Group-Based Diet and Physical Activity Weight-Loss Interventions

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Supplementary Files

for

Group-based diet and physical activity weight-loss interventions for overweight and obese adults: A systematic review and meta-analysis of randomised controlled trials

This supplement contains further details relevant to the systematic review, including characteristics of the included studies (Table S1), flow diagram of the study selection process (Figure S1), list of included studies (with numbers referred to in the main text of the paper and full references) (SF1), details of risk of bias assessments in all included studies (SF2), content coding in all included interventions (with coding instructions and report of coding reliability) (SF3), summary of results of sensitivity analyses and funnel plots (SF4), and summary of results of moderator (sub-group) analyses (SF5).

Contents

Table S1. Characteristics of included studies

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
Abedi 2010, Iran, RCT	76 I: 35 C: 29; 16%	Sedentary, post-menopausal, minimum primary education	100% women; Age: 52; BMI: I: 30.1 (6.2) C: 30.8 (30.8)	n/r	6	**D:** 5FV, ↑fibre, ↓fat, ↓salt	3 group sessions + 2 individual + telephone + booklets	n/r	No intervention	Prevention of CVD	6
Ahern 2017, UK, RCT	1269 I1: 530 I2: 528 C: 211; 35%	BMI ≥ 28, aged ≥ 18 years	68% women; Age: 53; I1: 34.7 (5.4) I2: 34.5 (5.1) C: 34.4 (4.6)	Community: n/r	I1: 3 I2: 12	***Commercial: Weight Watchers*** (GP referral)	**I1:** 12 group sessions **I2:** 52 group sessions	n/r	Minimal I: brief advice from a GP and a booklet	Weight loss	3, 12, 24
Anton 2011, USA, RCT	34 I: 17 C: 17; 6%	BMI ≥ 28, sedentary, aged 55-79, African American & Caucasian, mild-moderate physical impairment[1]	100% women; Age: 64; BMI: I: 37.8 (5.5) C: 35.8 (6.8)	Community: Church	6	**D:** caloric restriction by 750 kcal/day; **PA:** 150 min/wk MPA + 3/wk supervised exercise (aerobic, strength, flexibility)	24 group sessions + 3/wk exercise classes	n/r	Irrelevant I: lectures on topics not relevant to WL	Physical functioning	6
Ash 2006, Australia, RCT	191 I1: 62 I2: 66	BMI ≥ 27[2]	73% women; Age: 59; BMI:	Secondary care: Hospital	6	**D:** info, CBT **PA:** info	**I1:** 11 group sessions (Fat Booters)	Dietitians & nutritionists	Minimal I: WL booklet only	Weight loss	6, 12

[1] 3 participants in the intervention group had diabetes.
[2] Participants were not excluded on the basis of medical condition(s) or medication(s).

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	C: 63; 33%		I1: 33.7 (4.6) C: 35.8 (6.2)				+ booklet I2: Individual sessions + booklet				
Auslander 2002, USA, RCT	294 I:138 C:156; 26%	BMI > 27 aged 25-55, African American	100% women; Age: 41; BMI: I: 35.7 (6.2) C: 35.3 (6.0)	Community: n/r	3	**D:** ↓fat, FV, serving sizes	6 group sessions + 6 individual sessions	Peer (African-American women from community)	Minimal I: workbook	Prevention of T2DM	6
Aveyard 2017, UK, RCT	1882 I: 940 C: 942; 25%	BMI ≥ 30 or ≥ 25 if Asian, aged ≥ 18 years	57% women; Age: 56; BMI: I: 34.8 (4.6) C: 35.1 (5.1)	Community: n/r	3	***Commercial: Slimming World*** (GP referral)	12 group sessions	n/r	Minimal I: brief advice from GP	Weight loss	12
Avila & Hovell 1994, USA, RCT	44 I: 22 C: 22; 11%	≥ 20% overweight, Mexican & Mexican-American	100% women; Age: 42; BMI: I: 31.4 (3.8) C: 31.0 (2.9)	Community: n/r	2.5	**D:** info; **PA:** supervised exercise (stretching & walking)	8 group sessions + exercise classes	Doctor (bi-cultural & bilingual)	Irrelevant I: Sessions on cancer screening	Weight loss	5
Bouchard 2009, Canada, RCT	48 I1: 12 I2: 12 C: 12; 4%	≥ 35% body fat, sedentary, aged 55 -75, post-menopausal	100% women; Age: 63; BMI: I1: 31.9 (2.7) I2: 31.7 (2.6) C: 32.3 (2.4)	n/r	3	***I1. CR:*** **D:** caloric restriction ***I2. CR+RT:*** **D:** caloric restriction; **PA:** resistance training	**I1:** 12 group sessions **I2:** 12 group sessions + 3/wk supervised resistance training	I1: Dietitian I2: Dietitian & kinesiologist	No intervention	Physical functioning	3

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Canuto 2012, Australia, RCT	111 I: 55 C: 56; 33%	WC > 80 cm, aged 18-64, Aboriginal & Torres Strait Islander[3]	100% women; Age: 40; BMI: I: 36.1 (7.5) C: 33.5 (7.1)	n/r	3	**D:** info; **PA:** supervised aerobic exercise + resistance training + 10,000 steps/day	4 group sessions + 2/wk supervised exercise + newsletters	Dietitian & fitness instructor	No intervention (waiting list)	Weight loss	6
Carnie 2013, USA, RCT	199 I: 99 C: 100; 21%	BMI ≥ 25, inactive employees	100% women; Age: 46; BMI: I: 34.0 (6.2) C: 33.8 (6.6)	Worksite	6	**D:** info, calorie goals & counting tool; **PA:** ↑5,000 steps/day, access to exercise equipment	15 group sessions + Internet-based info + 1 individual session	Dietitian	Minimal I: same Internet-based info	Weight loss	6
Carroll 2012, UK, RCT	62 I: 31 C: 31; 34%	BMI > 30, sedentary, pre-menopausal[4]	100% women; Age: 40; BMI: I: 39.9 (7.4) C: 41.0 (7.7)	Community: municipal leisure centre	3	**D:** info, ↑fibre, ↓fat; **PA:** 2/wk supervised exercise, 4 h/wk or 30 min/day MPA	12 group sessions + 2/wk supervised exercise + booklet	Dietitians & exercise instructors	No intervention (waiting list)	Cardio-respiratory fitness	3
Conroy 2015, USA, RCT	99 I: 49 C: 50;	BMI ≥ 25, inactive, aged 46-65[5]	100% women; Age: 54; BMI:	Primary care: room	3	**D:** calorie + fat goals;	12 group sessions + manual	Doctor & PhD-level researcher	Minimal I: same manual	Physical activity + weight loss	3, 12

[3] Participants with diabetes included (26.7% in the control group and 17.2% in the intervention group).
[4] Participants with metabolic syndrome included (approx. half of the total sample, sub-analysis reported in Carroll et al. 2007).
[5] Participants with comorbidities included (56% had high blood pressure, 48% arthritis, 40% depression, 23% diabetes, and 24% sleep apnoea).

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
	24%		I: 36.1 (6.0) C: 33.4 (5.4)	in the practice		**PA:** 150 min/wk MPA					
Cousins 1992, USA, RCT	168 n/r; n/r %	20-100% over ideal body weight, aged 18-45, Mexican American	100% women; Age: 33; BMI: I1: 30.3 (4.5) I2: 31.7 (5.0) C: 31.6 (4.9)	n/r	12	***I1: Family:*** **D:** prescribed, ↓fat, calorie restriction by 700 kcal/day; **PA:** plan ***I2: Individual:*** **D:** prescribed, ↓fat, calorie restriction by 700 kcal/day; **PA:** plan	**I1:** 30 group sessions [focus on family changes] + manual **I2:** 30 group sessions [focus on individual changes] + manual	Dietitians (bi-lingual, female)	Minimal I: same manual	Weight loss	6, 12
Fitzgibbon 2005, USA, RCT	C1: 27 I:13 C: 14; 14% C2: 37 I: 18 C: 19; 11%	BMI ≥ 25, aged 35-65, African American & Black	100% women; C1: Age: 44; BMI: I: 37.7 (8.4) C: 35.9 (9.3) C2: Age: 45; BMI: I: 35.7 (7.3)	***Cohort 1:*** Community: YMCA site ***Cohort 2:*** University: room on campus	5	***Cohort 1:*** **D:** ↓fat, 5FV; **PA:** ↑PA; **BSE:** 50% WL, 50% BSE focus ***Cohort 2:*** **D:** ↓fat, CR 500 kcal/day, ↑FV; **PA:** ↑PA;	***Cohort 1:*** 20 group sessions + 1/wk aerobics & walking ***Cohort 2:*** 20 group sessions + 1/wk aerobics & walking	n/r	Irrelevant I: newsletters unrelated to WL or breast health	Weight loss + breast health	5

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Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
			C: 36.3 (7.3)			**BSE**: 80% WL, 20% BSE focus					
Folta 2009, USA, Cluster RCT	96 I: 61 C: 35; 12%	BMI ≥ 24, aged ≥ 40[6]	100% women; Age: 58; BMI: I: 33.4 (5.6) C: 32.1 (5.5)	Community: n/r	3	**D:** ↑FV, ↓fat; **PA:** 30 min/day MVPA, ↑lifestyle PA	24 group sessions	Health educators	No intervention (waiting list)	Prevention of CVD	3
Foster-Schubert 2012, USA, RCT	439 I1:118 I2:117 I3:117 C:87; 9%	BMI ≥ 25 (or ≥ 23 if Asian), inactive, aged 50-75, post-menopausal	100% women; Age: 58; BMI: I1: 31.1 (3.9) I2: 31.0 (4.3) C: 30.7 (3.9)	n/r	12	**I1. Diet only: D:** 1500-2000 kcal/day, ↓fat **I2. Diet & exercise: D:** 1500-2000 kcal/day, ↓fat; **PA:** ≥45 min 5/wk MVPA, 3/wk supervised exercise	*I1:* 24 group sessions + 2 individual + 6 individual or group sessions + 1 telephone or email *I2:* 24 group sessions + 2 individual + 6 individual or group sessions + 1 telephone or email + 3/wk supervised exercise	n/r	No intervention (waiting list)	Weight loss	12

[6] Although the inclusion criteria state that participants were included in the study with BMI≥24, we included this study (as a borderline case) because the mean BMI at baseline was over 32 (i.e. participants were overweight and obese rather than normal weight).

