Target group:** Family – some elements directed at obese child, some at parents and some at whole family,	6 and 12 months from baseline for intervention group – controls began intervention at 6 months. **Method of analysis:** Mean difference adjusted for baseline	(n=37) vs control group (n=45) adjusted for baseline (−4.1 cm and −1.2 kg/m2, respectively, or −0.24 and −0.37 z-scores ($p < 0.0001$). Body fat % did not change significantly between groups: mean difference: -1.6 (95%CI: -5 to 1.9) p=0.7. [n=23 (I); n=22 (C)] **Physical activity results:** Mean (SD): I = 14.2 (8.2); C = 11.0 (7.8). Mean difference: 3.9 (0.1 to 7.8) p=0.04 **Wellbeing results:** Self esteem (max 4) [n = 37 (I); 44 (C)] Mean (SD): I = 3.2 (0.7); C = 2.9 (0.7). Mean difference: 0.3 (0.0 to 0.7) p=0.04 **Attrition:** from baseline I: 37/60 seen at 6 months; 42/60 at 12 months. C: 45/56 seen at 6 months; 38 at 12 months.	Ltd., Bromley Mytime, Bromley 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, Lewisham Hospital NHS Trust, UCL Institute of Child Health, Waveney PCT, MRC. Three members of research team subsequently employed in clinical/ research roles with MEND Central Ltd. MEND will return a proportion of future revenues to UCL Institute for Child Health where several authors are/were employed. **Applicable to UK?** Yes – UK study
Sato 2011 – see Jelalian					
Savoye (Bright Bodies)					
First author and year: Savoye 2007 and 2011 Bright Bodies **Aim of study:** To determine if	**Setting:** Community – delivered at a school. New Haven USA. **Participants:** Intervention:	**Method of allocation:** Permuted block randomisation, generated by computer. Concealed by study statistician. **Intervention(s):**	**Anthropometry measures:** BMI SDS. BMI, body mass, height, % body fat, fat mass, weight and height. **Diet measures:**	**Anthropometry results:** Treatment effect was sustained at 24 months in the intervention versus control group for BMI z score (-0.16 95% CI -0.23 to -0.09).	**Limitations (author):** High attrition, though dropout rates were similar in both treatment groups. Lack of psychosocial measures and cost-

beneficial effects of a weight management program could be sustained for up to 24 months. **Study Design :** RCT **Quality score:** + **External validity score:** ++	children mean age 12.0 years; 55.2% female (n=58); 38.1% white, 38.1% black and 23.8% Hispanic. Control: Children with mean age of 12.5 years, 68.1% female (n=47), 34.8% white, 39.1% black and 26.1% Hispanic. **Inclusion:** English-speaking, aged 8 -16 BMI ≥ 95th percentile. **Exclusion:** Serious medical conditions; use of medications that may cause weight gain/loss; involvement in existing weight management programme. **Motivation/referral/ payment:** Recruited from university paediatric obesity clinic by clinicians who were co-investigators.	Intensive family-based lifestyle program of exercise, nutrition and behaviour modification. Twice-weekly sessions for 6 months, then twice monthly for further 6 months. Intervention group further randomized 1:1 to Structured Meal Plan (n=35) or Better Food Choices group (n=105), but this randomization discontinued due to high dropout rate. Only results for Control and Better Food Choices groups analysed. *Intensity:* 90 hours **Control:** Clinic control group. **Sample size:** 209 randomised; 174 analysed 105 = Better Food Choices 35 = discontinued arm. 69 = Control **Baseline comparisons:** No significant differences. **Study power:** Not reported. **Intervention delivery:** Exercise physiologists delivered exercise component. Behaviour modification classes facilitated by dietician or social worker. **Target group:** Children and parents.	Not assessed. **Physical activity measures:** Not assessed. **Wellbeing measures:** Not assessed. **Service satisfaction measures:** Not assessed. **Cost effectiveness measures:** Not assessed. **Other measures:** triglycerides, cholesterol, blood pressure, fasting insulin and glucose, insulin resistance (data not extracted) **Follow-up periods:** 6, 12 and 24 months from baseline. Intervention took place over first 12 months. **Method of analysis:** Mean changes from baseline and 95% confidence intervals (CIs).	At 6 months: mean change in BMI z score, 95% CI: I (n=86) -0.16, (-0.20 to -0.13); C (n=49) 0.01, -0.04 to 0.06). Treatment effect (I-C) mean -0.18, -0.24 to -0.12). P-Value <0.001. At 12 months: mean change in BMI z score, 95% CI: I (n=75) -0.21, -0.25 to -0.17; C (n=44) 0.01, -0.04 to 0.07. Treatment effect (I-C) mean = -0.23, -0.29 to -0.16). P-Value <0.001. At 24 months: mean change in BMI z score, 95% CI: I (n=45) -0.20, -0.25 to -0.16; C (n=31) -0.05, -0.10 to 0.01. Treatment effect (I-C) mean = -0.16, -0.23 to -0.19). P-Value <0.001. **Attrition:** At 6, 12 and 24 months respectively: Intervention: 18%, 29%, 57% Control: 29%, 36% and 55%.	effectiveness information. **Limitations (review team):** No power calculation, high attrition and unclear if blinded. **Evidence gaps:** None reported. **Funding sources:** National Center for Research Resources, a component of the NIH and NIH/National Institute of Diabetes and Digestive and Kidney Diseases grant, Yales University School of Medicine, McPhee Foundation, Tegger Foundation and Fulbright Commission. **Applicable to UK?** Yes – community based
Shrewsbury (Loozit)					
First author and year: Shrewsbury 2009, 2010, 2011	**Setting:** Community-based, Sydney, Australia	**Method of allocation:** Computer-generated randomisation sequences	**Anthropometry measures:** BMI *z* score Waist circumference *z* score	**N.B No between group differences reported at 2 months** **Anthropometry results:**	**Limitations (author):** Lack of a no treatment control group. Reliance on

Nguyen 2012 **Aim of study:** To assess the outcomes of a community based weight management programme for overweight to moderately obese 13-16 year olds, and to evaluate the effect of additional therapeutic contact 12 months into the programme **Study Design :** RCT **Quality score:** ++ **External validity score:** ++	**Participants:** 151 adolescents aged 13-16, mean age 14.1 +/- 0.9, 48% male, mean BMI 30.8 +/- 3.9, BMI z score 2.02 +/- 0.33 **Inclusion:** a) Overweight to moderately obese (BMI *z* score range 1.0-2.5) but otherwise healthy, b) age 13 to 16 years, c) available to attend the initial group sessions with one of their parents or caregivers on specified days, and d) ability to access a landline telephone and e-mail and/or a mobile telephone. **Exclusion:** Secondary causes of obesity; significant medical illness **Motivation/referral/ payment:** Recruitment mainly through the media, schools, health professionals, and community organisations.	stratified by sex, age group, and intervention site **Intervention(s):** Loozit group weight management programme Loozit group weight management programme plus additional therapeutic contact (ATC) Loozit component in two phases. Phase 1: 7 seven weekly group sessions held separately for adolescents and parents. Adolescent sessions focused on healthy living, goal setting, increasing physical activity and reducing sedentary behaviour, healthy eating, stress management, building positive self-esteem. Parent sessions focused on practical support of behaviour change and role modelling of healthy lifestyle behaviours. Phase 2: 7 further group sessions for adolescents only, quarterly over 21 months. + ATC component: combination of telephone coaching and SMS and/or emails once a fortnight over 21 months (32 electronic messages and 14 telephone coaching sessions). *Intensity:* 15.75 hours [children]; 8.75 hours [parents] **Control:** No non-treatment control group **Sample sizes:** Loozit only n=78 Loozit and ATC n=73	Weight, height **Diet measures:** Questions on frequency of food and beverage items and on eating patterns and behaviours. **Physical activity measures:** Children's Leisure Activities Study Survey to assess physical activity and sedentary behaviours **Wellbeing measures:** Harter Self-Perception Profile for Adolescents Body image perception MacArthur Scale of Subjective Social Status Mental Health Inventory-5 **Service satisfaction measures:** Adolescents rated satisfaction with programme using questionnaire adapted from another study **Cost effectiveness measures:** Not measured **Other measures:** Blood pressure, cholesterol, triglycerides, insulin, glucose, and liver function, pubertal stage (data not extracted) **Follow-up periods:** 2 months and 12 months post-baseline (24 month data not yet published) **Method of analysis:** Linear mixed models. Generalized estimating equation (GEE) models. Group x time interactions included if	At 2 months reduction in mean BMI (0.27 kg/m^2, 95% CI 0.41-0.13, p<.01), BMI z score (0.05, 95% CI 0.06-0.03, p<.01), and waist to height ratio (0.02, 95% CI 0.03-0.01, p<.01). At 12 months no difference in primary outcomes between groups. Across all participants, ITT analyses showed significant reductions in mean BMI z score (-0.09, 95% CI -0.12 to -0.06) and waist to height ratio (-0.02, 95% CI -0.03 to -0.01) **Diet results:** At two months significant improvement in fruit (p<.007) and vegetable (p=.04) intake, and decrease in high fat meat consumption (p=.001) and potato crisps consumption (p<.001). No between group differences at 12 months. However, all participants reported less frequent consumption of high-fat meat products (OR 0.34, 95% CI 0.21 to 0.54), potato crisps (OR 0.55, 95% CI 0.32 to 0.94), and lunch (OR 0.64, 95% CI 0.41 to 1.00) **Physical activity results:** Across all participants levels of physical activity did not change at 2 months. Time spent in screen based leisure pursuits (p=.04) and watching TV, videos and DVDs (p=.02) both decreased. No differences between groups or across time were found in physical activity levels at 12 months. Participants across both groups reported less time spent in front of screens at 12 months (geometric mean -0.8 hours, 95% CI -1.0 to -0.7 hours, p=.045) and less time	self-report behavioural data. **Limitations (review team):** As above **Evidence gaps:** The effectiveness and best application of different modes of electronic communication, with consideration of optimal intervention does, user preferences, and engagement. **Funding sources:** University of Sydney Research & Development Grant; a bequest of the Estate of the late R.T. Hall; Macquarie Bank Foundation; Financial Markets Foundation for Children; and the Heart Foundation of Australia Grant-in-Aid. One of the study authors was supported by a National Health and Medical Research Council Biomedical Postgraduate Scholarship **Applicable to UK?** Yes – community based delivered in Australia

		Baseline comparisons: No differences **Study power:** Estimated 64 participants per arm would provide 80% power to detect 0.4 unit difference in mean change of BMI z score from baseline to 2, 12, and 24 months follow-up at a .05 significance level. To accommodate 30% drop-out, the researchers aimed to enrol 84 participants per arm. **Intervention delivery:** Trained dieticians **Target group:** Overweight adolescents and their parents	fixed effects significant. ANOVA and Tukey post hoc comparison test for continuous data or chi square tests for categorical data. A linear mixed-model analysis	watching television (geometric mean -0.8 hours, 95% CI -1.0 to -0.7 hours, p=.02). **Wellbeing results:** No group differences in any psychosocial outcomes at 12 months except lower scholastic competence, where Loozit + ATC group had lower scores than Loozit only group (group difference -0.21, 95% CI -0.42 to 0.00, p=.049). Across all participants significant time effects at 12 months from baseline with improvements in Mental Health Inventory 5 score (−0.97; 95% CI, −1.72 to −0.22; *P*=.01), body shape dissatisfaction (−0.56; 95% CI, −0.74 to −0.38; *P*<.001), subjective social status (0.89; 95% CI, 0.48 to 1.31; *P*<.001), and global self-worth (0.21; 95% CI, 0.10 to 0.32; *P*<.001). **Attrition:** At 12 months: 18/78 (23.1%) Loozit only and 9/73 (12.3%) Loozit + ATC	
Wake (LEAP 2)					
First author and year: Wake 2009 'LEAP 2' **Aim of study:** To determine whether ascertainment of childhood obesity by surveillance followed by structured secondary prevention in primary care improved outcomes in overweight or mildly	**Setting:** Primary care. 45 family practitioners in Melbourne, Australia [non-representative sample of 66 GPs] **Participants:** 258 overweight/obese children aged 5-10 Mean age: 7.4(I), 7.6 (C) % Female:60% I: 61% C Mean social disadvantage score 1028 (I), 1028 (C) **Inclusion:**	**Method of allocation:** Randomisation stratified by GP and overweight versus obese status. Performed by a third party biostatistician using pre-generated computerized sequence. **Intervention(s):** Four standard consultations over 12 weeks. A 'solution focused' approach to set and record lifestyle goals targeting change in nutrition, physical activity, and	**Anthropometry measures:** BMI; BMI z score using US CDC 2000 gender specific BMI for age growth charts; child waist circumference (not extracted) **Diet measures:** Nutrition score from 4-day abbreviated food frequency diary **Physical activity measures:** Physical activity using 4 day activity diary and parent report. Actical Accelerometer (Mini	**Anthropometry results:** BMI: Adjusted mean differences (intervention-control) at 6 and 12 months for BMI were -0.12 (-0.40 to 0.15; p=0.4) and -0.11 (-0.45 to 0.22; p=0.5). **Diet results:** Adjusted mean differences for nutrition score at 6 and 12 months were 0.2 (-0.03 to 0.4; p=0.1) and 0.1 (-0.1 to 0.4; p=0.2). **Physical activity results:** Adjusted mean differences for	**Limitations (author):** GPs were volunteers, but unlikely that less committed GPs would achieve better results. Only 1/3 eligible families took up offer but again unlikely to improve chances of success. **Limitations (review team):** Lost to follow-up meant the study did not achieve target sample size, so meta-

