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Table 2 Data extraction of the 17 weight management interventions

STUDY	PARTICIPANTS (N, sex, BMI, age)	INTERVENTION (duration, characteristics, control, design)	MEASUREMENTS (outcomes, methods)	RESULTS (change over time ↑ and magnitude pre to post WL in %, difference between conditions and => correlations)	CONCLUSION
Aberg, 2008 (28)	100 women and men with obesity Low-fat diet BMI: 36.6 ± 4.5 kg/m^2 Age: 37.9 ± 6.2 y High-fat diet BMI: 36.5 ± 4.6 kg/m^2 Age: 38.2 ± 8.3 y	10-week dietary intervention study with two hypocaloric diets: low-fat (LF: 20-25%) or high-fat (HF: 40-45%) in free-living setting RCT	**Food reward:** Overall palatability of the diet (VAS end-of-day)	↑ by 11% (LF) and by 7% (HF) over time, but no difference between diets	A free-living diet intervention increased the overall palatability of the diet but manipulating fat content did not influence palatability.
			Food intake: Total daily energy intake (weighed food diaries)	↓ by 26% (LF) and by 24 % (HF) over time	
			Physiological: Body weight (calibrated scale)	↓ with a median weight loss of 7%, no difference between diets	
Alkahtani, 2014 (33)	10 men with overweight and obesity BMI: 30.7 ± 3.4 kg/m^2 Age: 29 ± 3.7 y	Two 4-week training interventions of 12 cycling sessions in each intervention (MIIT or HIIT) separated by a 6-week detraining wash-out Crossover design	**Food reward:** Liking and wanting (LFPQ)	Exercise-induced-liking for HFNS food trend for ↓ after HIIT (–10 mm), and ↑ after MIIT (+5 mm)	HIIT seemed to decrease liking for energy-dense food and fat intake after 4-week training compared to MIIT.
			Food intake: (ad libitum test meal)		
			- Energy intake of the meal	→ over time, no difference between conditions	
			- Energy intake from fat	↑ by 38% after MIIT, ↓ by 16% after HIIT, difference approaching significance	
			Physiological: Fat mass (BIS)	→ over time, no difference between conditions	
Andriessen , 2018 (34)	123 women and men with overweight and obesity BMI: N/A Age: 41.2±5.2 y	8-week low calorie dietary intervention Sub-group of the DiOGenes study that was randomised intervention study, no control condition	**Food reward:** Food preferences (Food Preference Checklist)		Low calorie diet induced weight loss decreased preference for high-fat-, high-carbohydrate-, and low-energy foods.
			- Low-energy foods	↓ by 1.9% (fasted) and by 13.5% (fed) over time	
			- High-carbohydrate foods	↓ by 11.4% (fasted) and by 17.4% (fed) over time	
			- High-fat foods	↓ by 16.2% (fasted) and by 22.7% (fed) over time	
			- High-protein foods	→ over time	
			- Food choice (Forced Choice Photographic Questionnaire)	→ over time	
			Physiological: Body Weight (N/A)	↓ by 11.1% over time	
Astell, 2013 (29)	33 women and men with overweight and obesity Experimental condition: BMI: 32.5 ± 6.4 kg/m^2 Age: 46.7 ± 9.7 y Placebo condition: BMI: 31.8 ± 4.1 kg/m^2 Age: 46.4 ± 10.4 y	12-week supplement (C. fimbriata extract) vs placebo intervention with dietary intake and exercise monitored RCT double blind placebo	**Food reward:** Overall palatability of the test breakfast meal (VAS)	↓ by 5% (experimental condition) vs no change (placebo)	Supplementation with C. fimbriata extract was associated with a decrease in overall palatability and a reduction in central adiposity.
			Food intake: (food diaries)		
			- Total daily energy intake	→ over time, no difference between conditions	
			- Energy intake from fat	↓ by 46% (experimental condition) and by 38% (placebo), but no difference between conditions	
			Physiological:		
			- Body weight (digital scales)	↓ by 2% (experimental condition) and by 3% (placebo) over time, but no difference between conditions	
			- Waist circumference (above the umbilicus)	↓ by 6% (experimental condition) vs only 3% (placebo)	