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
						I3: Exercise only: 3/wk supervised exercise	*I3:* No group sessions (not included)				
Gillett 1995, USA, RCT	157 I1: 63 I2: 68 C: 26; 15%	Sedentary, aged 49-59[7]	100% women; Age: 54; BMI: I1: 32.1 (4.2) I2: 31.3 (3.8) C: 33.0 (3.4)	n/r	4	*I1. Education:* **D:** info; **PA:** 3-4/wk 10-30 min MVPA (individually) *I2. Education + exercise:* **D:** info; **PA:** 3/wk exercise	*I1:* 16 group sessions + handouts *I2:* 16 group sessions + handouts + 3/wk supervised dance exercise	Nurses	No intervention	Physical functioning	4
Grant 2004, UK, RCT	44 I: 23 C: 21; 41%	BMI ≥ 25, aged 55-70, registered at the GP practice	100% women; Age: 63; BMI: I: 33.3 (4.5) C: 33.4 (6.9)	Primary care: GP practice	3	**D:** info, ↑FV, ↓fat; **PA:** 2/40min/wk supervised exercise (aerobic, strength, endurance & flexibility)	24 group sessions (exercise with dietary advice)	n/r	No intervention	Weight loss + physical functioning	3
Gray 2013, UK, Cluster RCT	103 I: 51 C: 52;	BMI ≥ 27, aged 35-65	0% women; Age: 47; BMI:	Community: football clubs	3	**D:** info, CR 600kcal/day, alcohol;	12 group sessions	Community football coaches	No intervention (waiting list)	Weight loss	3

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[7] Participants were recruited when they were healthy or at low-to-moderate risk for coronary heart disease.

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
	17%		I: 34.5 (3.9) C: 34.5 (6.0)			**PA:** 1/45min/wk supervised exercise (aerobic, strength & flexibility), 45min/day MPA					
Green 2005, USA, RCT	73 (n/r); 23%	BMI 25-29, aged 20-45, pre-menopausal	100% women; Age: 33; BMI: I: 29.3 (6.5) C: 26.9 (6.5)	n/r	2	*Commercial:* **D:** calorie restriction, balanced diet	8 group sessions	n/r	No intervention	Weight loss	2
Heideman 2015, Netherlands, RCT	125 I: 62 C: 63; 31%	BMI > 25 or WC > 88 cm for women or > 102 cm for men, aged 25-65, relatives of T2DM patients	68% women; Age: 55; BMI: I: 29.9 (3.6) C: 31.1 (4.7)	Healthcare: primary care clinic	0.5	**D:** info on healthy D, PA: info, Info about diabetes risk factors	2 group sessions + 4 newsletters	Dieticians, Masters students	Minimal I: booklet	Weight loss, prevention of T2DM	3, 9
Heshka 2003, USA, RCT	423 I:211 C:212;	BMI 27-40, aged 18-65[8]	85% women; Age: 45; BMI:	n/r	24	*Commercial:* ***Weight Watchers***	104 group sessions	Peer (successful	Minimal I: [9] Brief individual	Weight loss	6, 12, 24

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[8] Participants with medical conditions included ('persons with health problems for which weight reduction is a medically accepted therapy', Heshka, 2003, p. 1793).

[9] Participants in the control group also attempted to lose weight: 'In the self-help group almost all participants reported attempting to change diet and increase physical activity, 14 reported using weight loss medications, another 6 tried herbal products, 10 enrolled in some form of structured commercial program (TOPS [Take Off Pounds Sensibly], Jenny Craig, 5 in Weight Watchers), and 9 mentioned following an alternative diet plan (protein, Atkins, the Zone) at some point during the 2-year study. All were retained in the analyses' (Heshka, 2003, p.1795).

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	27%		I: 33.8 (3.4) C: 33.6 (3.7)			**D:** calorie restriction, balanced diet; **PA:** PA plan		programme graduates)	counselling + self-help resources		
Hunt 2014, UK, RCT	748 I:374 C:374; 10%	BMI ≥ 28, aged 35-65	0% women; Age: 47; BMI: I: 35.5 (5.1) C: 35.1 (4.8)	Community: football clubs	3	**D:** info, alcohol; **PA:** supervised exercise	12 group sessions	Community football coaches	No intervention (waiting list)	Weight loss	3, 12
Koniak-Griffin 2015, USA, RCT	223 I:111 C: 112; 14%	BMI ≥ 25, aged 35-64, Latina[10]	100% women; Age: 45; BMI: I: 32.4 (5.0) C: 32.9 (6.3)	Community	6	**D:** info, ↑FV, ↓fat, serving sizes; **PA:** supervised exercise, 10,000 steps/day	8 group sessions	Community health workers	Irrelevant I: sessions on safety & disaster preparation	Changes in diet & PA	6, 9
Krummel 2010, USA, RCT	151 I:78 C:73; 58%	Aged ≥ 18, post-partum (<2 years), enrolled in WIC[11]	100% women; Age: 27; BMI: I: 31.0 (7.2) C: 29.3 (6.4)	Community: Programme office or church	12	**D:** info, serving sizes, ↓fat, ↑fibre; **PA:** 10,000-12,000 steps/day	10 group sessions + 1individual + newsletters	Nutritionists (from WIC and MOMS)[11]	Minimal I: same individual counselling + newsletters	Weight loss	12
Kuller 2012, USA, RCT	508 I:253 C:255; 10%	Aged 52-62, WC > 80cm, BP < 140/90 post-menopausal	100% women; Age: 57; BMI: I: 30.6 (3.8) C: 30.9 (3.8)	n/r	36	**D:** ↓fat, 1300-1500kcal/day, ↑fiber, ↑FV, ↑whole grains;	40 group sessions (in the 1st year)	Nutritionists, exercise physiologist & psychologist	Irrelevant I: seminars on women's health	Weight loss	6, 18

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[10] Participants with diabetes and hypertension were included (6.3% of participants had diabetes and 12.2% had hypertension).
[11] WIC – Special Supplemental Nutrition Program for Women, Infants, and Children; MOMS – Mothers' Overweight Management Study.

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						PA: (delayed 6 mth) stepped goals: 150-180-240 min/wk MPA, resistance training					
Leblanc 2012, Canada, RCT	144 I1: 48 I2: 48 C: 48; 19%	BMI 25-35, stable weight, pre-menopausal	100% women; Age: 42; BMI: I1: 30.1 (3.0) I2: 30.6 (3.1) C: 30.5 (3.0)	n/r	3.5	**I1. Healthy-At-Every-Size:** **D:** info; **PA:** enjoyment of PA, **HAES approach:** well-being, knowledge & awareness of biological, psychological & sociocultural aspects of body weight, leaders were active educators. **I2. Social support:** **D:** info; **PA:** enjoyment of PA;	**I1:** 14 group sessions + workbook **I2:** 14 group sessions + workbook	Dietitian & clinical psychologist	No intervention (waiting list)	Eating behaviour	4

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
						SS approach: peer support, leaders were facilitators of discussions and group support.					
Morgan 2011, Australia, RCT	53 I: 27 C: 26; 19%	BMI 25-40, fathers of primary school children	0% women; Age: 41; BMI: I: 33.3 (3.7) C: 33.1 (4.1)	University: n/r	3	**D:** info, family eating patterns; **PA:** engaging with children, barriers and opportunities, health-related fitness, games, movement skills	8 group sessions + booklet + website	Researcher	No intervention (waiting list)	Weight loss	6
Morgan 2014, Australia, RCT	93 I: 47 C: 46; 16%	BMI 25-40, aged 18-65, fathers of primary school children	0% women; Age: 40; BMI: I: 32.6 (3.7) C: 32.3 (3.9)	Community: Local schools	2	**D:** info, family eating patterns; **PA:** engaging with children, health-related fitness, games, movement skills	7 group sessions + booklet	PE teachers	No intervention (waiting list)	Weight loss	3.5 (14 wks)
Munsch 2003, Switzerland, RCT	70 I: 53 C: 17; 24%	BMI ≥ 30	74% women; Age: 48; BMI: I: 36.2 (6.5) C: 32.6 (1.8)	Primary care: Primacy care practice	n/r	**D:** balanced nutrition; **PA:** stepwise increase in PA	16 group sessions + manual	Doctors	Usual care: general WL advice	Weight loss	Post 16 sess-ions, 12
Ostbye 2009, USA,	450 I: 225	BMI ≥ 25, aged ≥ 18,	100% women; Age: 31;	n/r	9	**D:** calorie restriction,	8 group sessions	n/r	Minimal I:	Weight loss	10

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RCT	C: 225; 30%	post-partum	BMI: I: 33.1 (6.7) C: 32.9 (6.0)			↓calorie-dense foods, ↑FV, serving sizes; **PA:** 30min/day x 5/wk, walking, aerobic, strength, flexibility and pelvic floor exercises	+ 10 exercise classes + 6 telephone + printed materials		newsletters with general tips for mothers		
Ross 2000, Canada, RCT	101 I: 14 C: 11; 59%	BMI > 27, WC > 100 cm, stable weight	0% women; Age: 44; BMI: I: 30.7 (1.9) C: 30.7 (1.6)	n/r	3	**D:** info, calorie restriction by 700kcal/day	12 group sessions	Dietitian	No intervention	Weight loss	3
Ross 2004, Canada, RCT	102 I: 28 C: 23; 47%	BMI > 27, WC > 88 cm, pre-menopausal	100% women; Age: 44; BMI: I: 31.9 (2.8) C: 32.4 (2.8)	n/r	3.5	**D:** info, calorie restriction by 500kcal/day	14 group sessions	Dietitian	No intervention	Weight loss	3.5 (14 wks)
Salinardi 2013, USA, Cluster RCT	133 I: 94 C: 39; 11%	BMI ≥ 25, aged ≥ 21, employees	75% women; Age: 43; BMI: I: 33.3 (6.4) C: 33.3 (7.0)	Worksite	6	**D:** ↑fibre, low glycaemic index, balanced diet, serving sizes; **PA:** initially maintain, then ↑PA	19 group sessions + 6 newsletters + 6 seminars + emails	Nutritionists	No intervention (waiting list)	Weight loss	6

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Samuel-Hodge 2009, USA, RCT	143 I: 72 C: 71; 12%	BMI 25-45, aged 40-64, under or uninsured, <200% federal poverty level[12]	100% women; Age: 53; BMI: I: 34.5 (0.6) C: 34.3 (0.6)	Community: community health centre & church	4	**D:** Calorie restriction by 500kcal/day, 7FV; **PA:** 150min/wk	16 group sessions + printed materials	Nurse & assistant	Irrelevant I: 2 newsletters unrelated to WL	Weight loss	5
Schroder 2010, USA, RCT	91 I: 31 C: 30; 17%	BMI ≥ 27, aged 18-65, interested in WL	85% women; Age: 43; BMI: I: 34.5 (5.0) C: 34.5 (5.3)	n/r	3	**D:** info, 5FV, ↓fat, ↓sweets, calorie restriction by 500kcal/day	5 group sessions + software (for self-monitoring of diet and PA)	n/r	No intervention (waiting list)	Weight loss	3
Share 2015, Australia, RCT	39 I: 22 C: 17; 33%	WC ≥ 80 cm, women, aged 18-30 years, inactive (< 210 min MPA/wk)	100% women, Age: n/r; BMI: I: 32.2 (5.9) C: 31.4 (6.6)	n/r	3	**D:** info on healthy D; **PA:** 2/wk supervised exercise classes (aerobic, strength, resistance, stretching), 1/wk PA at home; **CBT:** support + strategies to overcome barriers	12 group sessions (diet) + CBT sessions + 2/wk supervised exercises classes	Dietician, exercise scientists, CBT counsellor	No intervention (waiting list)	CVD risk factors	3

[12] At baseline 13% of participants had diabetes, 12% were taking anti-diabetic medication, 36% had high cholesterol, 50% were diagnosed with high blood pressure, and 9% had coronary heart disease.