obese children. **Study Design :** RCT nested within a baseline cross-sectional BMI survey **Quality score:** ++ **External validity score:** ++	Aged 5 years to 10th birthday Classified as overweight/ mildly obese according to the international Obesity TaskForce cutoff points. Not receiving ongoing weight management in secondary or tertiary care. Parents provided contact details. Attending participating practice for any reason May 2005 to July 2006; **Exclusion:** Children who were very obese (UK BMI z score ≥3.0) **Motivation/referral/ payment:** Families invited following involvement in BMI survey.	sedentary behaviour, supported by purpose designed family materials in form of personalised 20 page family folder (as per LEAP 1). *Intensity:* 4 hours **Control:** No intervention [GP records audited to assess any contamination] **Sample sizes:** 947 assessed for eligibility, 258 randomized: I = 139; C = 119 **Baseline comparisons:** Similar in both arms. **Study power:** Calculated based on 80% chance at two-sided 5% significance level to detect a reduction in mean BMI increase as small as 0.3 units, requiring a sample size of 380 - only 242 remained at 12 months. **Intervention delivery:** GPs **Target group:** Whole family.	Mitter) worn for 7 days, > 5 valid days required. **Wellbeing measures:** Child health related quality of life (PedsQL 4.0); Body disatisfaction (body figure perception questionnaire); Physical appearance and self worth (modified from Harter's perceived competence scale) **Service satisfaction measures:** None reported **Cost effectiveness measures:** Costs were evaluated from a healthcare perspective and calculated in Australian dollars at 2007 costs. **Other measures:** None-reported **Follow-up periods:** 6 and 12 months after randomisation **Method of analysis:** Intention to treat. Linear and logistic regression using random effects for GP. All comparisons adjusted for SES, age at randomisation, sex, and baseline score for outcome measures. All analysis except BMI z score also adjusted for baseline BMI.	physical activity in counts/min at 6 and 12 months were 24 (-4 to 52; -p=0.09) and 11 (-26 to 49; p=0.6). **Wellbeing results:** No evidence of harm to child. **Cost effectiveness results:** Intervention cost: $152,000 in 66 GP practices. Per child: $1,317 (I), $81 (C) **Other results:** LEAP trials 1 and 2 similar enough to combine in a meta-analysis giving an adjusted mean difference in BMI at 6 and 12 months of -0.16 (-0.38 to 0.06) and -0.06 (-0.34 to 0.22) respectively. Body of evidence points to no important difference between trial arms. Also by meta-analysis 80.2% of the intervention versus 84.8% of control children remained overweight/obese at 12 months (difference -4.6% [-12.2% to 2.9%; p=0.23]). **Attrition:** At randomization: 11 (I) withdrew or moved. At 6 month follow-up: 7 (I) and 1 (C) lost to follow up At 12 months follow up: 5 (I) and 3(C) lost to follow up. 3.1% at 6 months 6.2% at 12 months	analysis of LEAP 1 and LEAP 2 performed. Low compliance with 37% of intervention families attending all 4 sessions. **Evidence gaps:** None stated. **Funding sources:** Australian National Health and Medical Research Council (NH&MRC) **Applicable to UK?** Yes, likely.
Watson (GOALS)					
First author and year: Watson 2011 Watson 2009	**Setting:** Community. Liverpool, UK. September 2006 - March	**Method of allocation:** Recruitment through multiple referral pathways including	**Anthropometry measures:** BMI z score for children (1990 UK growth references; adult	**Anthropometry results:** *Watson 2011* At 12 months, pre-post BMI z score	**Limitations (author):** Lack of robust measures for physical activity and diet.

GOALS: Getting Our Active Lifestyles Started **Aim of study:** To explore the relationship between adult BMI change and child BMI SDS change following completion of a community-based, lifestyle change intervention for obese children and families. **Study Design :** UBA **Quality score:** – **External validity score:** ++	2009 [Watson 2011] June 2006-March 2009 [Watson 2009] **Participants:** Watson 2011 121 families with obese (>91st centile) 4-16 year olds. Mean age 10.17±1.75 years. [Completers] 40.4% boys 66% families from areas ranked within the 10% most deprived in England and 75% within the 30% most deprived. Watson 2009 163 families of whom 143 took part in the research and 74 completed (71 analysed). Mean age 10.41 years. 161 overweight children - 47.2% boys. **Inclusion:** As above. **Exclusion:** **Motivation/referral/ payment:**	Sportslinx, referral from health professionals and self-referral in response to press articles, posters, leaflets, health events etc. **Intervention(s):** 18 2-hour once weekly sessions focused on diet (*Fun Foods* - practical cooking and classroom sessions), physical activity (*Move It!* - weekly PA session and enhancing self-efficacy) and behaviour change (*Target Time* - guided goal setting and behavioural change techniques for use at home). Sessions ran in the evenings during term time in local schools. [19 sessions in early months - Watson 2009] **Control:** No control group. **Sample sizes:** 121 families (Watson 2011) 163 families (Watson 2009) **Baseline comparisons:** N/A. Authors noted no significant correlation between baseline measures and completion. **Study power:** Not reported **Intervention delivery:** Non-clinical staff trained by the developers of the programme (University specialists in public health nutrition, exercise physiology and sport and exercise	BMI score. **Diet:** Food intake questionnaire **Physical activity measures:** Physical activity questionnaire **Wellbeing measures:** 4 subscales from Harter's Self-Perception Profile for Children **Service satisfaction measures:** Focus groups for qualitative data - see review 2. **Cost effectiveness measures:** Not measured **Other measures:** Not measured **Follow-up periods:** 6 months (post intervention) and 12 months. [effectively a range of 12-16 months for participants in Watson 2009] **Method of analysis:** Paired t-tests to measure pre-post changes. One way ANOVA to explore between group differences. Chi square to explore child z score change direction in relation to adult changes. Correlational analyses to explore baseline measures (eg boy/girl) on outcomes.	difference for completer children −0.08±0.24, p=0.08. For boys and girls figures −0.09±0.24 and −0.08±0.24 respectively. Active involvement of adults in the weight loss process improved child health z score measures: Children attending with adults who lost weight, difference = −0.13±0.23. Children attending with adults who maintained/increased weight = −0.05±0.25. *Watson 2009* At post-treatment (6 months) and 12/16 months, the pre-post BMI z score differences for completer children to post intervention were -0.09 (SD 0.2) and -0.08 (SD 0.28, p<0.01) respectively. **Diet results:** Results considered unreliable by the authors and not reported. **Physical activity results:** Questionnaire modified during study period. Results considered unreliable by the authors and not reported. **Wellbeing results:** Small improvement in each score of social acceptance, athletic competence, physical appearance and global self-esteem but only perceived social acceptance score significant (p<0.05). No summary data (figure only) **Attrition:** *Watson 2011* 50%: 60/121 families completed over half the sessions and still in	Very high drop-out rate. **Limitations (review team):** No control group. Watson 2011 analysis effectively a secondary analysis of results. However, it excludes early months (when changes were made to intervention) and provides key details of z score effects for boys/girls and the influence of parental BMI change. Thus, treated as primary paper within this review. **Evidence gaps:** Further exploration of the mechanisms underlying the adult-child weight loss relationship and the influence of family characteristics. Need to explore reasons for very high drop-out rate. **Funding sources:** Liverpool City Council via the Neighbourhood Renewal Fund and Working Neighbourhood Fund. **Applicable to UK?** Yes- UK programme

		psychology). Community dietician involved in the early months (Watson 2009). **Target group:** Family wide		attendance at intervention end: Mean attendance = 83.4%±11.6 (in completers?) Complete data for 47 families at 6 moths: 62% attrition. Data for 26 at 12 month: 78% attrition. *Watson 2009* 74/163 completed intervention and 71/163 families analysed: 56.4% attrition	
West (Group Lifestyle Triple P)					
First author and year: West 2010 Group Lifestyle Triple P **Aim of study:** To evaluate the effect of a life-style parenting program (Group Lifestyle Triple P) on multiple child and parent outcomes. **Study Design :** Cluster RCT **Quality score:** - **External validity score:** +	**Setting:** Community at one of six venues: university child and family psychology clinic, paediatric teaching hospital and four state primary schools; Brisbane, Australia **Participants:** 101 families. 4 to 11 years old (mean age 8.54), 67.3% girls. Families predominantly two-parent families (81%), 24.7% earned less than AUD$20000. 87.1% White Australian; remaining Italian, Greek, Asian and Indigenous. **Inclusion:** Young people aged 8-18 years. **Exclusion:** Children taking medication that affects growth or weight control, or had a severe developmental delay or disability. **Motivation/referral/**	**Method of allocation:** Group randomisation – computer generated random numbers. Venue was allocated to intervention or control once 10 families registered **Intervention(s):** Group Lifestyle Triple P (modification of Level 4 Group Triple P). 12 weekly 90 min group sessions and 3 x 20 min telephone session s. To help parents acquire new knowledge and skills, all sessions used an active skills training process (e.g. demonstrating and rehearsing sills) within a self-regulation framework (self-selecting goals and self-evaluating progress). Each parent received a workbook summarising the session content and suggested between-session tasks. **Control:** Wait-list control (12 week delay). **Sample sizes:**	**Anthropometry measures:** BMI z score (WHO 2000 to classify into healthy , overweight and obese and CDC parameters for z scores) **Diet measures:** Lifestyle Behaviour Checklist (LBC) – child weight related problem behaviour) – considers both diet and physical activity **Physical activity measures:** None reported. **Wellbeing measures:** None reported. **Service satisfaction measures:** None reported. **Cost effectiveness measures:** None reported. **Other measures:** Parenting Scales (PS) – parental discipline practices. Consumer satisfaction (Client Satisfaction Questionnaire CSQ) Program adherence (Session Content Checklist SCC)	**Anthropometry results:** At 12 weeks: intervention BMI z score associated with significant univariate time effects. Not significant for control condition: Mean BMI z score (SD) pre vs post: I = 2.15 (0.43) to 2.04 (0.44); C = 2.11 (0.46) to 2.10 (0.45) BMI (MANOVA) I = $F(1,51)$ 32.85 P<0.001; C= $F(1,48)$ 1.19 P<0.281 At one year (intervention only): BMI maintained. Mean BMI z score (SD) baseline vs 1 year follow-up: 2.15 (0.43) to 1.96 (0.46) **Diet results:** At 12 weeks: Intervention LBC associated with significant univariate time effects Not significant for control. LBC problem: I = $F(1,51)$ 21.50 P<0.001; C= $F(1,48)$ 3.27 P<0.077 Mean LBC problem (SD) pre vs post: 71.88 (21.14) to 59.37 (20.66); C = 165.61 (44.15) to 165.76(46.40) LBC confidence: I = $F(1,51)$ 29.70 P<0.001; C= $F(1,48)$ <0.01 P<.977	**Limitations (author):** Generalisability – predominantly white, well-educated and middle income parents. Recruited through self-referral therefore parents likely to be more motivated. **Limitations (review team):** No control group follow-up beyond wait list period. No sample size calculation. No blinding of outcome assessment. Cluster RCT, yet results analysed individually with no adjustment for the clustering effect described. **Evidence gaps:** None reported. **Funding sources:** Telstra Foundation **Applicable to UK?** Yes

	payment: Recruited through advertisement in school newsletters.	101 families randomised and completed baseline measures: I=52; WLC: 49 **Baseline comparisons:** No differences. **Study power:** Not reported **Intervention delivery:** Clinical psychologist (accredited provider of Group Triple P) conducted all sessions on all sites. Graduate students in nutrition and dietetics, physical education, and psychology had minor co-therapist role and provided with technical and administrative support. **Target group:** Parents	**Follow-up periods:** Immediate post intervention (12 weeks after baseline) 1 year from baseline for original intervention group only **Method of analysis:** MANOVAs and pre and post means.	Mean LBC confidence (SD) pre vs post: I = 167.46 (45.12) to 204.37 (37.53); C = 165.61 (44.15) to 165.76(46.40) At one year (intervention only): LBC maintained Mean LBC problem (SD) pre vs post = 71.88 (21.14) to 61.21 (24.02) Mean LBC confidence (SD) = 167.46 (45.12) to 199.31 (43.11) **Other results:** Post-intervention, parents reported increased confidence in managing children's weight related behaviour and less frequent use of inconsistent or coercive parenting practices. At 12 weeks: Intervention PS total associated with significant uni-variate time effects. Not significant for control. PS total: I = $F(1,51)$ 25.71 P<0.001; C= $F(1,48)$ 0.04 (0.834) Mean PS total (SD) pre vs post: I = 3.16 (0.52) to 2.73 (0.69); C = 3.35 (0.43) to 3.36 (0.49) PS total maintained at one-year follow-up assessment. Mean PS total (SD) pre vs post = 3.16 (0.52) to 2.85 (0.69) **Attrition** At 12 weeks: I = 11/51; C = 3/49 At 1 year I = 18/52	

APPENDIX B – INCLUDED ECONOMIC ANALYSES/COST EFFECTIVENESS STUDIES - EVIDENCE TABLES

Coppins (Family Project)					
First author and year: Coppins 2011	Some economic data provided with effectiveness data. See Coppins 2011 in Appendix A for full summary			**Cost effectiveness:** Cost per child estimated to be £403 (based on running the intervention as a clinical service) compared with £45 for usual care of 1.5 h individual dietetic consultations.	
Goldfield					
First author and year: Goldfield 2001 Raynor 2002 **Aim of study:** To compare the cost-effectiveness of two protocols for the delivery of family-based behavioural treatment **Type of economic analysis:** Cost effectiveness **Applicability:** Partially **Study limitations:** Very serious	**Setting:** Not clear, meetings were probably held in a research clinic. The authors are based at a university in the USA. **Participants:** 31 families with obese 8 to 12 year old children. 24 families provided complete data for the cost-effectiveness analysis. The sample was 100% white. **Data sources:** Primary research **Motivation/referral/ payment:** Recruitment was via newspaper advertisements and	**Intervention(s):** Mixed treatment comprising both individual and group treatment: 15-20 minute individual sessions with a therapist and 40 minutes of group therapy. Individual therapy was designed to help participants identify the behaviours that influenced their weight changes, to determine the accuracy of habit book recording, to evaluate whether program goals were met and reinforcers earned were delivered, to provide performance feedback, and to	**Anthropometry:** Height, weight, BMI, z-BMI (US 2000 standards), percentage overweight. **Diet:** Not measured **Physical activity:** Not measured **Wellbeing:** Not measured **Service satisfaction:** Not measured **Cost effectiveness:** Cost-effectiveness was calculated for families, children and parents separately by dividing change in Z-BMI or percentage overweight by the total cost of	**Anthropometry:** Analyses of variance showed a highly significant change in percent overweight ($F(2,88)=18.01$, $P<.001$) and Z-BMI ($F(2,88)=19.16$, $P<.001$) over time. There were no main effects or interactions due to group or generation. **Cost effectiveness:** The cost of group treatment (US$491.51) was significantly less expensive than the cost of the mixed group (US$1390.70; $F(1,22)=13$, $P<.01$). The group treatment was associated with larger decreases in percentage overweight ($F(1,44)=4.69$, $P<.05$) or	**Limitations (author):** There were several decisions about calculating costs that may influence the cost estimates. For example, the costs of recruiting subjects were included, which may not be needed in the intervention is implemented in a clinical setting in which obese patients regularly are provided medical care. **Limitations (review team):** - **Evidence gaps:** The population on this study was mildly to moderately obese and further research is needed to determine if the findings generalise to more obese children, who may require more individualised treatment. **Funding sources:** Grants from the National Institutes of Diabetes and Digestive Diseases and the National Institute of Health. **Applicable to UK?** Potentially, although sample sizes were very small and to implement this sort of approach at a community level could be expensive

	physician referrals. No mention of motivation or payment.	problem solve situations that hinder behaviour change. **Control:** Group treatment only: participants received an additional 20 minutes of group therapy in order to equate time in treatment across groups. Across both conditions group treatment took place over 13 sessions. Parents and children were weighed at the beginning of each session and then separate parent and child groups were conducted. A mastery approach to teaching was used to teach families how to change eating and activity habits. Participants received manuals divided into modules. They were instructed to weigh themselves at home and to graph their weight, and to keep a habit book. They were also instructed to model appropriate eating and activity behaviours, and to	treatment at the 12 month follow-up, to provide a measure of improvement per dollar spent. If participants did not show a decrease in percentage overweight, they were treated as unsuccessful and values were set to zero, rather than having a negative cost. To facilitate interpretation of the cost-effectiveness data, the changes were presented as if the researchers had spent US$1000 providing treatment for each family. **Other:** Costs of recruitment and treatment Demographics: age, gender, SES using the Hollingshead Four Factor Index (Hollingshead, 1975). **Time horizon:** 20 week programme with follow-ups at 6 and 12 months post randomisation **Discount rates:** Not applicable **Modelling method:**	Z-BMI (F(1,44)=7.61, P<.01) per dollar spent at 12 months. At 12 months a decrease of 0.005 percentage overweight units per dollar was observed for the mixed group, while the group treatment produced a change of 0.014 percentage overweight units per dollar. When Z-BMI units are considered, a decrease of 0.0004 Z-BMI units was achieved per dollar spent using the mixed treatment, or 0.001 Z-BMI units per dollar spent using the group treatment.	