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Shuger 2011, USA, RCT	197 I1: 49 I2: 49 I3: 49 C: 50; 29%	BMI 25-45, inactive, aged 18-65, with Internet access	82% women; Age: 47; BMI: I1: 34.5 (6.3) I2: 34.4 (6.4) C: 34.5 (6.4)	n/r	4	**I1. Group weight loss:** **D:** info; **PA:** info **I2. GWL + SWA:** **D:** info; **PA:** info **SWA:** Sense Wear Armband ***I3. SWA***	*I1: GWL:* 14 group sessions + manual + telephone *I2. GWL+SWA:* 14 group sessions + manual + telephone + SWA + website I3: SWA + website (not included)	Health facilitator	Usual care: same manual	Weight loss	4, 9
Silva 2010, Portugal, RCT	239 I: 123 C: 116; 13%	BMI 25-40, aged 25-50, pre-menopausal	100% women; Age: 38; BMI: I: 31.7 (4.2) C: 31.3 (4.0)	n/r	12	**D:** ↓energy intake, ↓fat, ↓processed foods, ↑fibre; **PA:** (delayed) active lifestyle, dance classes & activity challenges	30 group sessions + printed materials	Exercise physiologist, nutritionists, dieticians, psychologist	Irrelevant I: health education (not WL)	Exercise motivation and adherence	12, 24
Sorkin 2014, USA, RCT	89 I: 53 C: 36; 4%	BMI > 25, daughters of mothers with T2DM, aged ≥ 18,	100%; Age: 28; BMI: 35.4 (7.3)	Community: n/r	4	**D:** calorie restriction by 200-800 kcal/day;	16 group sessions	Lifestyle community coach / health educator (Spanish-	Minimal I: educational materials sent by mail	Weight loss, prevention of T2DM	4

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
		Mexican American				**PA:** 20 min MPA in the groups & ≥ 150 min/wk		speaking, Latina)			
Stolley 2009, USA, RCT	213 I: 107 C: 106; 7%	BMI 30-50, aged 30-65, African American & Black, able to walk ≥ 30 mins	100% women; Age: 46; BMI: I: 38.8 (5.5) C: 39.6 (5.8)	University: on campus	6	**D:** ↓fat, ↑fibre, 5FV; **PA:** 3-4/wk x 30min MVPA, 2 x 30-40min supervised exercise (aerobic, strength and flexibility)	48 group sessions + optional motivational interviewing sessions	n/r	Irrelevant I: newsletters on general health & safety + phone calls	Weight loss	6, 18
Tanco 1998, Canada, RCT	62 I1: 21 I2: 21 C: 20; 19%	BMI ≥ 30, aged ≥ 19, ≥ 10yrs history of obesity, ≥ 3 failed WL attempts	100% women; Age: n/r; BMI: I1: 39.4 (5.2) I2: 38.7 (5.8) C: 40.7 (5.5)	n/r	2	***I1. Cognitive treatment [CT]:*** **D:** info on maladaptive eating, promote non-disordered eating, emotional well-being, no focus on WL; **PA:** promote PA + therapeutic and client-centred format	***I1: CT:*** 8 group sessions + printed materials	Clinical psychology graduate students	No intervention (waiting list)	Weight loss + well-being	2

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
						G2.Behavioural therapy [BT]: **D:** 1,200-1,500kcal/day, ↓fat, focus on WL; **PA:** ↑PA + prescriptive psycho-educational format	*G2: BT:* 8 group sessions				
Truby 2006, UK, RCT	293 I1: 58 I2: 58 I3: 57 I4: 59 C: 61; 28%	BMI 27-40, aged 18-65, living ≤ 30 miles from test centre	73% women; Age: 40; BMI: I1: 31.2 (2.7) I2: 31.6 (2.6) C: 31.5 (2.9)	n/r	6	**Commercial:** **I1. Weight Watchers:** **D:** energy-controlled, ↓fat, diet plan; **I2. Rosemary Conley:** **D:** energy-controlled, ↓fat, diet plan; **PA:** exercise classes **I3. Atkins diet I4. Slim-Fast**	*I1: WW:* 24 group sessions *I2: RC:* 24 group sessions **I3 and I4:** not group-based, not inlcuded	n/r	No intervention (waiting list)	Weight loss	6

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
Villareal 2011, USA, RCT	107 I1: 27 I2: 28 I3: 26 C: 27; 13%	BMI ≥ 30, aged ≥ 65, frail	63% women; Age: 70; BMI: I1: 37.2 (4.5) I2: 37.2 (5.4) C: 37.3 (4.7)	University hospital	12	*I1. Diet:* **D:** calorie restriction by 500-750 kcal/day + behavioural therapy *I2: Diet+Exercise:* **D:** calorie restriction by 500-750 kcal/day + behavioural therapy; **PA:** 3/wk supervised exercises (aerobic, resistance, flexibility and balance) *I3:* Supervised exercise only	*I1: D:* 52 group sessions (diet) *I2: D+Ex:* 52 group sessions (diet) + 3/wk exercise classes *I3:* not included	I1: dietician, I2: dietician + physical therapist	Minimal I: general brief advice	Weight loss, physical function / frailty	6, 12
Walker 2012, USA, RCT	71 I: 34 C: 37;	BMI ≥ 25, Hispanic, African	100% women; Age: 25; BMI: n/r	Secondary care:	3	**D:** info, 1500-1600kcal/day if not breast-	13 group sessions + handouts	Nurses or health educators	No intervention (waiting list)	Weight loss	3 (13 wks)

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
	30%	American & White, post-partum, retained ≥ 5kg weight, parental care funded by Medicaid		Family clinic or school-based clinic		feeding, 2200-2400 kcal/day if breast-feeding, serving sizes, ↑FV; **PA:** ↑PA					
West 2011, USA, Cluster RCT	228 I: 116 C: 112; 7%	BMI ≥ 30, aged ≥ 60, able to do moderate PA, resident in senior centres[13]	84% women; Age: 71; BMI: I: 37.1 (5.7) C: 35.0 (4.2)	Community: Senior centres	3	**D:** calorie restriction, ↓fat; **PA:** 150 min/wk MVPA	12 group sessions + handouts	Lay health educators (volunteers, senior centre staff)	Irrelevant I: Cognitive training (non WL)	Weight loss	3 (12 wks)
Wing 1998, USA, RCT	154 I1: 37 I2: 37 I3: 40 C: 40; 15%	30-100% over ideal body weight, aged 40-55, with 1 or 2 diabetic parents	79% women; Age: 46; BMI: I1: 36.1 (4.1) I2: 36.0 (3.7) I3: 35.7 (4.1) C: 36.0 (5.4)	n/r	24	*I1. Diet:* **D:** 800-1000 kcal/day, then at wk 16: 1200-1500 kcal/day, ↓fat, meal plans and shopping lists *I2. Exercise:*	*I1: D:* 48 group sessions *I2: Ex:* 48 group sessions	I1: Behaviour therapist & dietician I2: Behaviour therapist & exercise physiologist	Minimal I: Manual only	Weight loss + prevention of T2DM & CVD	6, 12, 24

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[13] Participants with diabetes, hypertension and other comorbidities could enrol (unclear if they did and how many).

Suppl Files for Systematic Review of Group-based Weight-loss Interventions

Study ID, Country, Design	Sample size; Attrition [%]	Participant inclusion criteria	Participant characteristics: % women; Mean age; BMI at baseline (SD)	Setting: Venue	Duration [mth]	Group intervention: key components (D – diet, PA – physical activity)	Delivery modes & contact time	Group facilitators	Control group type: key components	Primary outcome	Follow up length [mth]
						PA: 1-2/wk supervised walks, aerobic exercise & dancing available, 1500 kcal/wk *I3. D + EX:* **D:** as above **PA:** as above	+ weekly walk (wks 1-10) *I3: D + Ex:* 48 group sessions + weekly walk (wks 1-10)	I3: Behaviour therapist, dietician, exercise physiologist			

Abbreviations used in the table:

BMI – body mass index,
BP – blood pressure,
BSE- breast self-exam,
C – control group,
CBT – cognitive-behavioural therapy,
CVD – cardiovascular diseases,
D – diet,
Ex – exercise,
FV – portions or intake of fruit and vegetables,

h – hours,
I – intervention group,
info – information,
kcal – kilo calorie,
min – minutes,
MPA – moderate physical activity,
MVPA – moderate to vigorous physical activity,
mth- months,
n/r – not reported,

PA – physical activity,
RCT - randomised controlled trial,
SD – standard deviation,
T2DM – type 2 diabetes mellitus,
WC – waist circumference,
wk – week,
WL – weight loss,
↓ - decrease,
↑ - increase.