		rearrange their environment to maximise behaviour change. Several types of reinforcement were used, including praise and a points system to help meet behavioural goals. Participants were instructed to follow the Traffic Light Diet, to consume between 1000 and 1200 calories a day, and to reduce red foods to no more than 15 per week. Participants received information through their manuals on the positive effects of increasing physical activity and the negative effects of sedentary behaviours. Participants were given goals to increase their physical activity and were reinforced for any such increases. **Sample sizes:** Mixed treatment n=12, age 9.8 +/- 1.3, 33% male, weight 56.5 +/- 15.1, standardised BMI 3.0 +/- 1.2 Group treatment n=12, age 10.3 +/- 1.3,	One-way ANOVAs were conducted to explore between group differences at baseline for parent and child data. Group differences in percentage overweight and Z-BMI were analyzed using a mixed ANOVA, with Group and Generation (child/parent) as the between factors, and Time (baseline, 6, 12 months) as the within factor. Comparisons between groups in the rate of change over time were determined using linear contrasts based on the general linear model. Cost and cost-effectiveness (improvement per dollar spent) were analyzed using one-way ANOVAs.		

		25% male, weight 57.8 +/- 9.6, standardised BMI 2.7 +/- 0.6 (12 parents in each group also) **Intervention delivery:** Meetings led bytherapists – mix of those with several years experience and new. **Target group:** Obese children and their parents			
Hollingworth (Multiple programmes)					
First author and year: Hollingworth 2012 **Aim of study:** To estimate lifetime cost effectiveness of lifestyle interventions to treat overweight and obese children, from the UK NHS perspective. **Type of economic analysis:** Cost-effectiveness analysis	**Setting:** Economic analysis of 10 primary studies. **Participants:** Hypothetical cohorts on overweight or obese children based on bady mass data from the National Child Measurement Programme in the UK. Efficacy data from ten RCTs of lifestyle interventions vs no/minimal intervention for primary school aged children, 4-11 published before 2008. **Data sources:**	**Intervention(s):** Lifestyle weight management **Control:** No or minimal intervention **Sample sizes:** Varied **Intervention delivery:** Varied **Target group:** Varied	**Anthropometry:** BMI z score **Diet:** **Physical activity:** Not measured **Wellbeing:** Not measured **Service satisfaction:** Not measured **Cost effectiveness:** An adaption of the National Heart Forum economic model to predict lifetime health service costs and outcomes. **Other:** Not measured. **Time horizon:**	**Anthropometry:** Median effect = difference in BMI z score of -0.13 (0.04 to -0.60) at 12 months **Cost effectiveness:** Costs From £108 to £662 per child. For obese children aged 10-11 years, & median BMI z score reduction at 12 months & moderate cost of £400 per child, increased life expectancy by 0.19 years and intervention costs were offset by subsequent undiscounted savings in treatment costs (net saving of £110 per child). The saving did not emerge until the sixth or	**Limitations (author):** Sparse evidence base and generally short term follow up. Assumption made that gains would be maintained. Unable to identify all associated costs. **Limitations (review team):** - **Evidence gaps:** Need to understand the optimum duration of lifestyle treatments and long-term follow up. Large observational studies to describe the association between BMI and use of health services in adolescents and young adults to confirm if estimates of cost savings are reasonable. **Funding sources:** Centre for the Development and Evaluation of Complex Interventions for Public Health (DECIPHer) [British Heart Foundation. Cancer Research UK, ESRC, MRC, Welsh Assembly Government and Wellcome Trust] **Applicable to UK?** Yes

Applicability: Direct **Study limitations:** Potentially serious **Note: 2 studies included in this analysis are out of scope of the review**	10 RCTs **Motivation/referral/ payment:** -		12 month intervention outcomes extrapolated to life-time costs **Discount rates:** N/A **Modelling method:**	seventh decade of life. The discounted cost per life year gained was £13,589. Results were broadly similar for interventions aimed at children aged 4-5 years and which targeted both obese and overweight children. For more costly interventions, savings were less likely.	
Hughes (SCOTT)					
First author and year: Hughes 2008	Some economic data provided with effectiveness data. See Hughes 2008 in Appendix A for full summary			**Cost effectiveness:** Cost (for 1 patient) of delivering the novel intervention was £108 and £29 for the standard treatment.	
Janicke					
First author and year: Janicke 2009 **Aim of study:** To compare the costs of parent-only and family-based group interventions for childhood obesity delivered through Cooperative Extension Services in	**Setting:** Rural counties, USA **Participants:** 93 children aged 8 to 14 and their parents. All children had a BMI >85th percentile **Data sources:** Primary research **Motivation/referral/ payment:** Families were recruited through direct mailings, distribution of brochures though local schools, and	**Intervention(s):** 1. Behavioural family-based [FB] Weekly group sessions (90 mins) for 8 weeks, then biweekly for 8 weeks. Guidance via treatment manuals = changes in dietary habits via Stoplight diet; increased physical activity via pedometer based programme. Parent group based on strategies and discussion. Child	**Anthropometry:** BMI z score **Diet:** Not reported in current paper **Physical activity:** Not reported in current paper **Wellbeing:** Not reported in current paper **Service satisfaction:** Not reported in current paper **Cost effectiveness:** Program costs were	**Anthropometry:** Children in both the parent only and family-based intervention groups exhibited a significant decrease in weight status at month 10 follow-up relative to children in the waitlist control (0.090 and 0.115 BMI z-score units, respectively). Children in the waitlist control exhibited an increase of 0.022 BMI z-score units. **Cost effectiveness:** Only programme costs	**Limitations (author):** Costs related to research, costs to participants, and costs for physician appointments to assess study eligibility not included. Other potential long-term cost savings were also not included in the analysis, such as reductions in medical expenditure due to improved health status. Follow-up period was only six months after the end of the intervention. **Limitations (review team):** The authors only evaluate intermediate outcomes, not health related quality of life. **Evidence gaps:** - **Funding sources:** National Institute for Diabetes and Digestive and Kidney Diseases. Institute for Child and Adolescent Research and Evaluation at the University of Florida. **Applicable to UK?** Yes

rural communities **Type of economic analysis:** Cost-effectiveness analysis **Applicability:** Partial **Study limitations:** Very serious	community presentations.	group based on review of progress, a physical activity and preparation of healthy snack. Simultaneous but separate groups with parents and children brought together to discuss goals and plans. 2. Behavioural parent-only [PO] Similar to parent group above. Emphasis on activity targets to work with children to achieve goals. **Control:** Wait list control **Sample sizes:** 111 completed screening; 93 (from 64 families) randomised to groups: Family based: 33 Parent only: 34 Wait list control: 26 **Intervention delivery:** Family and Consumer Sciences agents in collaboration with a postdoctoral psychologist and graduate students in clinical psychology. All received 2 days training before and 6	determined by summing costs for personnel serving as trainers, group leaders, weekly supervision, materials, incentives, food, and travel. For each treatment condition, costs per child were calculated by dividing the total program costs for the treatment condition by the total number of children completing the follow-up assessment. As a metric for comparing costs, the authors calculated the cost per 0.1 decrease in BMI z-score for each treatment condition compared to the wait list controls. **Other:** - **Time horizon:** Four month study with follow-up six months post-intervention **Discount rates:** N/A **Modelling method:**	data for the parent-only and family-based programmes were reported in the paper. Total program costs for the family-based intervention were $20,928. Total program costs for the parent-only intervention were $13,546. The total cost per child for the family based intervention ($872) was 67% higher than for the parent-only intervention ($521). When factoring in the average weight status change per group, the cost per 0.10 decrease in BMI z-score for the family-based intervention ($758) was 31% higher than for the parent-only intervention ($579) when both were compared to the wait list controls.	

		hours booster training midway through intervention, plus weekly supervision. **Target group:** Parent/carer only and family in two separate arms.	Cost effectiveness analysis conducted alongside an RCT. No modelling used to extrapolate beyond end of trial.		
Kalavainen					
First author and year: Kalavainen 2009 **Aim of study:** To compare the cost-effectiveness of group treatment, already known to be more effective, with routine counselling in obese children. **Type of economic analysis:** Cost-effectiveness analysis **Applicability:** Partially **Study limitations:** Very serious	**Setting:** Finland **Participants:** 70 families with 7-9 year old obese children (weight for height from 120 to 200%). Mean age of children at baseline 8.1 +/- 0.8 years, mean weight for height 142 +/- 14.4% **Data sources:** Primary research **Motivation/referral/ payment:** Referral was via school nurses. No mention of motivation or payment.	**Intervention(s):** Group treatment: 14 evening sessions held separately for parents and children, and one joint session on making healthy snacks. The parents' groups were run by a dietician and the five children's groups (seven children in each) by two nutrition students. **Control:** Routine counselling: two individual appointments for children with school nurses, modified from the current counselling practice for obese children in school health care in the study region (Kuopio, Finland). Participants in both programs were provided with written	**Anthropometry:** Height for weight, BMI, BMI z score (UK 1990 standards) **Diet:** Not measured **Physical activity:** Not measured **Wellbeing:** Not measured **Service satisfaction:** Not measured **Cost effectiveness:** All the direct costs (salaries, printing and distribution of materials) of the treatment programs were included in the cost-effectiveness analysis, but costs caused by the research component were not. The analysis was from the perspective of the service provider, and therefore, the	**Anthropometry:** At the end of the intervention the mean change in weight for height was -6.8% (95%CI -8.9 to -4.7) for the group programme, and -1.8 (-3.9 to 0.4) for the routine programme (group difference p=.001). The mean change in BMI-SDS was -0.3% (-0.4 to -0.3) for the group programme, and -0.2 (-0.3 to -0.1) for the routine programme (group difference p=.022). At the 6-month post-intervention follow-up the mean change in weight for height was -3.4% (-6.0 to -0.7) for the group programme, and 1.8 (-0.9 to 4.5) for the routine programme (group difference p=.008). The mean change in BMI-SDS was -	**Limitations (author):** Cost-effectiveness analysed from the perspective of the service provider only. Available data did not allow authors to sample uncertainty, as they did not record the costs and effects individually for each patient. As the children were measured by different school nurses at the 6-month follow-up, the weights for height were not fully comparable with those at baseline. **Limitations (review team):** - **Evidence gaps:** - **Funding sources:** Grants from Kuopio University Hospital, the Scientific Foundation of the Finnish Association of Academic Agronomists, the Finnish Cultural Foundation of Northern Savo, Juho Vainio Foundation, Ministry of Social Affairs and Health, Social Insurance Institution and the Finnish Cultural Foundation **Applicable to UK?** Yes, these sorts of sessions could be run in the UK

		material. **Sample sizes:** Group treatment n=35, 16 boys and 19 girls Routine counselling n=35, 12 boys and 23 girls **Intervention delivery:** The parents' groups were run by a dietician and the five children's groups (seven children in each) by two nutrition students. **Target group:** Families	costs of the participating families were not included. The total costs of the routine and group treatment programs consisted of the labour costs and material costs during recruitment and treatment. **Other:** Not measured. **Time horizon:** Six month intervention with follow-up six months after the end of the intervention **Discount rates:** Not applicable **Modelling method:** The incremental cost effectiveness ratio (ICER) was estimated using the following formula: $ICER = \frac{\bar{C}_G - \bar{C}_R = \Delta\bar{C}}{\bar{E}_G - \bar{E}_R \quad \Delta\bar{E}}$ where $\bar{C}_i$ and $\bar{E}_i$ represent the costs and effects of interventions in the group (G) and routine (R) treatment, respectively. The	0.2 (-0.3 to -0.1) for the group programme, and -0.1 (-0.2 to 0.0) for the routine programme (group difference p=.081). **Cost effectiveness:** At follow up (12 months from baseline) the group costs were €168 per 0.1 decrease in BMI z score, versus €61 for routine counselling. In the routine programme, the recruitment costs formed about two thirds and the appointments one third of the total costs, whereas in the group treatment, the session costs formed about 90% of the total costs. Post-intervention ICER estimates, presenting additional costs per 1% weight for height decrease and per 0.1 BMI-SDS decrease, were €53 and €266 respectively. At follow-up six months after the end of the intervention, the respective ICER estimates were €53 and €275. In the one-way sensitivity analysis, the	