Figure S1. Flow diagram of the study selection process

```
┌──────────────────────────┐   ┌──────────────────────────┐
│  6,998 records identified │   │    49 records identified  │
│   through electronic      │   │   through hand searching  │
│   databases searching     │   │                           │
└──────────────────────────┘   └──────────────────────────┘
              │                            │
              └──────────┬─────────────────┘
                         ▼
          ┌──────────────────────────┐      ┌──────────────────────────┐
          │  7,047 total number of    │─────▶│   3,877 duplicates        │
          │    records identified     │      │      removed              │
          └──────────────────────────┘      └──────────────────────────┘
                         │
                         ▼
          ┌──────────────────────────┐      ┌──────────────────────────┐
          │  3,170 records screened   │─────▶│   2,773 studies excluded  │
          │   (titles and abstracts)  │      │                           │
          └──────────────────────────┘      └──────────────────────────┘
                         │
                         ▼
          ┌──────────────────────────┐      ┌──────────────────────────┐
          │  397 full texts screened  │─────▶│ 340 full texts excluded:  │
          │                           │      │ Population (125)          │
          └──────────────────────────┘      │ Intervention (30)         │
                         │                   │ Comparator (80)           │
                         ▼                   │ Outcomes (29)             │
          ┌──────────────────────────┐      │ Study design (41)         │
          │  57 reports of 47 RCTs    │      │ Other (35)                │
          │  including 60 evaluations │      └──────────────────────────┘
          └──────────────────────────┘
                         │
                         ▼
          ┌──────────────────────────┐
          │ 60 intervention evaluations│
          │         included          │
          └──────────────────────────┘
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Supplementary File 1. List of included studies

These studies were included in the systematic review and are referred to in the main text of the paper by numbers in square brackets [ ].

1. **Abedi 2010**
   Abedi, P., Lee, M.H.S., Kandiah, M., Yassin, Z., Shojaeezade, D., Hosseini, M., & Malihi, R. (2010). Diet intervention to improve cardiovascular risk factors among Iranian postmenopausal women. *Nutrition Research and Practice,* 4(6), 522-527. doi:10.4162/nrp.2010.4.6.522.

2. **Ahern 2017**
   Ahern, A.L., Wheeler, G.M., Aveyard, P., Boyland, E.J., Halford, J.C., Mander, A.P., … & Mead, B.R. (2017). Extended and standard duration weight-loss programme referrals for adults in primary care (WRAP): a randomised controlled trial. *The Lancet*, 389(10085), 2214-2225. doi:10.1016/S0140-6736(17)30647-5.

3. **Anton 2011**
   Anton, S.D., Manini, T.M., Milsom, V.A., Dubyak, P., Cesari, M., Cheng, J., Daniels, M.J., Marsiske, M., Pahor, M., Leeuwenburgh, C., Perri, M.G., (2011). Effects of a weight loss plus exercise program on physical function in overweight, older women: a randomized controlled trial. *Clinical Interventions in Aging*, 6, 141–149. doi:10.2147/CIA.S17001.

4. **Ash 2006**
   Ash, S., Reeves, M., Bauer, J., Dover, T., Vivanti, A., Leong, C., Sullivan, T.O., Capra, S., (2006). A randomised control trial comparing lifestyle groups, individual counselling and written information in the management of weight and health outcomes over 12 months. *International Journal of Obesity*, 30(10), 1557–1564. doi:10.1038/sj.ijo.0803263.

5. **Auslander 2002**
   Auslander, W., Haire-Joshu, D., Houston, C., Rhee, C.-W., Williams, J.H., (2002). A controlled evaluation of staging dietary patterns to reduce the risk of diabetes in African-American women. *Diabetes Care*, 25(5), 809–814. doi:10.2337/diacare.25.5.809.

6. **Aveyard 2016**
   Aveyard, P., Lewis, A., Tearne, S., Hood, K., Christian-Brown, A., Adab, P., … & Lycett, D. (2016). Screening and brief intervention for obesity in primary care: a parallel, two-arm, randomised trial. *The Lancet*, 388(10059), 2492-2500. doi: 10.1016/S0140-6736(16)31893-1.

7. **Avila and Hovell 1994**
   Avila, P. & Hovell, M., (1994). Physical activity training for weight loss in Latinas: a controlled trial. *International Journal of Obesity and Related Metabolic Disorders,* 18(7), 476–482.

8. **Bouchard 2009**
   Bouchard, D.R., Soucy, L., Sénéchal, M., Dionne, I.J., Brochu, M., (2009). Impact of resistance training with or without caloric restriction on physical capacity in obese older women. *Menopause*, 16(1), 66–72. doi:10.1097/gme.0b013e31817dacf7.

9. **Canuto 2012**
   Canuto, K., Cargo, M., Li, M., D'Onise, K., Esterman, A., McDermott, R., (2012). Pragmatic randomised trial of a 12-week exercise and nutrition program for Aboriginal and Torres Strait Islander women: clinical results immediate post and 3 months follow-up. *BMC Public Health,* 12, 933. doi:10.1186/1471-2458-12-933.

10. **Carnie 2013**
    Carnie, A., Lin, J., Aicher, B., Leon, B., Courville, A.B., Sebring, N.G., de Jesus, J., DellaValle, D.M., Fitzpatrick, B.D., Zalos, G., Powell-Wiley, T.M., Chen, K.Y., Cannon, R.O. (2013). Randomized trial of nutrition education added to internet-based information and exercise at the work place for weight loss in a racially diverse population of overweight women. *Nutrition & Diabetes,* 3, e98. doi:10.1038/nutd.2013.39.

11. **Carroll 2012**
    Carroll, S., Marshall, P., Ingle, L., Borkoles, E. (2012). Cardiorespiratory fitness and heart rate recovery in obese premenopausal women. *Scandinavian Journal of Medicine & Science in Sports*, 22(6), e133–e139. doi:10.1111/j.1600-0838.2012.01522.x.

12. **Conroy 2015**
    Conroy, M.B., Sward, K.L., Spadaro, K.C., Tudorascu, D., Karpov, I., Jones, B.L., Kriska, A.M., Kapoor, W.N. (2015). Effectiveness of a physical activity and weight loss intervention for middle-aged women: Healthy Bodies, Healthy Hearts randomized trial. *Journal of General Internal Medicine,* 30(2), 207-213. doi:10.1007/s11606-014-3077-5.

13. **Cousins 1992**
    Cousins, J.H., Rubovits, D.S., Dunn, J.K., Reeves, R.S., Ramirez, A.G., Foreyt, J.P. (1992). Family versus individually oriented intervention for weight loss in Mexican American women. *Public Health Reports,* 107(5), 549–555.

14. **Fitzgibbon 2005**
    Fitzgibbon, M.L., Stolley, M.R., Schiffer, L., Sanchez-Johnsen, L.A.P., Wells, A.M., Dyer, A. (2005). A combined breast health/weight loss intervention for Black women. *Preventive Medicine,* 40(4), 373–383. doi:10.1016/j.ypmed.2004.06.018.

15. **Folta 2009**
    Folta, S.C., Lichtenstein, A.H., Seguin, R.A., Goldberg, J.P., Kuder, J.F., Nelson, M.E. (2009). The Strong Women-Healthy Hearts program: reducing cardiovascular disease risk factors in rural sedentary, overweight, and obese midlife and older women. *American Journal of Public Health*, 99(7), 1271–1277. doi: 10.2105/AJPH.2008.145581.

16. **Foster-Schubert 2012**
    Foster-Schubert, K.E., Alfano, C.M., Duggan, C.R., Xiao, L., Campbell, K.L., Kong, A., Bain, C.E., Wang, C.-Y., Blackburn, G.L., McTiernan, A. (2012). Effect of diet and exercise, alone or combined, on weight and body composition in overweight-to-obese postmenopausal women. *Obesity*, 20(8), 1628–1638. doi:10.1038/oby.2011.76.

17. **Gillett 1995**
    Gillett, P.A., Caserta, M.S., White, A.T., Martinson, L. (1995). Responses of 49- to 59-year-old sedentary, overweight women to four months of exercise conditioning and/or fitness education. *Activities, Adaptation & Aging,* 19(4), 13–32. doi:10.1300/J016v19n04_02.

18. **Grant 2004**
    Grant, S., Todd, K., Aitchison, T.C., Kelly, P., Stoddart, D. (2004). The effects of a 12-week group exercise programme on physiological and psychological variables and function in overweight women. *Public Health,* 118, 31–42. doi:10.1016/S0033-3506(03)00131-8.

19. **Gray 2013**
    Gray, C.M., Hunt, K., Mutrie, N., Anderson, A.S., Treweek, S., Wyke, S. (2013). Weight management for overweight and obese men delivered through professional football clubs: a pilot randomized trial. *International Journal of Behavioral Nutrition and Physical Activity*, 10, 121. doi: 10.1186/1479-5868-10-121.

20. Green 2005

Green, M.W., Elliman, N.A., Kretsch, M.J. (2005). Weight loss strategies, stress, and cognitive function: Supervised versus unsupervised dieting. *Psychoneuroendocrinology*, 30(9), 908–918. doi:10.1016/j.psyneuen.2005.05.005.

21. Heideman 2015

Heideman, W.H., de Wit, M., Middelkoop, B.J., Nierkens, V., Stronks, K., Verhoeff, A.P., & Snoek, F.J. (2015). Diabetes risk reduction in overweight first degree relatives of type 2 diabetes patients: effects of a low-intensive lifestyle education program (DiAlert) A randomized controlled trial. *Patient Education and Counseling*, 98(4), 476-483. doi: 10.1016/j.pec.2014.12.008.

22. Heshka 2003

Heshka, S., Anderson, J., Atkinson, R., Greenway, F., Hill, J., Phinney, S., … & Pi-Sunyer, F. (2003). Weight loss with self-help compared with a structured commercial program: a randomized trial. *JAMA*, 289(14), 1792–1798. doi:10.1001/jama.289.14.1792.

23. Hunt 2014

Hunt, K., Wyke, S., Gray, C.M., Anderson, A.S., Brady, A., Bunn, C., Donnan, P.T., Fenwick, E., Grieve, E., Leishman, J., Miller, E., Mutrie, N., Rauchhaus, P., White, A., Treweek, S. (2014). A gender-sensitised weight loss and healthy living programme for overweight and obese men delivered by Scottish Premier League football clubs (FFIT): a pragmatic randomised controlled trial. *The Lancet,* 383, 1211–1221. doi:10.1016/S0140-6736(13)62420-4.

24. Koniak-Griffin 2015

Koniak-Griffin, D., Brecht, M.-L., Takayanagi, S., Villegas, J., Melendrez, M., Balcázar, H. (2015). A community health worker-led lifestyle behavior intervention for Latina (Hispanic) women: feasibility and outcomes of a randomized controlled trial. *International Journal of Nursing Studies,* 52(1), 75-87. doi:10.1016/j.ijnurstu.2014.09.005.

25. Krummel 2010

Krummel, D., Semmens, E., MacBride, A.M., Fisher, B. (2010). Lessons learned from the mothers' overweight management study in 4 West Virginia WIC offices. *Journal of Nutrition Education and Behavior*, 42(3 Suppl), S52–S58. doi:10.1016/j.jneb.2010.02.012.

26. Kuller 2012

Kuller, L.H., Gabriel, K.K.P., Kinzel, L.S., Underwood, D.A., Conroy, M.B., Chang, Y., Mackey, R.H., Edmundowicz, D., Tyrrell, K.S., Buhari, A.M., Kriska, A.M. (2012). The Women on the Move through Activity and Nutrition (WOMAN) study: final 48-month results. Obesity 20(3), 636–643. doi:10.1038/oby.2011.80.

27. Leblanc 2012

Leblanc, V., Provencher, V., Bégin, C., Corneau, L., Tremblay, A., Lemieux, S. (2012). Impact of a Health-At-Every-Size intervention on changes in dietary intakes and eating patterns in premenopausal overweight women: results of a randomized trial. *Clinical Nutrition*, 31(4), 481–488. doi:10.1016/j.clnu.2011.12.013.

28. Morgan 2011

Morgan, P.J., Lubans, D.R., Callister, R., Okely, A.D., Burrows, T.L., Fletcher, R., Collins, C.E. (2011). The "Healthy Dads, Healthy Kids" randomized controlled trial: efficacy of a healthy lifestyle program for overweight fathers and their children. *International Journal of Obesity,* 35(3), 436–447. doi:10.1038/ijo.2010.151.

29. Morgan 2014

Morgan, P.J., Collins, C.E., Plotnikoff, R.C., Callister, R., Burrows, T., Fletcher, R., Okely, A.D., Young, M.D., Miller, A., Lloyd, A.B., Cook, A.T., Cruickshank, J., Saunders, K.L., Lubans, D.R. (2014). The "Healthy Dads, Healthy Kids" community randomized controlled trial: a community-based healthy lifestyle program for fathers and their children. *Preventive Medicine,* 61, 90–99. doi:10.1016/j.ypmed.2013.12.019.

30. Munsch 2003

Munsch, S., Biedert, E., Keller, U. (2003). Evaluation of a lifestyle change programme for the treatment of obesity in general practice. *Swiss Medical Weekly,* 133, 148–154.

31. Østbye 2009

Østbye, T., Krause, K.M., Lovelady, C.A., Morey, M.C., Bastian, L.A., Peterson, B.L., Swamy, G.K., Brouwer, R.J.N., McBride, C.M. (2009). Active Mothers Postpartum: a randomized controlled weight-loss intervention trial. *American Journal of Preventive Medicine*, 37(3), 173–180. doi:10.1016/j.amepre.2009.05.016.

32. Ross 2000

Ross, R., Dagnone, D., Jones, P.J.H., Smith, H., Paddags, A., Hudson, R., Janssen, I. (2000). Reduction in obesity and related comorbid conditions after diet-induced weight loss or exercise-induced weight loss in men: a randomized, controlled trial. *Annals of Internal Medicine*, 133(2), 92–103. doi:10.7326/0003-4819-133-2-200007180-00008.

33. Ross 2004

Ross, R., Janssen, I., Dawson, J., Kungl, A.-M., Kuk, J.L., Wong, S.L., Nguyen-Duy, T.-B., Lee, S., Kilpatrick, K., Hudson, R. (2004). Exercise-induced reduction in obesity and insulin resistance in women: a randomized controlled trial. *Obesity Research,* 12(5), 789–798. doi:10.1038/oby.2004.95.

34. Salinardi 2013

Salinardi, T.C., Batra, P., Roberts, S.B., Urban, L.E., Robinson, L.M., Pittas, A.G., Lichtenstein, A.H., Deckersbach, T., Saltzman, E., Das, S.K. (2013). Lifestyle intervention reduces body weight and improves cardiometabolic risk factors in worksites. *American Journal of Clinical Nutrition*, 97(4), 667–676. doi:10.3945/ajcn.112.046995.

35. Samuel-Hodge 2009

Samuel-Hodge, C.D., Johnston, L.F., Gizlice, Z., Garcia, B.A., Lindsley, S.C., Bramble, K.P., Hardy, T.E., Ammerman, A.S., Poindexter, P.A., Will, J.C., Keyserling, T.C. (2009). Randomized trial of a behavioral weight loss intervention for low-income women: The Weight Wise Program. *Obesity*, 17(10), 1891–1899. doi:10.1038/oby.2009.128.

36. Schroder 2010

Schroder, K.E. (2010). Computer-assisted dieting: Effects of a randomised controlled intervention. *Psychology & Health*, 25(5), 519–534. doi:10.1080/08870440902812013.

37. Share 2015

Share, B.L., Naughton, G.A., Obert, P., Peat, J.K., Aumand, E.A., Kemp, J.G. (2015). Effects of a multi-disciplinary lifestyle intervention on cardiometabolic risk factors in young women with abdominal obesity: a randomised controlled trial. *PloS One*, 10(6), e0130270. doi:10.1371/journal.pone.0130270.

38. Shuger 2011

Shuger, S.L., Barry, V.W., Sui, X., McClain, A., Hand, G.A., Wilcox, S., Meriwether, R.A., Hardin, J.W., Blair, S.N. (2011). Electronic feedback in a diet- and physical activity-based

lifestyle intervention for weight loss: a randomized controlled trial. *International Journal of Behavioral Nutrition and Physical Activity,* 8, 41. doi:10.1186/1479-5868-8-41.

39. Silva 2010

Silva, M.N., Vieira, P.N., Coutinho, S.R., Minderico, C.S., Matos, M.G., Sardinha, L.B., Teixeira, P.J. (2010). Using self-determination theory to promote physical activity and weight control: a randomized controlled trial in women. *Journal of Behavioral Medicine,* 33(2), 110–122. doi:10.1007/s10865-009-9239-y.

40. Sorkin 2014

Sorkin, D.H., Mavandadi, S., Rook, K.S., Biegler, K.A., Kilgore, D., Dow, E., Ngo-Metzger, Q. (2014). Dyadic collaboration in shared health behavior change: the effects of a randomized trial to test a lifestyle intervention for high-risk Latinas. *Health Psychology*, 33(6), 566. doi:0.1037/hea0000063.

41. Stolley 2009

Stolley, M.R., Fitzgibbon, M.L., Schiffer, L., Sharp, L.K., Singh, V., Van Horn, L., Dyer, A. (2009). Obesity Reduction Black Intervention Trial (ORBIT): six-month results. *Obesity*, 17(1), 100–106. doi:10.1038/oby.2008.488.

42. Tanco 1998

Tanco, S., Linden, W., Earle, T. (1998). Well-being and morbid obesity in women: a controlled therapy evaluation. *International Journal of Eating Disorders,* 23(3), 325–339.

43. Truby 2006

Truby, H., Baic, S., deLooy, A., Fox, K.R., Livingstone, M.B.E., Logan, C.M., Macdonald, I.A., Morgan, L.M., Taylor, M.A., Millward, D.J. (2006). Randomised controlled trial of four commercial weight loss programmes in the UK: initial findings from the BBC "diet trials." *BMJ,* 332, 1309–1314. doi:10.1136/bmj.38833.411204.80.

44. Villareal 2011

Villareal, D.T., Chode, S., Parimi, N., Sinacore, D.R., Hilton, T., Armamento-Villareal, R., Napoli, N., Qualls, C. and Shah, K. (2011). Weight loss, exercise, or both and physical function in obese older adults. *New England Journal of Medicine*, 364(13), 1218-1229. doi:10.1056/NEJMoa1008234.

45. Walker 2012

Walker, L.O., Sterling, B.S., Latimer, L., Kim, S.-H., Garcia, A.A., Fowles, E.R. (2012). Ethnic-specific weight-loss interventions for low-income postpartum women: findings and lessons. *Western Journal of Nursing Research,* 34(5), 654–676. doi:10.1177/0193945911403775.

46. West 2011