			ICER describes additional costs per 1% weight for height decrease or per 0.1 BMI-SDS decrease respectively. One-way sensitivity analyses were used to evaluate the effects of the assumptions. Group treatment costs were evaluated presuming that two group leaders, instead of one leader, would have been needed in the children's groups. Extreme sensitivity analyses were performed by assuming that the clinical effectiveness of the treatments were at the lower and upper limits of the 95% confidence intervals, thus generating the best-case and worst-case scenarios for group treatment. Means and 95% confidence intervals were calculated for continuous variables, and the independent samples *t*-test was used in statistical	salaries of two group leaders in the children's groups were included in the group programme costs. Thus, the total costs were €15,378 instead of €11,432. Post-intervention ICER estimates, presenting additional costs per 1% weight for height decrease and per 0.1 BMI-SDS decrease, were €76 and €378 respectively. At follow-up the respective ICER estimates were €75 and €391. After the intervention, the ICER estimates for 1% decrease of weight for height were €29 in the best-case and €333 in the worst-case scenario. The ICER estimate for 0.1 decrease of BMI-SDS was €89 in the best-case scenario; in the worst-case scenario the two interventions were nearly equally effective. At follow-up, the ICER estimate for 1% decrease of weight for height was €26 and for 0.1 decrease of BMI-SDS €92 in the best-case scenarios. In the worst-case scenario the two interventions	

			analyses.	were nearly equally effective.	
Moodie (LEAP 1)					
First author and year: Moodie 2008 **Aim of study:** To assess from a societal perspective the incremental cost-effectiveness of a family-based GP-mediated intervention targeting overweight and moderately obese children. The intervention was modelled on the LEAP trial. **Type of economic analysis:** Cost-effectiveness evaluation **Applicability:** Directly **Study limitations:** Potentially	**Setting:** Australia. The modelling was based on all GPs in Australia being invited to participate. **Participants:** 5-9 year old children who were overweight or moderately obese **Data sources:** Primary research **Motivation/referral/ payment:** In the LEAP trial, families were invited to take part following involvement in a BMI survey conducted at GP practice.	**Intervention(s):** The intervention was modelled on the LEAP intervention **Control:** No intervention **Sample sizes:** The intervention, as modelled, reached 9,685 children aged 5–9 years with a BMI z-score of ≥3.0 **Intervention delivery:** GPs – four consultations over 12 weeks using a 'solution focussed' approach to set and record lifestyle goals, assisted by a personalised 20 page family folder. **Target group:** Whole family	**Anthropometry:** Not measured **Physical activity:** Not measured **Wellbeing:** No measured **Service satisfaction:** Not measured **Cost effectiveness:** Pathway analysis was used to identify the component activities of the intervention in order to ascertain the associated resource utilisation. All costs were adjusted to real prices in the 2001 reference year using the relevant Consumer Price Index. **Other:** Assessment of benefit: Benefits were calculated by a two-stage process. The first stage involved the estimation of the health gain that could be attributed to the intervention using the DALY. The	**Cost effectiveness:** Estimated effect size = mean BMI change of -0.25 (SD 0.185). The intervention, as modelled, reached 9,685 children aged 5–9 years with a BMI z-score of ≥3.0, and cost AU $6.3M (95% uncertainty level $5.3M to $7.4M) (or AU $4.8M excluding time costs). It resulted in an incremental saving of 2,300 BMI units (95% uncertainty level -1,100 to 6,000) which translated to 511 DALYs (95% uncertainty level -90 to 1,156). The cost-offsets stemming from the intervention totalled AU $3.6M, resulting in a net cost per DALY saved of AU $4,670 (dominated; $0.1M) (dominated means intervention costs more for less effect).	**Limitations (author):** Reliance on one small pilot study and the lack of definitive data on evidence of effectiveness. **Limitations (review team):** - **Evidence gaps:** Consideration should be given to other strategies designed to engage parents in addressing childhood overweight, as well as ways in which the effectiveness of the LEAP intervention may be potentially enhanced through the incorporation of other elements or practitioners. **Funding sources:** Victorian Department of Human Services, Australia **Applicable to UK?** Yes

serious			second stage involved the assessment of issues that either influenced the degree of confidence that could be placed in the ICERs, or broader issues that needed to be taken into account in decision-making about resource allocation. **Time horizon:** Lifetime **Discount rates:** All costs and benefits were discounted at 3% as advised by the US Consensus Panel on Cost-Effectiveness. The reference year was 2001. **Modelling method:** Uncertainty analysis: simulation-modelling techniques were used to facilitate the presentation of an uncertainty range around the health benefits, costs and ICERS. Sensitivity analysis: sensitivity testing was undertaken around several key		

			design issues associated with the intervention.		
Roberston (Families for Health)					
First author and year: Robertson 2011 Robertson 2008	Very limited cost data provided with effectiveness data. See Robertson 2011 in Appendix A for full summary			**Cost effectiveness:** Costs of the programme were £517 per family (£402 per child), equivalent to £2,440 per unit reduction in BMI z-score at 9 months and £2,543 at 2 years.	
First author and year: Wake 2008 **Aim of study:** To report a cost-consequence analysis to compare costs borne by families and the health care system to outcomes of the Live, Eat and Play (LEAP) programme **Type of economic analysis:** Cost-consequence analysis **Applicability:**	**Setting:** Melbourne, Australia. 34 GPs from 29 family medical practices. **Participants:** 163 children randomised. Children aged 5 years 0 months to 9 years 11 months. Classified as overweight/obese. Mean age: 7.5(I), 7.4 (C) % Female: 49% I: 54% C Deprived (SES 5) 21% (I), 31% (C) **Data sources:** Primary research **Motivation/referral/ payment:**	**Intervention(s):** Parents were asked to attend four consultations with their GP over a 12-week period, with or without their child present. **Control:** No intervention [GP records audited to assess any contamination] **Sample sizes:** 412 assessed for eligibility, 82 allocated to intervention and 81 to control. **Intervention delivery:** GPs – four consultations over 12 weeks using a 'solution focussed' approach to set and	**Anthropometry:** BMI, BMI z-scores [using the US CDC 2000 gender-specific BMI-for-age growth charts **Diet:** Parent reported child nutrition (nutrition score, range 0-28 [higher score=better nutrition], calculated from a 4-day food diary) **Physical activity:** Parent reported physical activity (activity score from 1 [sedentary] to 7 [intense activity) from a 4-day activity diary) **Wellbeing:**	**Anthropometry:** UK BMI z score: No significant difference. At 9 months unadjusted difference (I-C) 0.04 (95% CI: -0.16 to 0.23) and adjusted difference (I-C)-0.09 (95%CI: -0.20 to 0.02) At 15 months unadjusted difference (I-C) 0.08 (95% CI: -0.12 to 0.29) and adjusted difference (I-C) -0.03 (95%CI: -0.17 to 0.1) **Diet:** There was a relative improvement in nutrition scores in the intervention arm at both 9 and 15 months. Adjusted mean differences 2.1 (1.3 to 2.9) and 1.6 (0.9 to 2.3)	**Limitations (author):** The dose of the intervention may have been too low, more sessions may be needed. Solution focused approach may have lead to goals that were not addressing BMI. Lack of quality control on GP consultations, no objective monitoring of GP consultations. **Limitations (review team):** May have been an optimistic power calculation for a brief intervention. Fairly high refusal rate to join trial - 249/505 = 49% Low compliance 41% attended all 4 GP visits. **Evidence gaps:** **Funding sources:** Australian Health Ministers' Advisory Council Priority Driven Research Project Grant; National Health and Medical Research Council Postgraduate Scholarship **Applicable to UK?** Yes

Partially **Study limitations:** Very serious	Families invited following involvement in BMI survey conducted at GP practice.	record lifestyle goals, assisted by a personalised 20 page family folder. **Target group:** Whole family	Parent reported health status (PedsQL parent proxy); Child reported health status (PedsQL child self-report), body satisfaction (Collins body figure perception) physical appearance and self-worth (modified Harter scale). **Service satisfaction:** Not measured **Cost effectiveness:** The objective was to estimate the resource use that would be required to repeat the intervention. Therefore, the costs of the initial development of the LEAP intervention, training materials, and all research costs are excluded. Relevant resource use includes both investment of health care resources (such as GP visits) and family resources (such as additional time and money required to meet changed dietary and physical activity	respectively. **Physical activity:** There was weak evidence of an increase in daily physical activity in the intervention arm. Adjusted mean differences 0.2 (-0.0 to 0.4) and 0.2 (-0.0 to 0.3) at 9 and 15 months. **Wellbeing:** Health status and body image were the same in the trial arms. **Cost effectiveness:** The total cost of providing the LEAP intervention was AU $57,812. This equates to AU $1,994 per participating practice, AU $1,700 per GP trained, or AU $705 per intervention child. The cost of LEAP per intervention family was AU $4,094 (SD $864 to $7,324, p=.01) greater than for control families, mainly due to increased family resources devoted to child physical activity. Total health sector costs were AU $873 per intervention family and AU $64 per control, a difference of AU $809 (p<.001).	

			practices). Resource use and costs of the LEAP intervention were derived from 3 main sources: the LEAP team records, practice audit, and parent written questionnaires at 9 months. **Other:** - **Time horizon:** 15 months **Discount rates:** N/A **Modelling method:** Economic analysis was conducted on an intention-to-treat basis. All costs are shown in 2003 Australian dollars. Sensitivity analysis was conducted to assess the robustness of results to variation in unit cost estimates used (average wage rates, GP visit costs) and to variation in intervention costs (assuming greater numbers of children treated per GP).		

Wake (LEAP 1)					
First author and year: Wake 2009 **Aim of study:** To compare the costs and consequences f the LEAP2 intervention from a public health perspective **Type of economic analysis:** Cost-consequence analysis **Applicability:** Partially **Study limitations:** Very serious	**Setting:** Australia. Non-representative sample of 66 GPs in 45 family medical practices **Participants:** 258 children randomized. Children aged 5 years 0 months to 10 years. Classified as overweight/obese. % Female: 60% I, 61% C Mean age: 7.4(I), 7.6 (C) BMI mean 20.2 (I), 20.3 (C) Mean social disadvantage score 1028 (I), 1028 (C) **Data sources:** Primary research **Motivation/referral/ payment:** Families invited following involvement in BMI survey.	**Intervention(s):** GPs delivered using a solution focused approach to set lifestyle goals with the family assessed by a Family Folder. Parents attended four consultations over a 12 week period. **Control:** Control families received no GP consultation but were notified of their status via letter. **Sample sizes:** 947 assessed for eligibility, 139 allocated to intervention and 119 to control. **Intervention delivery:** GP practice with 4 consultations over 12 weeks **Target group:** Families with overweight/mildly obese children as identified using BMI survey.	**Anthropometry:** BMI z score using US centres for Disease Control 2000 gender specific BMI for age growth charts. **Diet:** 4 day diet diary. Food frequency questionnaire. **Physical activity:** Physical activity using 4 day activity diary and parent report. Actical Accelerometer (Mini Mitter) worn for 7 days, > 5 valid days required. **Wellbeing:** Peds QL parents Proxy and Child Self report Child body satisfaction and physical appearance, Global self worth using the Collins body figure perception and modified Harter scales **Service satisfaction:** Not measured **Cost effectiveness:**	**Anthropometry:** Adjusted mean differences in BMI at 6 and 12 months (intervention-control) were -0.12 (95% CI -0.40 to 0.15; p=.4) and -0.11 (-0.45 to 0.22; p=.5). Unadjusted differences were -0.13 (95% CI: -0.74 to 0.48, p=.7) and -0.11 (95% CI: -0.77 to 0.55, p=.7). Adjusted differences in waist circumference were 0.12 (95%CI: -0.98 to 1.22, p=.8) at 6 months and 0.12 (95%CI: -1.12 to 1.37, p=.8) at 12 months. Unadjusted differences were -0.3 (95% CI: -2.37 to 1.77, p=.8) at 6 months and -0.02 (95% CI: -2.27 to 2.22, p=1.0) at 12 months. **Diet:** Adjusted mean differences for nutrition score at 6 and 12 months were 0.2 (-0.03 to 0.4; p=.1) and 0.1 (-0.1 to 0.4; p=.2). Unadjusted differences were 0.3 (95% CI: 0.1 to 0.5, p=.01) and 0.2 (95% CI: 0.004 to 0.4. p=.05). **Physical activity:**	**Limitations (author):** GPs were volunteers, but unlikely that less committed GPs would achieve better results. Only 1/3 eligible families took up the offer but, again this would be likely to improve the chances of success. **Limitations (review team):** Loss to follow-up meant the study did not achieve target sample size. Low compliance with only 37% of intervention families attending all 4 sessions. **Evidence gaps:** - **Funding sources:** Australian National Health and Medical Research Council (NH&MRC) **Applicable to UK?** Yes