West, D.S., Bursac, Z., Cornell, C.E., Felix, H.C., Fausett, J.K., Krukowski, R.A., Lensing, S., Love, S.J., Prewitt, T.E., Beck, C. (2011). Lay health educators translate a weight-loss intervention in senior centers: a randomized controlled trial. *American Journal of Preventive Medicine*, 41(4), 385–391. doi:10.1016/j.amepre.2011.06.041.

47. Wing 1998

Wing, R.R., Venditti, E., Jakicic, J.M., Polley, B.A., Lang, W. (1998). Lifestyle intervention in overweight individuals with a family history of diabetes. *Diabetes Care*, 21(3), 350–359. doi:10.2337/diacare.21.3.350.

Supplementary File 2. Risk of bias assessments

This file includes summaries of the risk of bias assessments, for each risk of bias domain (Figure S2.1) and for each study (Table S2.1). The risk of bias assessments were conducted using the Cochrane Risk of Bias tool. Details of how the judgments were made (support for judgments) is available from the first author.

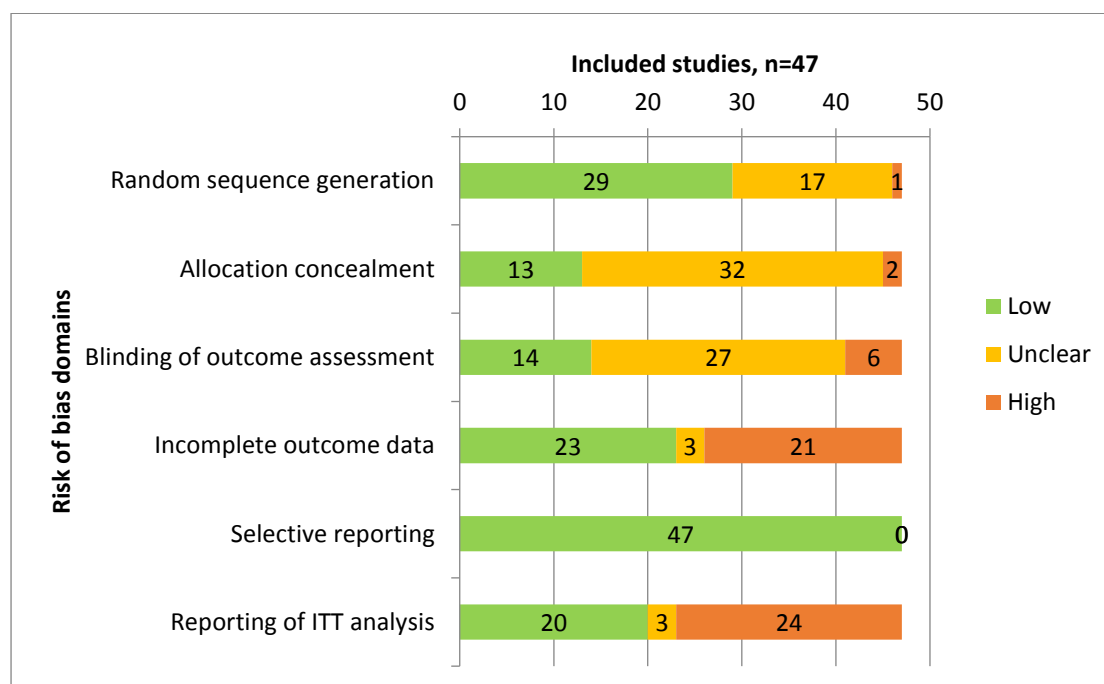**Figure S2.1. Summary diagram of the risk of bias assessments**

Table S2.1. Summary table of the risk of bias assessments in included studies

Study ID*	Random sequence generation	Allocation concealment	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	ITT analysis reported
Abedi 2010	unclear	unclear	unclear	high	low	no
Ahern 2017	low	low	high	low	low	no
Anton 2011	low	unclear	low	low	low	yes
Ash 2006	low	high	unclear	high	low	yes
Auslander 2002	unclear	unclear	unclear	high	low	no
Aveyard 2016	low	low	low	low	low	yes
Avila & Hovell 1994	unclear	unclear	low	high	low	no
Bouchard 2009	unclear	unclear	unclear	low	low	no
Canuto 2012	unclear	unclear	low	high	low	no
Carnie 2013	low	low	low	unclear	low	yes
Carroll 2012	low	unclear	high	low	low	unclear
Conroy 2015	low	unclear	unclear	high	low	yes
Cousins 1992	unclear	unclear	unclear	high	low	no
Fitzgibbon 2005	low	low	unclear	low	low	no
Folta 2009	unclear	unclear	low	low	low	no
Foster-Schubert 2012	low	low	low	low	low	yes
Gillett 1995	unclear	unclear	unclear	unclear	low	no
Grant 2004	low	unclear	unclear	high	low	no
Gray 2013	low	unclear	low	low	low	yes
Green 2005	unclear	unclear	unclear	high	low	no
Heideman 2015	low	low	high	high	low	yes
Heshka 2003	low	low	unclear	low	low	yes
Hunt 2014	low	low	low	low	low	yes
Koniak-Griffin 2015	low	low	low	low	low	yes
Krummel 2010	low	unclear	unclear	high	low	yes
Kuller 2012	low	low	unclear	low	low	no
Leblanc 2012	low	unclear	unclear	high	low	no
Morgan 2011	low	low	low	low	low	yes
Morgan 2014	low	low	unclear	low	low	unclear

Study ID*	Random sequence generation	Allocation concealment	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	ITT analysis reported
Munsch 2003	unclear	unclear	unclear	high	low	no
Ostbye 2009	unclear	unclear	unclear	high	low	yes
Ross 2000	low	unclear	unclear	high	low	no
Ross 2004	low	unclear	unclear	high	low	no
Salinardi 2013	low	unclear	unclear	high	low	no
Samuel-Hodge 2009	low	unclear	low	low	low	yes
Schroder 2010	high	high	low	low	low	yes
Share 2015	unclear	unclear	low	high	low	no
Shuger 2011	low	unclear	unclear	low	low	yes
Silva 2010	low	unclear	unclear	unclear	low	unclear
Sorkin 2014	unclear	unclear	unclear	low	low	yes
Stolley 2009	low	low	high	low	low	no
Tanco 1998	unclear	unclear	unclear	high	low	no
Truby 2006	low	unclear	high	low	low	no
Villareal 2011	unclear	unclear	unclear	low	low	yes
Walker 2012	unclear	unclear	unclear	high	low	yes
West 2011	low	unclear	high	low	low	no
Wing 1998	unclear	unclear	unclear	high	low	no

**Studies highlighted in red were judged as having overall low quality (high or unclear risk of bias in at least three out of six domains); studies highlighted in green and underlined were judged as having overall high quality (low risk of bias in at least three out of six domains).

Supplementary File 3. Intervention content coding

This file includes a summary of the number of change techniques coded in the included intervention reports with results of inter-rater agreement (Table S3.1). The change techniques were coded using coding instructions developed for coding of the included reports (see below). This files also includes a table (S3.2) summarising which change techniques were identified in each of the included interventions.

Table S3.1. Summary of the number of change techniques coded in with inter-rater reliability.

Change techniques	*N* interventions[1]	% inter-rater agreement[2]	*AC1*[2]
Self-monitoring	41	100	1
Goal setting	29	100	1
Barrier identification / problem solving	25	100	1
Social or group support	23	85	0.7
Providing information	22	85	0.8
Relapse prevention	16	100	1
Providing feedback	15	100	1
Modelling / demonstrating behaviour	15	100	1
Stimulus control	11	100	1
Providing instruction	10	92	0.9
Additional change techniques			
Supervised exercise	29	100	1
Providing specific diet goals / plans	27	92	0.9
Providing specific physical activity goals / plans	14	92	0.9
In-class weighing	17	100	1
Practical activities / skills development	11	85	0.7
Encouraging / facilitating group discussion	11	100	1
Encouraging sharing experiences	6	92	0.9

[1] Number of intervention reports in which the technique was identified (out of 60).

[2] Inter-rater agreement and AC1 were calculated on the basis of coding the techniques in 22% (13 of 60) of randomly selected interventions.

Change techniques: definitions and coding instructions

These definitions and coding instructions are based on the taxonomies of behaviour change techniques (Abraham and Michie, 2008; Michie et al. 2011, Michie et al. 2013), and include the techniques that were most frequently observed in the reports of included interventions. Additional specific behaviour change techniques and group management techniques were derived from, and defined on the basis of, the reports of included interventions.

General coding approach:

- Code only explicit reports of techniques and do not infer them, i.e. code only techniques that can be matched with specific text (a word, phrase or sentence) in the paper.
- Code also techniques that are reported generically (e.g. 'social support', 'goal setting', 'self-monitoring') without providing further details.

Change techniques:

Self-monitoring - Participants are asked to self-monitor behaviour(s) (B), e.g. dietary or physical activity diaries, or outcomes (O), e.g. weight. Code only if self-monitoring is used as part of the intervention (done by the participants) and not as part of measuring intervention outcomes.

Goal setting - Participants are asked to set goals for behaviour (e.g. eating 5 portions of fruit and veg, walking for 30 minutes a day etc.) or outcomes (e.g. losing a stone). Don't code this technique if the goals are 'given' to the participants by the intervention staff (e.g. asking them to reduce calorie intake by 500kcal, or exercising for 30 minutes) – in this case code 'Provide dietary goals/instructions' or 'Provide exercise goals/instructions'.

Barrier identification / problem solving - Involves prompting the person to think about and identify any potential barriers to changing behaviours and/or prompting the person to identify ways to overcome barriers and find solutions to potential problems that might stop them from performing desired behaviour or achieving goals. Code any format of reporting of barrier identification (BI) or problem solving (PS) – also generic.

Providing information - Involves providing general or specific information about health risk, link between behaviour and health, or about health-related behaviour. Code any references to providing information, even if it is reported without details of what exactly the information concerned (e.g. 'nutrition information', 'information about healthy lifestyle', 'advice on healthy diet' etc.).

Social / group support - Involves prompting the person to identify and elicit social support from people outside the group (social support), or encouraging providing mutual support within the group (group or peer support). Includes both practical and emotional support. (Code a generic description or social support as 'social support' – SS, and peer or group support - GS).

Providing feedback - Involves providing the participant with feedback about their behaviour, performance or outcomes. Code providing feedback face-to-face or through a device or software/website that provides data on performance or about body (biofeedback). Code only if it is explicitly reported.

Relapse prevention / coping planning - Involves planning how to maintain behaviour that has been changed. It is about maintaining behaviour change and not about initiation of behaviour change.