			Costs were evaluated from a healthcare perspective and calculated in Australian dollars at 2007 costs. Resources required to provide the intervention were recorded by the research team and via an audit of GP visits for intervention and control families. Resource use was valued using appropriate salary scales, travel cost allowances, and fee rates from the Medicare Benefits Schedule **Other:** - **Time horizon:** 12 week study with follow-up 6 and 12 months post-randomisation **Discount rates:** N/A **Modelling method:** Linear and logistic regression models. All comparisons adjusted for SES, age	Adjusted mean differences for physical activity in counts/min at 6 and 12 months were 24 (-4 to 52; -p=.09) and 11 (-26 to 49; p=.6). Unadjusted differences were 26 (95% CI: -3 to 54, p=.08) and 12 (95% CI: -26 to 49, p=.6). **Wellbeing:** Adjusted mean differences in PedsQL scores were 1.3 (95% CI: -1.7 to 4.4, p=.4) at 6 months and 1.6 (95% CI: -1.5 to 4.7, p=.3) at 12 months. Unadjusted differences were 1.0 (95%CI:-2.1 to 4.0, p=.5) at 6 months and 0.8 (95%CI:-2.4 to 4.0, p=.8) at 12 months. **Cost effectiveness:** The cost to the health sector of providing the intervention (BMI surveillance, GP recruitment and training) to the 66 participating GPs was $A152,000. Including the costs of all GP consultations with participating families, costs borne by the health sector were $A1,317 per intervention child and $A81 per control, a difference of	

			at randomisation, sex, and baseline score for outcome measures. All analysis except BMI z score were also adjusted for baseline BMI.	$A1,236 (95% CI $A1,205 to $A1,267). It should be noted that the GPs in the LEAP2 trial provided the intervention to an artificially small number of children (2.1 per GP). These costs would fall if the intervention were provided to a greater number of children per GP—for example, to $A412 (95% CI $A381 to $A442) if each GP managed 30 children. This still, however, represents a marked increase in costs for no real improvement in the primary or secondary outcomes.	
York Health Economics Consortium (MEND)					
First author and year: York Health Economics Consortium 2010 Tchakehakij 2011 **Aim of study:** To examine the economic and social value of MEND 7-13 (only economic outcomes reported here) **Type of**	**Setting:** England, community-based. Modelling based on MEND 7-13 being made available to all eligible children in England **Participants:** 7-13 year old children and their parents. To be eligible for the programme children had to have a BMI greater or equal to the 91st centile.	**Intervention(s):** Group-based after-school course that teaches healthy living to children and their parents. The programme is delivered in community settings and consists of twice weekly two-hour sessions. The sessions cover nutrition, behaviour change, and exercise and are a combination of information-giving	**Anthropometry:** Model of QALY savings based on BMI changes observed in the MEND RCT **Diet:** Not measured **Physical activity:** Not measured **Wellbeing:** QALYs **Service satisfaction:** Not measured **Cost effectiveness:**	**Cost effectiveness:** As it costs, on average, £415.77 to make MEND 7-13 available to each child, a budget of £551.2 million would be required to deliver the service across the total eligible population of 1,325,638 children in 2010. However, implementing MEND 7-13 in 2010 would decrease the number of obese adults in 2027 by 119,627. This results in direct medical cost	

economic analysis: Cost-effectiveness evaluation **Applicability:** Direct **Study limitations:** Potentially serious	**Data sources:** Primary research and modelling assumptions **Motivation/referral/ payment:** Referral is via a mixture of healthcare professional- and self-referral.	and applied learning. Many of the sessions are conducted with the parents and children together, with the exception of the exercise classes which are only attended by the children. **Control:** Waiting list control **Sample sizes:** In 2010 1,325,638 7-13 year olds were eligible for the programme **Intervention delivery:** Teams of health, social, education, and exercise professionals **Target group:** Family – some elements directed at obese child, some at parents and some at whole family	Long-term economic evaluation of the BMI reductions that are evidenced in the MEND 7-13 roll-out data. **Other:** Not measured **Time horizon:** Lifetime **Discount rates:** 3.5% **Modelling method:** An incremental cost-effectiveness ratio (ICER) was calculated, defined as the additional costs of the intervention divided by the additional quality-adjusted life years (QALY) gained. The ICER was derived from a project scenario, informed by the following assumptions: 1) MEND 7-13 is fully implemented & available to the eligible population of 1,325,638 7 - 13 year olds in England that have a BMI greater, or equal to, the 91st centile in 2010. 2) Effectiveness of	savings of £216 million (an average of £166 per participating child). A total of 200,511 QALYs would be gained from such a roll-out. This is the equivalent to 0.15 QALY per participating child. Based on NICE guidelines it is estimated that MEND 7-13 delivers health outcomes worth £3,025 – £4,537.70 per enrolled child. The ICER for MEND 7-13 is £1,671.5 per QALY gained. The ICER is considered cost-effective according to NICE guidance. *Note*: Tchakehakij 2011 provided a slightly different ICER estimate, viz £1,668 per QALY gained. Additional data from this thesis show that the model was based on effectiveness data using the international definition: 15.3% of children became non-obese. If the UK definition had been used, the author notes that 9.1% of children would have been deemed non-

			MEND 7-13 in reducing BMI concurs with the 3-month follow-up data from the roll-out. The percentage of obese children averted into non-obesity is, therefore, 15.27%. 3) The future medical costs of obesity are drawn from the Foresight report. These are applied only to the age group reached if the MEND 7-13 is implemented in 2010 and costs are linearly distributed. 4) Health outcomes are measured in QALYs calculated using the EQ-5DL measure. The estimate of life years gained is based on survival probabilities at different BMI. 5) Survival curves (based on projected BMI at age 27) do not permit movement between groups and so may overestimate life expectancy of the non-obese group.	obese, post intervention.

APPENDIX C: SUMMARY OF QUALITY APPRAISAL – INCLUDED STUDIES

Key to headings (brief summary from Appendix F, NICE 2009): 1.1 Source population described; 1.2 Eligible population representative of source ; 1.3 Selected population representative of eligible; 2.1 Population described; 2.2 Intervention/comparison described; 2.3 Allocation concealed; 2.4 Blinded; 2.5 Exposure adequate; 2.6 Contamination low; 2.7 Other interventions similar in groups; 2.8 All participants accounted for; 2.9 Setting reflects UK practice; 2.10 Intervention reflects UK practice; 3.1 Reliable outcomes; 3.2 Complete outcomes; 3.3 Important outcomes assessed; 3.4 Relevant outcomes; 3.5 Similar follow up times; 3.6 Meaningful follow up; 4.1 Groups similar at baseline; 4.2 ITT used; 4.3 Sufficient power; 4.4 Estimates of effect size given; 4.5 Appropriate analysis; 4.6 Precision; 5.1 Internally valid; 5.2 Externally valid; ++ Minimal bias; +Bias unclear; - Risk of bias; nr Not reported; na Not applicable

Author and Year	Study design	Population			Method of allocation to intervention (or comparison)											Outcomes						Analyses						Summary	
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	3.1	3.2	3.3	3.4	3.5	3.6	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2
Banks 2012	RCT	+	++	+	++	+	+	nr	+	++	nr	–	++	++	++	++	+	++	++	++	++	++	–	–	++	++	++	+	+
Berkowitz 2011	RCT	++	nr	nr	+	–	nr	nr	nr	nr	nr	nr	nr	+	nr	++	nr	nr	+	nr	nr	++	nr	nr	++	nr	+	–	
Braet 1997	Quasi RCT	+	+	++	nr	++	nr	nr	++	–	++	++	++	–	+	++	++	+	++	++	++	++	nr	nr	++	++	++	+	+
Bryant 2011	UBA	++	++	+	++	++	++	++	nr	++	+	+	++	++	++	+	++	++	++	++	++	+	nr	–	++	++	++	+	++
Collins 2011 Okely 2010	RCT	+	++	++	++	++	++	++	++	–	++	++	++	++	++	++	++	++	++	++	++	++	++	+	++	++	++	++	++
Coppins 2011	Quasi-RCT	–	+	++	–	++	–	–	+	+	++	+	++	++	++	+	++	++	++	++	++	+	+	–	++	++	++	+	+
Croker 2011	RCT	+	++	+	++	++	++	+	+	++	+	–	++	++	na	++	+	++	++	–	+	+	++	++	++	++	++	+	+
Daley 2006	RCT	++	++	++	++	++	++	+	++	++	++	++	++	–	–	+	+	+	++	++	++	++	++	+	++	+	++	++	+
DeBar 2010	RCT	++	++	+	++	++	++	nr	+	+	++	++	++	++	++	++	+	++	++	++	++	+	++	++	++	++	++	++	++
Duckworth 2009	Quasi-RCT	++	++	++	++	++	++	nr	nr	+	++	++	+	++	++	++	–	++	++	++	++	++	++	nr	++	+	++	+	++
Estabrooks 2009	RCT	–	nr	–	++	++	++	nr	++	++	++	–	+	+	+	++	++	++	++	++	++	++	++	++	++	++	++	+	+
Ford 2010	RCT	–	nr	+	++	++	++	+	++	++	+	++	++	++	++	++	++	++	++	++	++	+	++	++	++	++	++	++	+
Gately 2005	CBA	++	+	++	–	+	nr	nr	nr	+	+	nr	nr	++	++	++	nr	+	++	nr	–	–	nr	nr	+	+	+	–	++
Gately 2007	RCT	++	+	+	+	++	nr	+	+	+	++	+	–	++	++	++	+	+	++	na	–	na	nr	nr	++	+	++	–	++
Goldfield 2001 Raynor 2002	Quasi-RCT	–	+	+	nr	++	nr	nr	++	–	++	–	nr	–	++	+	+	+	++	++	++	++	nr	nr	++	++	++	–	+
Golley 2007 and 2011	RCT	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+	+	++	++	++	++	+	++	++	++	++	++	++
Hughes 2008	RCT	++	++	++	++	++	++	++	++	++	++	+	+	++	++	++	–	++	++	++	++	++	+	++	++	++	++	+	++

Author and Year	Study design	Population			Method of allocation to intervention (or comparison)											Outcomes						Analyses						Summary	
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	3.1	3.2	3.3	3.4	3.5	3.6	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2
Janicke 2008a/b	RCT	+	+	++	+	++	+	nr	+	++	++	+	–	++	++	++	++	+	+	++	++	++	+	+	++	++	++	+	++
Jelalian 2010, 2011, Sato 2011	RCT	–	+	++	++	++	++	+	++	++	++	+	++	+	+	+	+	++	++	++	++	++	+	++	++	++	++	+	+
Kalarchian 2009	RCT	+	+	++	++	++	++	+	++	++	++	++	++	+	+	++	++	+	++	++	++	++	++	++	++	++	++	++	+
Kalavainen 2007, 2011, 2012	RCT	++	++	+	++	++	++	nr	++	++	++	++	++	+	+	++	++	+	++	++	++	++	nr	+	++	++	++	++	+
King 2007	UBA	++	+	–	na	+	na	na	na	na	na	+	–	++	++	++	+	+	++	na	+	na	–	nr	++	++	++	–	+
Margarey 2011	RCT	++	++	++	++	++	++	++	++	++	++	+	++	++	++	++	+	+	++	++	++	++	+	++	++	++	++	++	++
McCallum 2007, 2005	RCT	++	++	+	++	++	++	++	+	++	++	++	++	++	++	++	++	++	++	++	++	++	+	++	++	++	++	++	++
Murdoch 2011	UBA	++	+	+	na	++	na	–	+	na	na	nr	–	++	++	+	nr	++	++	na	–	na	–	nr	++	–	+	–	+
Nguyen 2012 Shrewsbury 2009, 2010, 2011	RCT	++	++	++	++	++	++	++	++	+	++	+	++	+	+	++	+	++	++	++	++	++	++	+	++	++	++	++	++
Norton 2011 (abstract only)	UBA	+	nr	–	na	–	na	na	nr	na	na	–	nr	++	++	++	–	++	++	na	+	na	na	nr	++	nr	+	–	
Nova 2001	Quasi-RCT	+	–	–	nr	++	nr	–	++	++	++	+	++	–	++	++	++	++	++	++	++	+	++	+	++	++	+	+	+
Petty 2009	RCT	+	++	+	++	++	++	–	+	+	+	++	++	++	+	++	–	++	++	+	+	++	++	+	++	++	+	+	++
Pittson 2011/ 2010	UBA	++	++	++	na	na	na	na	nr	na	na	–	nr	++	++	++	+	++	++	na	–	na	–	nr	+	+	+	–	++
Rennie 2010 (abstract only)	UBA	nr	nr	+	na	na	na	–	na	na	na	++	nr	++	na	++	++	++	++	na	++	na	+	na	+	++	+	–	
Resnicow 2005	Quasi-RCT	+	+	+	+	++	nr	nr	++	++	++	+	++	–	–	++	+	+	+	++	+	nr	++	–	++	–	++	–	+
Robertson 2011 and 2012	UBA	++	++	+	na	++	na	na	+	na	na	+	na	++	++	++	+	++	++	na	++	na	+	na	++	++	++	–	+
Rudolf 2006	UBA	++	++	+	na	++	na	na	nr	na	na	–	nr	++	++	++	+	+	++	na	–	na	nr	na	++	nr	++	–	+
Sabin 2007	UBA	+	+	+	na	++	na	na	++	na	na	–	+	+	+	++	+	+	++	na	++	na	–	na	++	++	++	–	+

Author and Year	Study design	Population			Method of allocation to intervention (or comparison)											Outcomes						Analyses						Summary	
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	3.1	3.2	3.3	3.4	3.5	3.6	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2
Sacher 2010	RCT	++	+	+	++	++	++	–	++	++	+	–	++	++	++	++	+	++	++	++	+	+	–	++	++	++	++	+	++
Savoye 2009, 2011	RCT	++	++	++	++	++	++	nr	nr	+	++	++	++	++	++	++	–	+	++	++	++	++	++	nr	++	+	++	+	++
Wake 2009	RCT	++	++	+	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+	++	++	++	++	++
Watson 2011, 2010	UBA	++	+	+	na	++	na	na	+	na	na	–	–	++	++	+	–	+	++	na	++	na	–	nr	++	++	++	–	++
West 2010	Cluster RCT	+	+	–	++	++	++	–	+	++	++	–	++	++	+	++	+	++	++	–	+	++	++	nr	++	–	+	–	+

APPENDIX D Quality Assessment of economic analyses

Key to headings (brief summary from Appendix I, NICE 2009): 1.1 Study population appropriate? 1.2 Interventions appropriate? 1.3 Sufficiently similar to UK? 1.4 Perspectives clearly stated? 1.5 Direct health effects on individuals included? 1.6 Future costs and outcomes discounted appropriately? 1.7 Value of health effect in QALYs? 1.8 Costs and outcomes from other sectors measured and valued? 2.1 Model structure accurately reflects nature of topic? 2.2 Time horizon sufficiently long? 2.3 All important and relevant outcomes included? 2.4 Estimates of baseline outcomes from best available source? 2.5 Estimates of relative treatment effects from best source? 2.6 Important and relevant costs included? 2.7 Estimates of resource from best possible source? 2.8 Unit cost of resources from best available source? 2.9 Appropriate incremental analysis presented or can be calculated? 2.10 All important parameters with uncertain values subjected to sensitivity analyses? 2.11 Any potential conflict of interest?