Code also when the report includes only a generic description (e.g. 'relapse prevention' or 'coping planning').

Modelling / demonstrating behaviour - Involves *showing* participants how to perform the behaviour, e.g. through physical or visual demonstrations. Code this technique if the demonstration is provided either in person or remotely (e.g. DVD or video). Note the difference between this technique, which involves showing the participants how to perform a behaviour (so they can observe it), and 'providing instructions', which only involves telling participants how to perform behaviour.

Stimulus control - Involves teaching participants how to identify stimulus, triggers or cues to behaviour and how to manage responses to those triggers and cues. Code if the technique is reported generically as 'stimulus control' or more specifically, e.g. as identifying and dealing with cues to eating/ feeling hunger/ fullness.

Providing instruction - Involves providing instructions, i.e. *telling* participants, on how to perform the behaviour or preparatory behaviours. Don't code this technique if participants are instructed to follow specific behaviours without telling them *how* to perform the behaviours. Don't code exercise classes, which should be coded separately as 'supervised exercise'.

Additional change techniques:

Supervised exercise - Code if the intervention included supervised or structured exercise or physical activity as part of the sessions or as separate sessions. This might include, for example, aerobics, stretching, resistance training, walking, dance classes etc. Don't code the report of supervised exercise as 'model / demonstrate behaviour' unless there is a specific report that the participants were shown how to perform the exercise; don't code it as 'providing instruction' unless specifically reported that participants were told how to exercise. This technique is a specific type of a BCT 'behavioural practice rehearsal'.

Providing specific diet goals / plans - Participants are given specific dietary goals, plans or instructions by the intervention staff, e.g. meal plans, calorie restriction goals, weight loss goals. Code 'goal setting' if the participants set their goals themselves.

Providing specific physical activity goals / plans - Participants are given specific exercise or physical activity goals, plans or instructions by the intervention staff, e.g. participants were encouraged or asked to walk or exercise for 150 min a week, were encouraged to aim for 10,000 steps a day or increase steps by 5000, were given activity plan.

In-class weighing - Participants are weighed as part of the group sessions either in private or public (e.g. at the beginning or end of the sessions). This is a specific type of a technique '2.7. Feedback on outcome(s) of behavior' (Michie et al., 2013, p. 5).

Practical activities / skills development - Involves practical, hands-on activities in the group sessions to learn new skills or practise behaviours, e.g. cooking, playing games, going for a supermarket trip, reading labels etc. Don't code if the activities involved supervised exercise (code this separately as 'supervised exercise'). Note the difference between 'modelling / demonstrating behaviour' and this technique – in the first instance the behaviours are shown to the participants (e.g. cooking demonstration), whereas in the second instance participants are able to practise these behaviours (e.g. practising cooking). This technique is a specific type of a BCT 'behavioural practice rehearsal'.

Encouraging / facilitating group discussion - Code if there is an explicit report of encouraging or facilitating group discussions as part of the group intervention (e.g. 'group discussions', 'discussion of sensitive topics').

Encouraging sharing experiences - Code if there is an explicit report that participants were encouraged or prompted to share personal experiences, feelings, and tips (e.g. 'group sharing', 'sharing stories'). Don't code if the report refers only to encouraging discussions or social interaction.

References:

Abraham, C. and S. Michie (2008) 'A taxonomy of behaviour change techniques used in interventions', *Health Psychology*, 27, no. 3, pp. 379–87. doi:10.1037/0278-6133.27.3.379.

Michie, S., S. Ashford, F. Sniehotta, S. Dombrowski, A. Bishop, and D. French (2011) 'A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: The CALO-RE Taxonomy'. *Psychology & Health* 26, no. 11, pp. 1479–98. doi:10.1080/08870446.2010.540664.

Michie, S., M. Richardson, M. Johnston, C. Abraham, J. Francis, W. Hardeman, M. Eccles, J. Cane, and C. Wood (2013) 'The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions'. *Annals of Behavioral Medicine* 46, no. 1, pp. 81–95. doi:10.1007/s12160-013-9486-6.

Table S3.2. Techniques coded in the included interventions.

Study ID	Self-monitoring	Goal setting	Barrier identification / Problem solving	Social / group support	Provide information	Relapse prevention	Provide feedback	Model / demonstrate behaviour	Stimulus control	Provide instruction	Supervised exercise	Provide diet plan / goals	Provide exercise plan / goals	In-class weighing	Practical activities	Group discussions	Sharing experiences
Abedi 2010					X							X				X	
Ahern 2017 12wk				GS										X			
Ahern 2017 52wk				GS										X			
Anton 2011	B	X	PS		X		X				X	X	X				
Ash 2006						X										X	
Auslander 2002																X	
Aveyard 2016		X		GS													
Avila & Hovell 1994	B		PS	SS+ GS			X				X	X	X				
Bouchard 2009 CR	B+O											X					
Bouchard 2009 CR+RT	B+O											X	X				
Canuto 2012	B							X			X		X		X		
Carnie 2013	B	X			X							X	X	X			
Carroll 2012		X			X					X	X		X				
Conroy 2015	B										X	X	X	X		X	
Cousins 1992 Family	B	X	PS	SS		X	X	X				X					

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Study ID	Self-monitoring	Goal setting	Barrier identification / Problem solving	Social / group support	Provide information	Relapse prevention	Provide feedback	Model / demonstrate behaviour	Stimulus control	Provide instruction	Supervised exercise	Provide diet plan / goals	Provide exercise plan / goals	In-class weighing	Practical activities	Group discussions	Sharing experiences
Cousins 1992 Individual	B	X	PS	GS		X	X	X		X	X	X					
Fitzgibbon 2005 Cohort 1	B	X	BI	SS	X	X		X	X	X	X						X
Fitzgibbon 2005 Cohort 2	B	X	BI	SS	X	X		X	X	X	X						X
Folta 2009	B	X						X		X	X				X		
Foster-Schubert 2012 D+Ex	B	X		GS			X				X	X		X			
Foster-Schubert 2012 Diet	B	X		GS			X					X		X			
Gillett 1995 Edu+Ex	B				X			X			X						
Gillett 1995 Education	B				X			X					X				
Grant 2004					X			X		X	X						
Gray 2013b	B+O	X		SS+GS			X				X						
Green 2005				GS								X		X			
Heideman 2015	B	X	BI		X											X	X
Heshka 2003				SS								X	X	X			

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Suppl Files for Systematic Review of Group-based Weight-loss Interventions

Study ID	Self-monitoring	Goal setting	Barrier identification / Problem solving	Social / group support	Provide information	Relapse prevention	Provide feedback	Model / demonstrate behaviour	Stimulus control	Provide instruction	Supervised exercise	Provide diet plan / goals	Provide exercise plan / goals	In-class weighing	Practical activities	Group discussions	Sharing experiences
Hunt 2014b	X	X		SS+GS	X		X				X					X	
Koniak-Griffin 2015	B	X	BI		X			X		X	X		X	X			
Krummel 2010	B		PS	SS					X				X	X		X	X
Kuller 2012												X					
Leblanc 2012 HAES					X										X	X	
Leblanc 2012 SS				GS												X	
Morgan 2011	B	X	BI+PS	SS	X	X		X		X	X				X	X	
Morgan 2014	B+O	X	BI	SS	X			X			X				X	X	
Munsch 2003	B	X	PS		X	X											
Ostbye 2009		X	BI					X			X				X		
Ross 2000	B										X	X					
Ross 2004	B										X	X					
Salinardi 2013	X	X		SS					X		X						
Samuel-Hodge 2009	B	X	PS				X	X			X				X	X	X
Schroder 2009	B	X	PS	SS	X	X	X			X						X	
Share 2015			PS	GS	X						X						

Suppl Files for Systematic Review of Group-based Weight-loss Interventions

Study ID	Self-monitoring	Goal setting	Barrier identification / Problem solving	Social / group support	Provide information	Relapse prevention	Provide feedback	Model / demonstrate behaviour	Stimulus control	Provide instruction	Supervised exercise	Provide diet plan / goals	Provide exercise plan / goals	In-class weighing	Practical activities	Group discussions	Sharing experiences
Shuger 2011 GWL	B													X			
Shuger 2011 GWL+SWA	B+O						X							X			
Silva 2010	B	X	BI		X	X	X				X						
Sorkin 2014	B	X	PS	SS		X		X			X	X	X				