Codes: N = No; N/A = non-applicable; P = Partially; U = Unclear; Y = Yes;

First author/year	Applicability									Study Limitations											
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	Overall	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	Overall Assessment
Coppins 2011	Y	Y	Y	N	N	N	N	N	Partially	N/A	N	N	Y	Y	N	U	U	P	N	N	Very serious
Goldfield 2001	Y	Y	P	N	N	N/A	N	N	Partially	N/A	N	N	Y	Y	N	Y	U	Y	N	U	Very serious
Hollingworth 2012	Y	Y	Y	Y	P	Y	N	N	Directly	Y	Y	P	Y	Y	Y	Y	Y	Y	Y	Y	Potentially serious
Hughes 2008	Y	Y	Y	N	P	N/A	N	N	Partially	N/A	N	N	Y	Y	N	Y	U	P	N	U	Very serious
Janicke 2009	Y	Y	P	N	N	N/A	N	N	Partially	N/A	N	N	Y	Y	N	Y	U	Y	N	U	Very serious
Kalavainen 2009	Y	Y	P	Y	N	N/A	N	N	Partially	N/A	N	N	Y	Y	N	Y	U	Y	P	N	Very serious
Moodie 2008	Y	Y	P	Y	Y	P	N	P	Directly	Y	Y	Y	Y	Y	U	U	U	Y	P	U	Potentially serious
Robertson 2011	Y	Y	Y	Y	P	N	N	N	Partially	N/A	N	N	N	N	N	N	U	Y	N	U	Very serious
Wake 2008	Y	Y	P	Y	N	N/A	N	P	Partially	N/A	N	N	Y	Y	N	Y	U	Y	Y	U	Very serious
Wake 2009	Y	Y	P	Y	P	N/A	N	N	Partially	N/A	N	N	Y	Y	N	Y	U	Y	P	N	Very serious
YHEC 2010	Y	Y	Y	Y	Y	Y	Y	N	Directly	Y	Y	Y	N	N	Y	Y	U	Y	Y	U	Potentially serious

APPENDIX E: REVIEW TEAM

Staff/Resource Description	Role
Dr Sinead Brophy	Study selection, quality assessment, data extraction, expert advice.
Dr Will Hollingworth	Quality assessment, report writing, expert advice on cost effectiveness and economic analysis
Dr Ruth Kipping	Report writing and expert advice
Ms Fiona Morgan, SURE, Cardiff University	Project management, searching, study selection, quality assessment, data extraction, narrative synthesis and report writing.
Dr Helen Morgan, SURE, Cardiff University	Project management, searching study selection, quality assessment, data extraction, narrative synthesis and report writing.
Ms Ruth Turley, SURE, Cardiff University	Searching, Quality assessment, data extraction
Dr Alison Weightman, SURE, Cardiff University	Project Director. Searching, study selection, quality assessment, data extraction, narrative synthesis and report writing.
Dr Sarah Whitehead, CISHE, Cardiff University	Study selection, quality assessment and data extraction.
Dr James White	Statistical analysis and report writing

APPENDIX F: SEARCH STRATEGY

APPENDIX D: Search Strategy (Ovid Medline) 1 January 2000 to May Week 3 2012

A focused database search strategy has been developed. A comprehensive but specific range of terms have been identified for each of three concepts (topic, intervention and population) to reduce 'noise' (the number of irrelevant records identified). In addition, the use of medical subject (MeSH) headings has been restricted to allow more targeted searching in title and abstract.

Terms for specific programme/study names are included in the search in two ways. Non-specific names such as Mend, Scott or SHINE are included within the list of broad interventions. Narrow project names are 'OR'd with the three search concepts as a failsafe to ensure they are not missed in the more focused combination of search concepts.

The search was tested in Medline against a set of 53 potentially relevant papers with 92% being identified. It resulted in 2370 hits from 2000 to date. As noted in 2.1.1 above, database searching will be supplemented by a range of snowballing techniques to ensure that the overall search is highly sensitive.

Describing topic - reducing or treating obesity

1. (exp obesity/dh or exp obesity/th) and (reduc* or decreas* or treat* or manag* or control* or improv*).ti,ab.
2. overweight/th and (reduc* or decreas* or treat* or manag* or control* or improv*).ti,ab.
3. ((reduc* or decreas* or treat* or manag* or control* or improv*) adj6 (obes* or weight gain or weight loss or overweight or over weight)).ti,ab.
4. or/1-3

Describing broad interventions

5. exp behavior therapy/ or family therapy/ or *family practice/ or weight loss/
6. exp Exercise Therapy/
7. ((group* or family or families* or cognitive) adj1 therap*).ti,ab.
8. ((lifestyle or life style or behavi?r or behavi?ral) adj2 (intervention* or project* or strateg* or program* or organi?ation* or model* or scheme* or initiative* or service*)).ti,ab.
9. outpatient care.ti,ab.
10. ((dietary or diet or physical activit* or exercise or nutrition or nutritional) adj1 (intervention* or program* or project*1 or strateg* or organi?ation* or model* or scheme* or initiative* or service*)).ti,ab.
11. ((dietary or diet or physical activit* or exercise or nutrition or nutritional) adj1 (education or training)).ti,ab.
12. (obes* adj2 treatment*).ti,ab.
13. (children adj3 parent* adj3 (therap* or treatment* or intervention* or program* or project*1 or strateg* or organi?ation* or model* or scheme* or initiative*)).ti,ab.
14. ((school-based or school or schools or communit*) adj2 (program* or project* or intervention* or organi?ation* or model* or scheme* or initiative* or service*)).ti,ab.
15. (("use" or wear*) adj2 pedometer*).ti,ab.
16. ((famil* or parent* or family based or caregiver*) adj1 (treatment* or intervention* or program* or project*1 or organi?ation* or model* or scheme* or initiative* or service*)).ti,ab.
17. ((parent or caregiver*) adj2 (behavio?r or involve* or control* or attitude* or educat*)).ti,ab.
18. ((behavio?r or behavi?ral) adj1 (therapy or modification)).ti,ab.
19. (LEAP RCT or SCOTT or SHINE or (leap adj3 trial)).ti,ab.
20. (weight adj1 (manag* or loss or control or obesity) adj2 (intervention* or program* or project or organi?ation* or model* or scheme* or initiative* or service* or dietary or diet or physical activit* or exercise or nutrition or nutritional)).ti,ab.
21. ((mend or "watch it") adj1 program*).ti,ab.

22. ("on the go" or kick-start or "more life" or "balance it" or "co action" or "be active eat well" or "project story" or SHINE or weight concern or help trial or "healthy eating and lifestyle program" or COCO or COBWEBS or HENRY).ti,ab.
23. ((carnegie or day or residential or boot or weight loss or obes* or overweight) adj (camp or camps or club or clubs)).ti,ab.
24. (jenny adj1 craig*).ti,ab.
25. (rosemary adj1 conley*).ti,ab.
26. (weightwatchers or weight watchers or Slimming World).ti,ab.
27. (cambridge adj1 (weight plan* or weight program* or diet*1)).ti,ab.
28. (lighter life or lighterlife).ti,ab.
29. (counterweight and (exercise or nutrition or weight or obese or obesity or program*)).ti,ab.
30. or/5-29 **[Broad interventions]**
31. 4 and 30 **[obesity AND interventions]**

Describing population – 0-17 year olds

32. pediatrics/ or pediatric*.ti,ab. or paediatric*.ti,ab.
33. exp child/ or child, preschool/ or infant/
34. adolescents/
35. (child or children* or schoolchild* or school pupil* or adolescen* or infant* or teen* or kids or youth* or youngster* or boy*1 or girl*1).ti,ab.
36. (young people or young person* or aged 16 or aged 17 or under 18 or under 18s or under 16 or under 16s).ti,ab.
37. or/32-36
38. 37 and 31 **[population AND obesity AND broad interventions]**

Specific intervention terms

39. (slimming adj3 (club* or group* or organi?ation* or program* or scheme* or initiative* or intervention* or service* or project*1 or class*)).ti,ab.
40. (henry adj3 (exercise or nutrition or weight or obese or obesity)).ti,ab.
41. (carnegie adj3 weight management).ti,ab.
42. morelife.ti,ab.
43. (child health improvement sessions or family initiative supporting childrens health or fit friendz or food fit fun or getting our active lifestyles started or "live eat and play" or "mind exercise nutrition do it" or "carnegie weight management" or "alive n kicking" or "beezee bodies" or "care of childhood obesity" or "connect 3" or "fisch family support" or "fit for life academy" or "fun 4 life" or "go 4 it" or "getting our active lifestyles started" or "self help independence nutrition and exercise" or "traffic light childhood obesity" or "Y W8" or "young PALS" or "practice activity and leisure scheme" or "Sheffield obesity trial" or "Scottish childhood overweight treatment trial" or "America on the move" or "stanford sports to prevent obesity" or mini mend or "mend 5-7" or combating obesity ltd or Health exercise nutrition for the really young).ti,ab.
44. or/39-43
45. animal/ not (animal/ and human/)
46. (letter or editorial or historical article).pt.
47. (38 or 44) not (45 or 46)) **[(population AND obesity AND broad interventions) OR specific interventions with limits]**
48. limit 47 to english language
49. limit 48 to yr="2000 -Current"

APPENDIX G: LIST OF INCLUDED STUDIES

Banks, J., Sharp, D.J., Hunt, L.P., & Shield, J.P. 2012. Evaluating the transferability of a hospital-based childhood obesity clinic to primary care: a randomised controlled trial. *British Journal of General Practice*, 62, (594) 6-12

Barton, S.B., Walker, L.L., Lambert, G., & Gately, P.J. 2004. Cognitive change in obese adolescents losing weight. *Obesity Research*, 12, (2) 313-319

Berkowitz, R.I., Rukstalis, M., Bishop-Gilyard, C.T., Moore, R.H., Gehrman, C., Xanthopoulos, M.S., Cochran, W.J., & Wadden, T.A. 2011. Treatment of adolescent obesity in primary care: A self-guided approach. *Obesity*, Conference abstract, October

Braet, C., Van Winckel, M., & Van Leeuwen, K. 1997. Follow-up results of different treatment programs for obese children. *Acta Paediatrica*, 86, (4) 397-402

Bryant, M., Farrin, A., Christie, D., Jebb, S.A., Cooper, A.R., & Rudolf, M. 2011. Results of a feasibility randomised controlled trial (RCT) for WATCH IT: a programme for obese children and adolescents. *Clinical Trials*, 8, (6) 755-764

Burrows, T., Warren, J.M., Baur, L.A., Collins, C.E., Burrows, T., Warren, J.M., Baur, L.A., & Collins, C.E. 2008. Impact of a child obesity intervention on dietary intake and behaviors. *International Journal of Obesity*, 32, (10) 1481-1488

Burrows, T., Warren, J.M., & Collins, C.E. 2010. The impact of a child obesity treatment intervention on parent child-feeding practices. *International Journal of Pediatric Obesity*, 5, (1) 43-50

Burrows, T., Janet, W.M., Collins, C.E., Burrows, T., Janet, W.M., & Collins, C.E. 2011. Long-term changes in food consumption trends in overweight children in the HIKCUPS intervention. *Journal of Pediatric Gastroenterology & Nutrition*, 53, (5) 543-547

Cliff, D.P., Okely, A.D., Morgan, P.J., Steele, J.R., Jones, R.A., Colyvas, K., & Baur, L.A. 2011. Movement skills and physical activity in obese children: randomized controlled trial. *Medicine & Science in Sports & Exercise*, 43, (1) 90-100

Collins, C.E., Morgan, P.J., Okely, A.D., Burrows, T.L., Cliff, D.P., Jones, R.A., Steele, J.R., & Baur, L.A. 2010. HIKCUPS (Hunter Illawarra Kids Challenge Using Parent Support) reduces BMI z-score up to 2 years: Results of a multi-site randomized trial for overweight children. *Obesity Reviews*, Conference abstract, July

Collins, C.E., Okely, A.D., Morgan, P.J., Jones, R.A., Burrows, T.L., Cliff, D.P., Colyvas, K., Warren, J.M., Steele, J.R., & Baur, L.A. 2011. Parent diet modification, child activity, or both in obese children: an RCT. *Pediatrics*, 127, (4) 619-627

Coppins, D.F., Margetts, B.M., Fa, J.L., Brown, M., Garrett, F., & Huelin, S. 2011. Effectiveness of a multi-disciplinary family-based programme for treating childhood obesity (the Family Project). *European Journal of Clinical Nutrition*, 65, (8) 903-909

Croker, H., Viner, R.M., Nicholls, D., Haroun, D., Chadwick, P., Edwards, C., Wells, J.C., & Wardle, J. 2012. Family-based behavioural treatment of childhood obesity in a UK National Health Service setting: randomized controlled trial. *International Journal of Obesity*, 36, (1) 16-26

Daley, A.J., Copeland, R.J., Wright, N.P., & Wales, J.K. 2005. Protocol for: Sheffield Obesity Trial (SHOT): a randomised controlled trial of exercise therapy and mental health outcomes in obese adolescents [ISRCNT83888112]. *BMC Public Health*, 5, 113

Daley, A.J., Copeland, R.J., Wright, N.P., Roalfe, A., & Wales, J.K. 2006. Exercise therapy as a treatment for psychopathologic conditions in obese and morbidly obese adolescents: a randomized, controlled trial. *Pediatrics*, 118, (5) 2126-2134

DeBar, L.L., Stevens, V.J., Perrin, N., Wu, P., Pearson, J., Yarborough, B., Dickerson, J., & Lynch, F. 2012. A primary-are based, multicomponent lifestyle intervention for overweight adolescent females. *Pediatrics*, 129, (3) e611-e620

Duckworth, L.C., Gately, P.J., Radley, D., Cooke, C.B., King, R.F., & Hill, A.J. 2009. RCT of a high-protein diet on hunger motivation and weight-loss in obese children: an extension and replication. *Obesity*, 17, (9) 1808-1810

Edwards, C., Nicholls, D., Croker, H., Van Zyl, S., Viner, R., & Wardle, J. 2006. Family-based behavioural treatment of obesity: acceptability and effectiveness in the UK. *European Journal of Clinical Nutrition*, 60, (5) 587-592

Estabrooks, P.A., Shoup, J.A., Gattshall, M., Dandamudi, P., Shetterly, S., & Xu, S. 2009. Automated telephone counseling for parents of overweight children: a randomized controlled trial. *American Journal of Preventive Medicine*, 36, (1) 35-42

Ford, A.L., Bergh, C., Sodersten, P., Sabin, M.A., Hollinghurst, S., Hunt, L.P., & Shield, J.P. 2010. Treatment of childhood obesity by retraining eating behaviour: randomised controlled trial. *BMJ*, 340, b5388

Gately, P.J., Cooke, C.B., Barth, J.H., Bewick, B.M., Radley, D., & Hill, A.J. 2005. Children's residential weight-loss programs can work: a prospective cohort study of short-term outcomes for overweight and obese children. *Pediatrics*, 116, (1) 73-77

Gately, P.J., King, N.A., Greatwood, H.C., Humphrey, L.C., Radley, D., Cooke, C.B., & Hill, A.J. 2007. Does a high-protein diet improve weight loss in overweight and obese children? *Obesity*, 15, (6) 1527-1534

Goldfield, G.S., Epstein, L.H., Kilanowski, C.K., Paluch, R.A., & Kogut-Bossler, B. 2001. Cost-effectiveness of group and mixed family-based treatment for childhood obesity. *International Journal of Obesity and Related Metabolic Disorders*, 25, (12) 1843-1849

Golley, R.K., Magarey, A.M., Baur, L.A., Steinbeck, K.S., & Daniels, L.A. 2007. Twelve-month effectiveness of a parent-led, family-focused weight-management program for prepubertal children: a randomized, controlled trial. *Pediatrics*, 119, (3) 517-525

Golley, R.K., Magarey, A.M., & Daniels, L.A. 2011. Children's food and activity patterns following a six-month child weight management program. *International Journal of Pediatric Obesity*, 6, (5-6) 409-414

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APPENDIX H: Systematic Reviews discussed comparatively

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Sbruzzi, G., Eibel, B., Cesa, C.C., Ribeiro, R.A., Barbiero, S.M., Petkowicz, R., De Souza, W.B., Martins, C., Schaan, B.D., & Pellanda, L. 2011. Educational and behavioral interventions in childhood obesity: A systematic review with metanalysis of randomized clinical trials. *European Heart Journal*, Conference abstract, August

Silveira, J.A., Taddei, J.A., Guerra, P.H., & Nobre, M.R. 2011. Effectiveness of school-based nutrition education interventions to prevent and reduce excessive weight gain in children and adolescents: a systematic review. *Jornal.de pediatria.*, 87, 382-392

Snethen, J.A., Broome, M.E., & Cashin, S.E. 2006. Effective Weight Loss for Overweight Children: A Meta-Analysis of Intervention Studies. *Journal of Pediatric Nursing*, 21, (1) 45-56

Staniford, L., Breckon, J., & Copeland, R. 2011. Treatment of Childhood Obesity: A Systematic Review. *Journal of Child and Family Studies* 1-20

Tsiros, M.D., Sinn, N., Coates, A.M., Howe, P.R., Buckley, J.D., Tsiros, M.D., Sinn, N., Coates, A.M., Howe, P.R.C., & Buckley, J.D. 2008. Treatment of adolescent overweight and obesity. *European Journal of Pediatrics*, 167, (1) 9-16

Tsiros, M.D., Olds, T., Buckley, J.D., Grimshaw, P., Brennan, L., Walkley, J., Hills, A.P., Howe, P.R.C., & Coates, A.M. 2009. Health-related quality of life in obese children and adolescents. *International Journal of Obesity*, 33, (4) 387-400

Waters, E., de-Silva Sanigorski, A., Hall, B.J., Brown, T., Campbell, K.J., Gao, Y., Armstrong, R., Prosser, L., & Summerbell, C.D. 2011. Interventions for preventing obesity in children. *Cochrane Database of Systematic Reviews*

Weinstein, P.K. 2006. A review of weight loss programs delivered via the Internet [corrected] [published erratum appears in J CARDIOVASC NURS 2007 Mar-Apr;22(2):137]. *Journal of Cardiovascular Nursing*, 21, (4) 251-260 available from: http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=2009242344&site=ehost-live

Whitlock, E.P., Williams, S.B., Gold, R., Smith, P.R., Shipman, S.A., Whitlock, E.P., Williams, S.B., Gold, R., Smith, P.R., & Shipman, S.A. 2005. Screening and interventions for childhood overweight: a summary of evidence for the US Preventive Services Task Force. [Review] [127 refs]. *Pediatrics*, 116, (1) e125-e144

Whitlock, E.P., O'Connor, E.A., Williams, S.B., Beil, T.L., & Lutz, K.W. 2010. Effectiveness of Weight Management Interventions in Children: A Targeted Systematic Review for the USPSTF. *Pediatrics*, 125, (2) e396-e418 available from: http://pediatrics.aappublications.org/content/125/2/e396.abstract

Wilfley, D.E., Tibbs, T.L., Van Buren, D.J., Reach, K.P., Walker, M.S., & Epstein, L.H. 2007. Lifestyle interventions in the treatment of childhood overweight: a meta-analytic review of randomized controlled trials. *Health Psychol.*, 26, (5) 521-532

Wolfenden, L., Wiggers, J., Tursan, d.E., & Bell, A.C. 2010. How useful are systematic reviews of child obesity interventions? *Obesity Reviews*, 11, (2) 159-165

Woods, K., Bond, C., Humphrey, N., Symes, W., & Green L. 2011, *Solution focused brief therapy (SFBT) with children and families*, Department for Education, London, DFE-RR179.

Young, K.M., Northern, J.J., Lister, K.M., Drummond, J.A., & O'Brien, W.H. 2007. A meta-analysis of family-behavioral weight-loss treatments for children. *Clinical Psychology Review*, 27, (2) 240-249

APPENDIX K: STUDIES IN PROGRESS

Ball GD, Ambler KA, Keaschuk RA, Rosychuk RJ, Holt NL, Spence JC, Jetha MM, Sharma AM,and Newton AS. (2012) Parents as Agents of Change (PAC) in pediatric weight management: The protocol for the PAC randomized clinical trial. BMC Pediatrics Aug 6; 12, (1) 114. [Epub ahead of print]

Bean, M.K., Mazzeo, S.E., Stern, M., Bowen, D., & Ingersoll, K. 2011.A values-based Motivational Interviewing (MI) intervention for pediatric obesity: Study design and methods for MI Values. *Contemporary Clinical Trials*, 32, (5) 667-674

Christie, D., Hudson, L., Mathiot, A., Cole, T.J., Karlsen, S., Kessel, A., Kinra, S., Morris, S., Nazareth, I., Sovio, U., Wong, I.C., & Viner, R.M. 2011. Assessing the efficacy of the Healthy Eating and Lifestyle Programme (HELP) compared with enhanced standard care of the obese adolescent in the community: study protocol for a randomized controlled trial. *Trials [Electronic Resource]*, 12, 242

Gallagher, K.S., Davis, A.M., Malone, B., Landrum, Y., & Black, W. 2011. Treating rural pediatric obesity through telemedicine: baseline data from a randomized controlled trial. *Journal of Pediatric Psychology*, 36, (6) 687-695

Hare, M.E., Coday, M., Williams, N.A., Richey, P.A., Tylavsky, F.A., & Bush, A.J. 2012. Methods and baseline characteristics of a randomized trial treating early childhood obesity: the Positive Lifestyles for Active Youngsters (Team PLAY) trial. *Contemporary Clinical Trials*, 33, (3) 534-549

Janicke, D.M., Lim, C.S., Perri, M.G., Bobroff, L.B., Mathews, A.E., Brumback, B.A., Dumont-Driscoll, M., & Silverstein, J.H. 2011. The Extension Family Lifestyle Intervention Project (E-FLIP for Kids): Design and methods. *Contemporary Clinical Trials*, 32, (1) 50-58

Maddison, R., Mhurchu, C.N., Foley, L., Epstein, L., Jiang, Y., Tsai, M., Dewes, O., & Heke, I. 2011. Screen-time weight-loss intervention targeting children at home (SWITCH): a randomized controlled trial study protocol. *BMC Public Health*, 11, 524

Resnicow, K., McMaster, F., Woolford, S., Slora, E., Bocian, A., Harris, D., Drehmer, J., Wasserman, R., Schwartz, R., Myers, E., Foster, J., Snetselaar, L., Hollinger, D., & Smith, K. 2012. Study design and baseline description of the BMI2 trial: reducing paediatric obesity in primary care practices. *Pediatric Obesity*, 7, (1) 3-15

Wake, M., Lycett, K., Sabin, M., Gunn, J., Gibbons, K., Hutton, C., McCallum, Z., York, E., Stringer, M., & Wittert, G. 2012. A shared-care model of obesity treatment for 3-10 year old children: Protocol for the HopSCOTCH randomised controlled trial. *BMC Pediatrics*, 12, (1) 39

APPENDIX L: EXCLUDED PAPERS WITH REASONS FOR EXCLUSION

Aguilar, S., Ferreira, S., Fonseca, H., Ferreira, P.D., Martins, S., & Palmeira, A. 2010. Adolescent residential summer weight-loss camps can work: Short-term outcomes. *Journal of Adolescent Health*, Conference abstract, S42-S43	Conference abstract only. Insufficient data
Aicken C, Roberts H, Arai L. 2010. Mapping service activity: the example of childhood obesity schemes in England. BMC Public Health. Jun 4, 10, 310	Study design. Mapping schemes rather than evaluating them.
Ames, G.E., Perri, M.G., Fox, L.D., Fallon, E.A., De Braganza, N., Murawski, M.E., Pafumi, L., & Hausenblas, H.A. 2005. Changing weight-loss expectations: a randomized pilot study. *Eating Behaviors*, 6, (3) 259-269	Adults
Backlund, C., Sundelin, G., & Larsson, C. 2011. Effect of a 1-year lifestyle intervention on physical activity in overweight and obese children. *Advances in Physiotherapy*, 13, (3) 87-96	No BMI outcome data
Baker, J., Saunders, K., Baker, J., & Saunders, K. 2012. Fitter, healthier, happier families: a partnership to treat childhood obesity in the West Midlands. *Public Health*, 126, (4) 332-334Accessed 12 June 2012	Narrative discussion of MEND implementation
Bautista-Castano, I., Molina-Cabrillana, J., Montoya-Alonso, J.A., & Serra-Majem, L. 2004. Variables predictive of adherence to diet and physical activity recommendations in the treatment of obesity and overweight, in a group of Spanish subjects. *International Journal of Obesity & Related Metabolic Disorders*, 28, (5) 697-705	Age range from 14 -76 years but not possible to disaggregate data for 14-17 population
Birch, L. 2011. A review of the effectiveness of an established residential weight management intervention on short-term health outcomes in overweight and obese youth. *Journal of Human Nutrition & Dietetics*, 24, (3) 277-278	Age range to 18, no mean age and not possible to disaggregate
Birketvedt, G.S., Thom, E., Bernersen, B., & Florholmen, J. 2000. Combination of diet, exercise and intermittent treatment of cimetidine on body weight and maintenance of weight loss. A 42 months follow-up study. *Medical Science Monitor*, 6, (4) 699-703	Adults
Bravender, T., Russell, A., Chung, R.J., & Armstrong, S.C. 2010. A "novel" intervention: a pilot study of children's literature and healthy lifestyles. *Pediatrics*, 125, (3) e513-e517	Not a weight management programme
Chadwick, P., Stevenson, A., Radley, D., Kolotourou, M., & Sacher, P.M. 2010. Improvements in BMI z-score, diet and sedentary behaviour during a UK preschool community-based healthy lifestyle programme: MEND:2-4. Obesity Reviews, Conference abstract, July	Not overweight or obese population
Croker, H., Viner, R., Nicholls, D., Cooke, L., & Wardle, J. 2010. Eating behaviours of children attending obesity treatment as measured by the Children's Eating Behaviour Questionnaire	Study design – observational study

(CEBQ). *Obesity Reviews*, Conference abstract, July	
Croker, H., Cooke, L., & Wardle, J. 2011. Appetitive behaviours of children attending obesity treatment. *Appetite*, 57, (2) 525-529	Study design – observational study
Davis, C.L., Tkacz, J., Gregoski, M., Boyle, C.A., Lovrekovic, G., Davis, C.L., Tkacz, J., Gregoski, M., Boyle, C.A., & Lovrekovic, G. 2006. Aerobic exercise and snoring in overweight children: a randomized controlled trial. *Obesity*, 14, (11) 1985-1991	No BMI outcome data
Davis, J.N., Tung, A., Chak, S.S., Ventura, E.E., Byrd-Williams, C.E., Alexander, K.E., Lane, C.J., Weigensberg, M.J., Spruijt-Metz, D., & Goran, M.I. 2009. R no detail on BMI (primary outcome is reduced snoring. *Medicine and Science in Sports and Exercise*, 41, (7) 1494-1503	Hispanic population with no SES data
DAVIS, K., HODSON, P., & ZHANG, G. Promoting health-related fitness for elementary students with intellectual disabilities through a specifically designed activity program. Journal of Policy and Practice in Intellectual Disabilities, 77-84. 2011	Not overweight or obese population
de Niet, J., Timman, R., Bauer, S., van den Akker, E., Buijks, H., de, K.C., Kordy, H., & Passchier, J. 2012. 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. *Pediatric Obesity*, 7, (3) 205-219	Weight maintenance programme following a weight management programme
Dill, K.C. 2009. Adolescent values and exercise behaviors. *Dissertation Abstracts International: Section B: The Sciences and Engineering* (9-B) 5763	Not overweight or obese population
Fernandez, A.C., Tulio De, M.M., Tufik, S., Morcelli de, C.P., & Fisberg, M. 2004. Influence of the aerobic and anaerobic training on the body fat mass in obese adolescents. *Revista Brasileira de Medicina do Esporte*, 10, (3) 152-164	Population aged 15-19. Not possible to disaggregate data for age 15-17 population.
Ford, A.L., Hunt, L.P., Cooper, A., Shield, J.P., Ford, A.L., Hunt, L.P., Cooper, A., & Shield, J.P.H. 2010. What reduction in BMI SDS is required in obese adolescents to improve body composition and cardiometabolic health? Archives of Disease in Childhood, 95, (4) 256-261	Study design: observational study
Gesell, S.B., Scott, T.A., & Barkin, S.L. 2010. Accuracy of perception of body size among overweight latino preadolescents after a 6-month physical activity skills building intervention. *Clinical Pediatrics*, 49, (4) 323-329	Hispanic population with no SES data
Gibbons, K., McCallum, Z., & Wake, M. 2004. A primary care intervention for childhood obesity: Six-month results from LEAP (Live, Eat And Play), a randomised controlled trial. *International Journal of Obesity*, 28, S194	Abstract – superseded by McCallum 2007 (included paper)
Goldschmidt, A.B., Sinton, M.M., Aspen, V.P., Tibbs, T.L., Stein, R.I., Saelens, B.E., Frankel, F., Epstein, L.H., & Wilfley,	Weight maintenance programme following a weight