Stolley 2009			PS	SS+GS	X				X		X	X	X		X	X	
Tanco 1998 BT	B+O	X				X			X			X			X		
Tanco 1998 CT			PS			X			X								
Truby 2006 RC											X						
Truby 2006 WW																	
Villareal 2011 D	B	X										X			X		
Villareal 2011 D+Ex	B	X									X	X			X		
Walker 2012	X	X	BI			X						X				X	X
West 2011	B	X	PS			X	X		X						X		
Wing 1998 D+Ex	B		PS+BI		X	X	X		X		X	X	X				

Suppl Files for Systematic Review of Group-based Weight-loss Interventions

Study ID	Self-monitoring	Goal setting	Barrier identification / Problem solving	Social / group support	Provide information	Relapse prevention	Provide feedback	Model / demonstrate behaviour	Stimulus control	Provide instruction	Supervised exercise	Provide diet plan / goals	Provide exercise plan / goals	In-class weighing	Practical activities	Group discussions	Sharing experiences
Wing 1998 D	B		PS		X	X	X		X			X					
Wing 1998 Ex	B		PS+BI						X		X		X				

Abbreviations used in the table:

B – (Self-monitoring of) behaviour,
BI – barrier identification,
BT – behaviour therapy,
CR – calorie restriction,
CT – cognitive therapy,
D – diet,
Edu – education,
Ex- exercise,
GS – group support,
GWL – group weight loss,
HAES – healthy at every size,
O – (self-monitoring of) outcomes,
PS – problem solving,
RT – resistance training,
RC – Rosemary Conley,
SS – social support,
SWA – sense wear armband,
WW – Weight Watchers,
X – techniques coded as present in the intervention description.

Supplementary File 4. Sensitivity analyses and funnel plots

This file includes a summary of the conducted sensitivity analyses with their results (Table S4.1). These sensitivity analyses were conducted using mean difference (MD) in weight loss at up to 6 months. By comparison, the meta-analysis including all eligible interventions (as reported in the main text of the paper) resulted in the MD in weight loss of -3.49 kg (95% CI [-4.15, -2.84]; $I^2 = 90\%$).

This file includes also funnel plots (Figures S4.1-S4.3) with studies included closest to 6, 12 and 24 months, showing any outliers that might indicate a publication bias.

Table S4.1. Summary of results of sensitivity analyses

Comparison	# studies included	MD [95% CI]
Study quality High quality (low risk of bias) (excluded low quality studies)	19	-3.06 [-4.05, -2.08]
Intention-to-treat analysis With ITT (excluded studies without ITT)	18	-3.30 [-4.60, -2.00]
Participants with comorbidities Not included / not reported (excluded studies that reported including participants with comorbidities[1])	42	-3.77 [-4.57, -2.97]
Imputed standard deviations No (excluded studies with imputed SD)	31	-4.39 [-5.24, -3.54]
Contributing multiple group-based interventions to the meta-analysis No (excluded studies that contributed multiple interventions)	30	-3.43 [-4.32, -2.55]
Baseline BMI differences between intervention and control groups Less than 1 BMI point (excluded studies with more than 1 BMI point difference)	38	-3.82 [-4.65, -3.02]

[1] Studies marked in Table 1.

Funnel plots

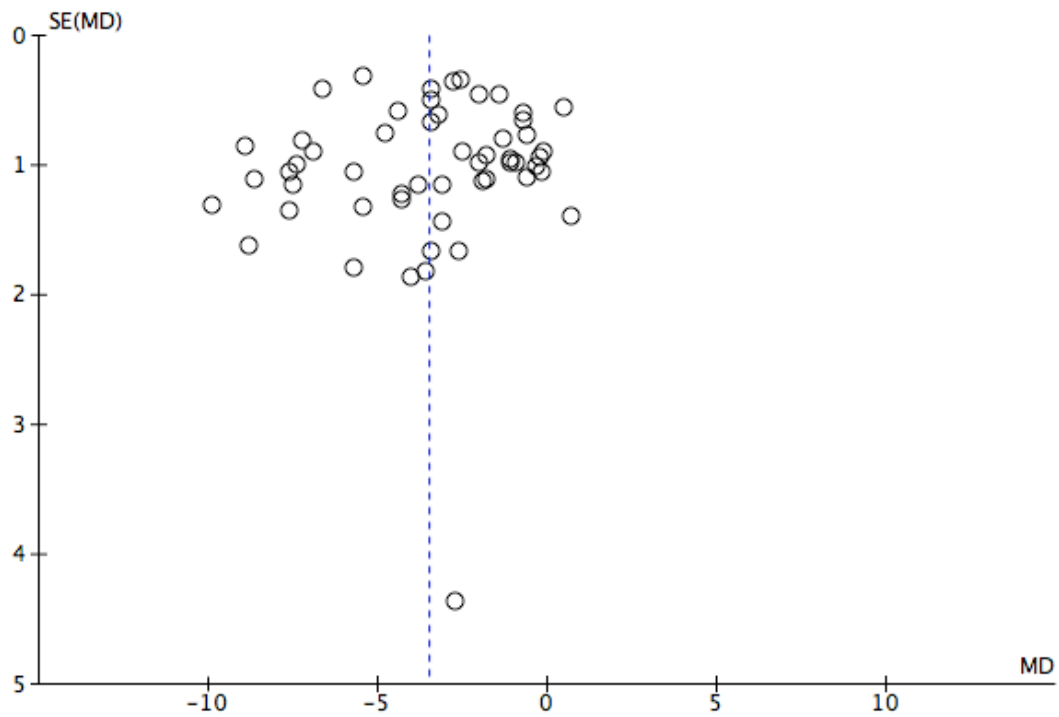**Figure S4.1. Funnel plot of mean difference in weight loss at up to 6 months**

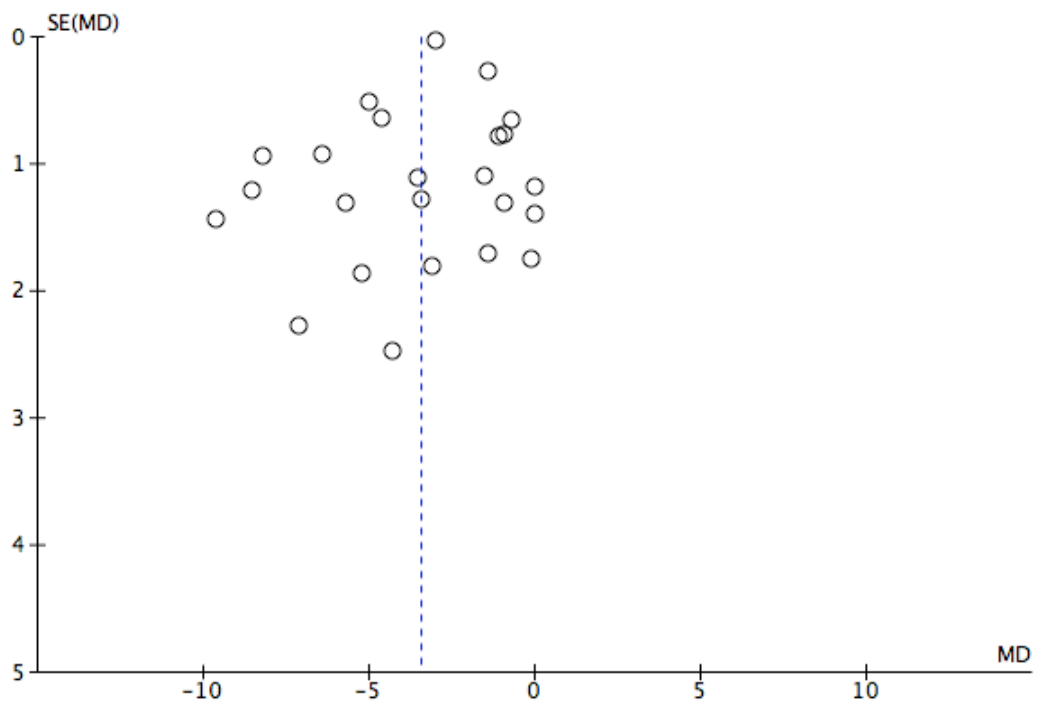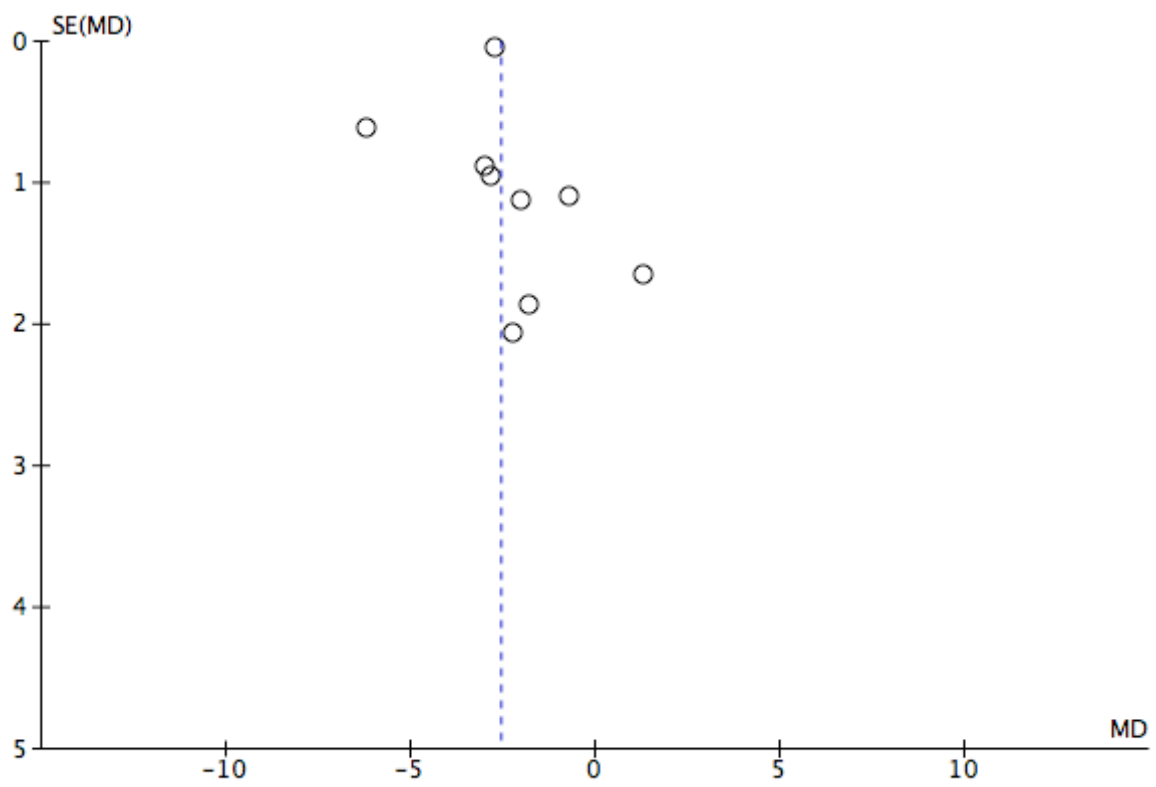**Figure S4.2. Funnel plot of mean difference in weight loss closest to 12 months**

Figure S4.3. Funnel plot of mean difference in weight loss closest to 24 months

Supplementary File 5. Moderator analyses

This file includes a summary of the conducted moderator (sub-group) analyses based on the intervention design features (Table S5.1), reported intervention content (change techniques) (Table S5.2) and combinations of identified change techniques (Table S5.3). These moderator analyses were conducted using mean difference (MD) in weight loss at up to 6 months. By comparison, the meta-analysis including all eligible interventions (as reported in the main text of the paper) resulted in the MD in weight loss of -3.49 kg (95%CI [-4.15, -2.84]; I^2=90%).

Table S5.1. Moderator analyses based on intervention design features

Comparison	Subgroups	n	Subtotal MD [95% CI]	I^2 [%]	Test for subgroup differences p / I^2
Type of control group	No intervention (I)	26	-3.75 [-4.77, -2.72]	88	p = 0.61 I^2 = 0%
	Irrelevant I	9	-3.55 [-5.28, -1.81]	94	
	Usual care / min I	19	-3.06 [-3.98, -2.15]	87	
Primary study aim	Weight loss	41	-4.01 [-4.75, -3.27]	90	==p < 0.0001== I^2 = 94%
	Other targets	13	-1.65 [-2.49, -0.80]	65	
Behavioural target	Diet + Exercise	40	-3.17 [-3.93, -2.41]	90	p = 0.06 I^2 = 73%
	Diet alone	13	-4.80 [-6.28, -3.31]	92	
Setting	Healthcare	8	-1.26 [-5.53, -0.99]	92	p = 0.77 I^2 = 0%
	Community	17	-3.53 [-4.58, -2.48]	91	
	Worksite	2	-4.78 [-12.82,3.25]	98	
	University	3	-4.97 [-7.73, -2.20]	85	
Commercial programme	Yes	6	-4.33 [-5.80, -2.86]	86	p = 0.1 I^2 = 62%
	No	48	-3.39 [-4.14, -2.64]	90	
Delivery mode	Groups only	21	-4.77 [-6.14, -3.41]	90	==p = 0.01== I^2 = 84%
	Mixed mode	33	-2.79 [-3.50, -2.08]	89	
Total contact time in groups	≤18 hrs (median)	17	-2.97 [-4.14, -1.81]	86	p = 0.72 I^2 = 0%
	>18 (median)	18	-3.26 [-4.33, -2.20]	90	
Participants gender	Women only	31	-2.62 [-3.49, -1.74]	87	==p = 0.0007== I^2 = 86%
	Men only	5	-5.50 [-6.78, -4.23]	76	
	Mixed gender	18	-4.28 [-5.42, -3.15]	92	
Tailored to ethnic groups	No	42	-3.70 [-4.45, -2.96]	90	p = 0.23 I^2 = 32%
	Yes	12	-2.77 [-4.08, -1.46]	88	
Facilitators profession	Not reported	14	-2.99 [-4.00, -1.98]	84	p = 0.06 I^2 = 51%
	Multidisciplinary	12	-3.95 [-5.97, -1.94]	92	
	Dieticians, nutritionists	8	-4.60 [-6.82, -2.38]	93	
	GP, nurse, health educators	8	-2.40 [-3.50, -1.29]	70	
	Exercise instructors	3	-4.62 [-5.86, -3.39]	72	
	Researchers, students	3	-4.74 [-8.14, -1.34]	76	
	Non-professional, lay	4	-1.94 [-3.66, -0.22]	93	
Facilitators training	Not reported	34	-4.37 [-5.29, -3.45]	90	==p = 0.0009== I^2 = 91%
	Reported	20	-2.18 [-3.09, -1.27]	89	

Table S5.2. Moderator analyses based on intervention content (change techniques)

Comparison	Subgroups	N	Subtotal MD [95% CI]	*I²* [%]	Test for subgroup differences *p* / *I²*
Self-monitoring	Yes	37	-3.77 [-4.65, -2.90]	90	*p* = 0.24
	No	17	-2.96 [-3.99, -1.92]	9190	*I²* = 28%
Goal setting	Yes	24	-3.65 [-4.70, -2.61]	92	*p* = 0.67
	No	30	-3.36 [-4.23, -2.50]	88	*I²* = 0%
Barrier identification / problem solving	Yes	22	-3.02 [-4.00, -2.04]	85	*p* = 0.24
	No	32	-3.80 [-4.67, -2.94]	91	*I²* = 28%
Providing information	Yes	21	-2.85 [-3.98, -1.71]	90	*p* = 0.13
	No	33	-3.92 [-4.74, -3.09]	90	*I²* = 55%
Social or group support	Yes	19	-3.42 [-4.35, -2.48]	88	*p* = 0.83
	No	35	-3.56 [-4.49, -2.64]	91	*I²* = 0%
Providing feedback	Yes	12	-4.46 [-5.40, -3.51]	76	==*p* = 0.04==
	No	42	-3.19 [-3.98, -2.41]	91	*I²* = 75%
Relapse prevention	Yes	15	-3.38 [-4.57, -2.18]	81	*p* = 0.83
	No	39	-3.53 [-4.32, -2.74]	92	*I²* = 0%
Modelling / demonstrating behaviour	Yes	14	-3.02 [-4.25, -1.80]	87	*p* = 0.38
	No	40	-3.67 [-4.44, -2.89]	91	*I²* = 0%
Stimulus control	Yes	10	-4.23 [-5.97, -2.50]	88	*p* = 0.35
	No	44	-3.34 [-4.06, -2.61]	90	*I²* = 0%
Providing instruction	Yes	7	-3.02 [-4.97, -1.08]	85	*p* = 0.61
	No	47	-3.56 [-4.27, -2.86]	91	*I²* = 0%
Supervised exercise	Yes	26	-3.86 [-4.90, -2.83]	90	*p* = 0.31
	No	28	-3.16 [-4.04, -2.28]	90	*I²* = 4%
Provide diet goals/plans	Yes	24	-4.59 [-5.74, -3.43]	89	==*p* = 0.009==
	No	30	-2.72 [-3.49, -1.96]	89	*I²* = 86%
Provide exercise goals/plan	Yes	13	-3.02 [-4.35, -1.68]	88	*p* = 0.42
	No	41	-3.65 [-4.39, -2.90]	90	*I²* = 0%
In-class weigh-in	Yes	16	-3.62 [-4.57, -2.67]	87	*p* = 0.77
	No	38	-3.43 [-4.31, -2.54]	91	*I²* = 0%
Practical activities / skills development	Yes	9	-3.47 [-4.75, -2.19]	88	*p* = 0.97
	No	38	-3.50 [-4.26, -2.74]	90	*I²* = 0%
Encouraging group discussion	Yes	10	-1.87 [-3.37, -0.37]	92	==*p* = 0.02==
	No	44	-3.90 [-4.65, -3.15]	90	*I²* = 82%
Encouraging sharing experiences	Yes	5	-1.94 [-3.95, 0.08]	87	*p* = 0.11
	No	49	-3.66 [-4.35, -2.97]	90	*I²* = 60%

Table S5.3. Moderator analyses based on combinations of change techniques

Comparison	Subgroups	N	Subtotal MD [95% CI]	I^2 [%]	Test for subgroup differences p / I^2
Self-monitoring and goal-setting (both)	Yes	23	-3.65 [-4.73, -2.57]	92	$p = 0.69$
	No	31	-3.38 [-4.22, -2.53]	88	$I^2 = 0\%$
Model/demonstrate behaviour and provide instruction	Yes	7	-2.56 [-4.40, -0.72]	89	$p = 0.28$
	No	47	-3.64 [-4.33, -2.95]	90	$I^2 = 13\%$
Supervised exercise or practical activities	Either	27	-3.66 [-4.58, -2.73]	89	$p = 0.63$
	Neither	27	-3.33 [-4.30, -2.36]	91	$I^2 = 0\%$