D.E. 2010. Psychosocial and familial impairment among overweight youth with social problems. *International Journal of Pediatric Obesity*, 5, (5) 428-435	management programme
Goldschmidt, A.B., Stein, R.I., Saelens, B.E., Theim, K.R., Epstein, L.H., & Wilfley, D.E. 2011. Importance of early weight change in a pediatric weight management trial. *Pediatrics*, 128, (1) e33-e39	Weight maintenance programme following a weight management programme
Gutin, B., Barbeau, P., Owens, S., Lemmon, C.R., Bauman, M., Allison, J., Kang, H., & Litaker, M.S. 2002. Effects of exercise intensity on cardiovascular fitness, total body composition, and visceral adiposity of obese adolescents. *The American journal of clinical nutrition*, 75, (5) 818-826	No BMI data – weight and height at baseline only
Hobkirk, J.P., King, R.F., Gately, P., Pemberton, P., Smith, A., Barth, J.H., & Carroll, S. 2012. Longitudinal factor analysis reveals a distinct clustering of cardiometabolic improvements during intensive, short-term dietary and exercise intervention in obese children and adolescents. *Metabolic Syndrome & Related Disorders*, 10, (1) 20-25	Age range to 18. No mean age and not possible to disaggregate data for under18s.
Hogue, A., Henderson, C.E., Dauber, S., Barajas, P.C., Fried, A., & Liddle, H.A. 2008. Treatment adherence, competence, and outcome in individual and family therapy for adolescent behavior problems. *Journal of Consulting Clinical Psychology*, 76, (4) 544-555	Not obesity
Johnston, C.A., Tyler, C., Fullerton, G., Poston, W.S., Haddock, C.K., McFarlin, B., Reeves, R.S., & Foreyt, J.P. 2007. Results of an intensive school-based weight loss program with overweight Mexican American children. *International Journal of Pediatric Obesity*, 2, (3) 144-152	Mexican-Americans – no SES data
Johnston, C.A., Tyler, C., McFarlin, B.K., Poston, W.S., Haddock, C.K., Reeves, R., & Foreyt, J.P. 2007. Weight loss in overweight Mexican American children: a randomized, controlled trial. *Pediatrics*, 120, (6) e1450-e1457	Mexican-Americans – no SES data
Johnston, C.A., Tyler, C., Fullerton, G., McFarlin, B.K., Poston, W.S., Haddock, C.K., Reeves, R.S., & Foreyt, J.P. 2010. Effects of a school-based weight maintenance program for Mexican-American children: results at 2 years. *Obesity*, 18, (3) 542-547	Mexican-Americans – no SES data
Johnston, C.A., Tyler, C., Fullerton, G., McFarlin, B.K., Poston, W.S.C., Haddock, C.K., Reeves, R.S., & Foreyt, J.P. 2010. Corrigendum: Effects of a school-based weight maintenance program for Mexican-American children: Results at 2 years. *Obesity* (3) Mar	Mexican-Americans – no SES data
Lake, K. 2007. Family intervention and therapy for overweight and obese kids. *Community Practitioner*	No BMI data at follow-up
Lazaar, N., Aucouturier, J., Ratel, S., Rance, M., Meyer, M., Duche, P., Lazaar, N., Aucouturier, J., Ratel, S., Rance, M., Meyer, M., & Duche, P. 2007. Effect of physical activity	Not overweight or obese population

intervention on body composition in young children: influence of body mass index status and gender. *Acta Paediatrica*, 96, (9) 1315-1320	
Lewis, A.L., Denley, J., Beach, J., Jolly, K., Daley, A., Adab, P., & Aveyard, P. 2011. A randomised controlled trial to compare a range of commercial or primary care led weight reduction programmes with a minimal intervention control for weight loss in obesity: the lighten up trial. *Obesity Reviews*, Conference abstract, May	Adult weight management programme
Li, Y.P., Hu, X.Q., Schouten, E.G., Liu, A.L., Du, S.M., Li, L.Z., Cui, Z.H., Wang, D., Kok, F.J., Hu, F.B., Ma, G.S., Li, Y.P., Hu, X.Q., Schouten, E.G., Liu, A.L., Du, S.M., Li, L.Z., Cui, Z.H., Wang, D., Kok, F.J., Hu, F.B., & Ma, G.S. 2010. Report on childhood obesity in China (8): effects and sustainability of physical activity intervention on body composition of Chinese youth. *Biomedical & Environmental Sciences*, 23, (3) 180-187	Not overweight or obese population
Lubans, D.R., Morgan, P.J., Dewar, D., Collins, C.E., Plotnikoff, R.C., Okely, A.D., Batterham, M.J., Finn, T., & Callister, R. 2010. The Nutrition and Enjoyable Activity for Teen Girls (NEAT girls) randomized controlled trial for adolescent girls from disadvantaged secondary schools: rationale, study protocol, and baseline results. *BMC Public Health*, 10, 652	Not overweight or obese population
Lubans, D.R., Plotnikoff, R.C., Morgan, P.J., Dewar, D., Costigan, S., & Collins, C.E. 2012. Explaining dietary intake in adolescent girls from disadvantaged secondary schools. A test of Social Cognitive Theory. *Appetite*, 58, (2) 517-524	Not overweight or obese population
Maddison, R., Foley, L., Ni, M.C., Jull, A., Jiang, Y., Prapavessis, H., Rodgers, A., Vander, H.S., Hohepa, M., & Schaaf, D. 2009. Feasibility, design and conduct of a pragmatic randomized controlled trial to reduce overweight and obesity in children: The electronic games to aid motivation to exercise (eGAME) study. *BMC Public Health*, 9 , 2009. Article Number, 146	Testing effectiveness of substituting active video game for normal video games in increasing MVPA. Not a weight management programme
Maddison, R., Foley, L., Ni, M.C., Jiang, Y., Jull, A., Prapavessis, H., Hohepa, M., & Rodgers, A. 2011. Effects of active video games on body composition: A randomized controlled trial. *American Journal of Clinical Nutrition*, 94, (1) 156-163	Testing effectiveness of substituting active video game for normal video games in increasing MVPA. Not a weight management programme
Mauri, M., Simoncini, M., Castrogiovanni, S., Iovieno, N., Cecconi, D., Dell'Agnello, G., Quadrigli, M., Rossi, A., Donda, P., Fagiolini, A., & Cassano, G.B. 2008. A psychoeducational program for weight loss in patients who have experienced weight gain during antipsychotic treatment with olanzapine. *Pharmacopsychiatry*, 41, (1) 17-23	Adults
McCallum, Z., Wake, M., Gerner, B., Sheehan, J., Gibbons, K., & Harris, C. 2004. Six month results from the LEAP (Live, Eat and Play) trial: A randomised controlled trial of a primary care intervention for childhood overweight/mild obesity. *Pediatric*	Abstract – superseded by McCallum 2007 (included paper)

Research, 55, 220A-221A	
McCallum, Z., Wake, M., & Baur, L. 2004. The Leap (live, eat and play) trial: Results of a randomized controlled trial of a primary care intervention for childhood overweight/mild obesity. *Obesity Research*, 12, A15-A16	Abstract – superseded by McCallum 2007 (included paper)
McCallum, Z., Gerner, B., McCallum, Z., & Gerner, B. 2005. Weighty matters--an approach to childhood overweight in general practice. [Review] [13 refs]. *Australian Family Physician*, 34, (9) 745-748	Superseded by McCallum 2007 (included paper
Nowicka, P. & Flodmark, C.E. 2011. Family therapy as a model for treating childhood obesity: useful tools for clinicians. *Clinical Child Psychology & Psychiatry*, 16, (1) 129-145	Study design: narrative description of programme
Olson, W.A. 2011. Internet technology and social support: Are they beneficial for overweight older adolescents? *Dissertation Abstracts International: Section B: The Sciences and Engineering* (2-B) 1171	Age 19-22
Papadaki, A., Linardakis, M., Larsen, T.M., van Baak, M.A., Lindroos, A.K., Pfeiffer, A.F.H., Martinez, J.A., Handjieva-Darlenska, T., Kunesova, M., Holst, C., Astrup, A., Saris, W.H.M., Kafatos, A., & DiOGenes Study Group. 2010. The effect of protein and glycemic index on children's body composition: the DiOGenes randomized study. *Pediatrics*, 126, (5) e1143-e1152	Not overweight or obese population
Pavlov, D.V., Iotova, V., & Ivanova, D.G. 2011. 2010 inform summer camp experience in combating preadolescence obesity. *Obesity Reviews*, Conference abstract, May	Conference abstract only. Insufficient information.
Polacsek, M., Orr, J., Letourneau, L., Rogers, V., Holmberg, R., O'Rourke, K., Hannon, C., Lombard, K.A., & Gortmaker, S.L. 2009. Impact of a primary care intervention on physician practice and patient and family behavior: keep ME Healthy---the Maine Youth Overweight Collaborative. *Pediatrics*, 123 Suppl 5, S258-S266	Not overweight or obese population
Poulsen, A.A., Desha, L., Ziviani, J., Griffiths, L., Heaslop, A., Khan, A., & Leong, G.M. 2011. Fundamental movement skills and self-concept of children who are overweight. *International Journal of Pediatric Obesity*, 6, (2-2) e464-e471	No BMI outcomes
Rolland-Cachera, M.F., Thibault, H., Souberbielle, J.C., Soulie, D., Carbonel, P., Deheeger, M., Roinsol, D., Longueville, E., Bellisle, F., & Serog, P. 2004. Massive obesity in adolescents: dietary interventions and behaviours associated with weight regain at 2 y follow-up. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity*, 28, (4) 514-519	Long-term (10-month) residential programme, therefore not community-based
Rosado, J.L., del, R.A., Montemayor, K., Garcia, O.P., & Caamano, M.d. 2008. An increase of cereal intake as an approach to weight reduction in children is effective only	Population is combination of overweight and at risk of overweight. Data cannot be

when accompanied by nutrition education: a randomized controlled trial. *Nutrition Journal*, 7, 28	disaggregated for overweight children
Sacher, P.M., Chadwick, P., Wells, J.C., Williams, J.E., Cole, T.J., & Lawson, M.S. 2005. Assessing the acceptability and feasibility of the MEND Programme in a small group of obese 7-11-year-old children. Journal of Human Nutrition and Diet, 18, (1) 3-5	Small-scale uncontrolled pilot for included RCT.
Sacher, P.M., Chadwick, P., Kolotourou, M., Radley, D., Chipperfield, A., Stevenson, A., Cole, T.J., Lawson, M., Lucas, A., & Singhal, A. 2010. From clinical trial to large-scale community implementation: Evaluation of the MEND multicomponent, family-based, child weight management programme in overweight and obese 7-13-year-old children in the United Kingdom. Obesity Reviews, Conference, (S1) July	Abstract reporting routinely collected programme data. RCT of same programme included.
Schelling, S., Munsch, S., Meyer, A.H., Newark, P., Biedert, E., & Margraf, J. 2009. Increasing the motivation for physical activity in obese patients. *International Journal of Eating Disorders*, 42, (2) 130-138	Adult weight management programme
St Jeor, S.T., Perumean-Chaney, S., Sigman-Grant, M., Williams, C., & Foreyt, J. 2002. Family-based interventions for the treatment of childhood obesity. *Journal of the American Dietetic Association*, 102, (5) 640-644	Study design: narrative review
Stice, E., Presnell, K., Groesz, L., Shaw, H., Stice, E., Presnell, K., Groesz, L., & Shaw, H. 2005. Effects of a weight maintenance diet on bulimic symptoms in adolescent girls: an experimental test of the dietary restraint theory. *Health Psychology*, 24, (4) 402-412	Not overweight or obese population
Taplin, C.E., Zeitler, P., Taplin, C.E., & Zeitler, P. 2009. Exercise for the treatment of childhood obesity--is it simply too much to ask? *Acta Paediatrica*, 98, (2) 214-216	Study design - commentary
Tkacz, J., Young-Hyman, D., Boyle, C.A., & Davis, C.L. 2008. Aerobic exercise program reduces anger expression among overweight children. *Pediatric Exercise Science*, 20, (4) 390-401	No BMI outcomes (anger only)
Verloigne, M., De Bourdeaudhuij, I., Tanghe, A., D'Hondt, E., Theuwis, L., Vansteenkiste, M., & Deforche, B. 2011. Self-determined motivation towards physical activity in adolescents treated for obesity: an observational study. *International Journal of Behavioral Nutrition & Physical Activity*, 8, 97	Long-term (10-month) residential programme, therefore not community-based
Wallman, K., Plant, L.A., Rakimov, B., & Maiorana, A.J. 2009. The effects of two modes of exercise on aerobic fitness and fat mass in an overweight population. *Research in Sports Medicine*, 17, (3) 156-170	Adult weight management programme
Wilfley, D.E., Stein, R.I., Saelens, B.E., Mockus, D.S., Matt, G.E., Hayden-Wade, H.A., Welch, R.R., Schechtman, K.B.,	Weight maintenance programme following a weight

Thompson, P.A., & Epstein, L.H. 2007. Efficacy of maintenance treatment approaches for childhood overweight: a randomized controlled trial. *JAMA*, 298, (14) 1661-1673	management programme
Yancy, W.S.J., Olsen, M.K., Guyton, J.R., Bakst, R.P., & Westman, E.C. 2004. A low-carbohydrate, ketogenic diet versus a low-fat diet to treat obesity and hyperlipidemia: a randomized, controlled trial. *Annals of Internal Medicine*, 140, (10) 769-777	Adults

The following papers are excluded RCTs with a population of between 40-99 participants.

Ball, G.D.C., Mackenzie-Rife, K.A., Newton, M.S., Alloway, C.A., Slack, J.M., Plotnikoff, R.C., & Goran, M.I. 2011. One-on-one lifestyle coaching for managing adolescent obesity: Findings from a pilot, randomized controlled trial in a real-world, clinical setting. *Paediatrics and Child Health*, 16, (6) 345-350

Bathrellou, E., Yannakoulia, M., Papanikolaou, K., Pehlivanidis, A., Pervanidou, P., Kanaka-Gantenbein, C., Tokou, I., Tsiantis, J., Chrousos, G.P., & Sidossis, L.S. 2010. Parental involvement does not augment the effectiveness of an intense behavioral program for the treatment of childhood obesity. *Hormones*, 9, (2) 171-175

Baxter, K.A., Ware, R.S., Batch, J.A., & Truby, H. 2012. Predicting success: Factors associated with weight change in obese youth undertaking a weight management program. *Obesity Research & Clinical Practice* (In Press - online early)

Berntsen, S., Mowinckel, P., Carlsen, K.H., Lodrup Carlsen, K.C., Pollestad Kolsgaard, M.L., Joner, G., & Anderssen, S.A. 2010. Obese children playing towards an active lifestyle. *International Journal of Pediatric Obesity*, 5, (1) 64-71

Berry, D., Savoye, M., Melkus, G., & Grey, M. 2007. An intervention for multiethnic obese parents and overweight children. *Applied Nursing Research*, 20, (2) 63-71

Bocca, G., Stolk, R., & Sauer, P. 2011. Long lasting positive effects of a multidisciplinary intervention program to treat obesity in preschool children. *Hormone Research in Paediatrics*, Conference abstract, October

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