Blundell, 2017 (30)	30 women and men with obesity BMI: 33.8 ± N/A kg/m^2 Age: 42 ± N/A y	12-week treatment with once-weekly subcutaneous Semaglutide (S), dose-escalated to 1.0 mg Randomised, double-blind, placebo-controlled, two-period crossover trial	**Food reward:**		Semaglutide-induced weight loss reduced energy intake associated with lower relative preference for fatty, energy-dense foods.
			- Palatability of the ad libitum meal (VAS)	N/A over time, no difference between conditions	
			- Liking for HFNS (LFPQ)	↓ more in S, with (-13.9 mm) difference	
			- Wanting for HFNS (LFPQ)	↓ more in S, with (-15.8 no unit) difference	
			- Wanting for LFS (LFPQ)	↑ more in S, with (+13.9 no unit) difference in S vs placebo	
			Food intake:		
			- Total daily energy intake (ad libitum test meals lunch, dinner and snack)	↓ more in semaglutide, with 24% difference in semaglutide vs placebo	
			- Energy intake from HFNS (ad libitum evening snacks)	↓ more in semaglutide, with 35% difference in semaglutide vs placebo	
			Physiological:		
			- Body weight (N/A)	↓ by 5% (semaglutide) vs ↑ by 1% (placebo)	
			- Fat mass (ADP)	↓ by 3.5kg (semaglutide) vs ↑ by 0.3kg (placebo) (% pre to post N/A)	
Cameron, 2008 (31)	15 women and men with obesity BMI: 35.7 ± 4.3 kg/m^2 Age: 33.6 ± 7.4 y	8-week of caloric deprivation (-700 kcal/day) Secondary analysis from a RCT, no control condition	**Food reward:**		Prolonged caloric deprivation increased liking of the food reinforcers but not the RRV of palatable foods, except for subjects with high disinhibition scores who tended to have an increase in the RRV of snack food.
			- Liking for a standard lunch test meal (VAS)	→ over time	
			- Liking for the snack food reinforcer (VAS)	↑ by 9% over time	
			- Relative-reinforcing value (RRV) of snack foods versus fruits/vegetables (progressive ratio computer task prior to lunch and food reinforcers)	→ over time	
			Psychological: Dietary disinhibition (TFEQ)	⇨ Correlation between high disinhibition scores and increase in the RRV post-weight-loss	
			Physiological:	⇨ No significant correlations between pre- or post-fat mass, fat-free mass and liking.	
			- Body weight (digital scale)	↓ by 5.2 ± 2.7%	
			- Body composition (DXA)	↓ by 8.2 ± 6.7% for fat mass and by 4.5 ± 3.3% for fat free mass	
Demos, 2017 (35)	37 women with obesity BMI: 33.5 ± 3.9 kg/m^2 Age 47.0 ± 7.9 y Baseline control: normal weight BMI: 22.7 ± 1.8 kg/m^2 Age: 44.0 ± 8.9 y	12 to 16-week behavioural weight loss (BWL) interventions incorporating diet, exercise, and behavioural therapy delivered by face-to-face group meetings (n=31) or via the internet (n=6)	**Food reward:** Tastiness of snack food pictures (5-point scale (-2 to 2))		Tastiness and especially tastiness of unhealthy food decreased following BWL.
			- Mean taste	↓ by 31% pre to post intervention - no difference with the control mean taste	
			- Healthy food	↑ by 5% pre to post intervention	
			- Neutral food	↓ by 22% pre to post intervention	
			- Unhealthy food	↓ by 71% pre to post intervention	

		Non randomised trial, no control group completed the intervention	**Food choice:** Food choice task (4-point scale)	↑ in healthier, less tasty food choices post-treatment but less than in the control ⇨ BWL enhanced the valuation of health and diminished the valuation of taste in food choice	
			Physiological: Body weight (N/A)	↓ by 6.62%, no differences between the face-to-face program, the internet-delivered program, the 12-week or 16-week interventions	
Grieve, 2003 (44)	118 women with obesity Responders: BMI: 33.7 ± 6.1 kg/m^2 Age: 45.2 ± 11.4 y Non-Responders: BMI: 35.6 ± 7.3 kg/m^2 Age: 40.4 ± 12.4 y	12-week behavioural intervention including a reduction in energy and dietary fat intake as well as an increase in physical activity Secondary analysis of a single group intervention, no control condition	**Food reward:** Desire to eat in the past 7 days (48-item questionnaire)		Changes in consumption were associated with changes in desire to eat low-fat and high-fat foods.
			- Low-fat foods	↑ by 9 % over time	
			- High-fat foods	↓ by 12% over time	
			- Medium-fat foods and drinks	→ over time	
			Food intake:(48-item questionnaire)	⇨ Strong positive association between change in desire to eat and change in consumption of these foods.	
			- Low-fat foods	↑ over time	
			- High-fat foods	↓ over time	
			- Medium-fat foods and drinks	→ over time	
Hopkins, 382014 (36)	46 women and men with obesity Women: BMI: 30.8 ± 3.5 kg/m^2 Age: N/A Men: BMI: 30.5 ± 4.7 kg/m^2. Age: N/A	12-week supervised aerobic exercise program designed to expend 2500 kcal/week Single group intervention no control condition	**Food reward:** Liking and wanting before a fixed-energy meal (LFPQ)	→ between baseline and post-intervention ⇨ Fat mass and fat-free mass were associated with explicit liking for high fat foods ⇨ Implicit wanting was only associated with fat mass	12-weeks of exercise did not significantly change food reward nor food intake but decreased body weight and fat mass.
			Food intake: Total daily energy intake (test meals)	→ between baseline and post-intervention	
			Physiological:		
			- Body weight (N/A)	↓ by 2% pre to post intervention	
			- Fat mass (ADP)	↓ by 6% pre to post intervention	
Johnstone, 2008 (32)	17 men with obesity BMI: 35.1 ± 3.8 kg/m^2 Age: 38 ± 10 y	Two 4-week dietary interventions comparing high protein diets either low-carbohydrate (LC: 4%) or medium-carbohydrate (MC: 35%) RCT, crossover design	**Food reward:** Overall pleasantness of each meal (computerised VAS, post meal)	→ over time, no difference between diets	No influence of carbohydrate content on overall pleasantness of meals.
			Food intake: Total daily energy intake (food diaries)	↓ with an average difference of 294 kcal/d in LC vs MC diet ⇨ No correlation between pleasantness and energy intake of the 2 diets	
			Physiological: Body weight (scale)	↓ by 5.8% (LC) vs 4.0% (MC)	
Martin, 2011 (37)	270 women and men with obesity BMI: 36 ± 3,3 kg/m^2 Age: 45.2 ± 9.8 y	2-year dietary intervention comparing a low-carbohydrate diet (LCD) with a low-fat diet (LFD) RCT	**Food reward:** Food preferences (FPQ)		LCD and LFD decreased preferences for high-carbohydrate, high-sugar and low carbohydrate foods.
			- High-carbohydrate	↓ more in the LCD vs LFD	
			- High-sugar food	↓ more in the LCD vs LFD	
			- Low-carbohydrate/high-protein foods	↓ more in the LFD vs LCD at 18 months	

			Physiological: Body weight (N/A)	↓ by 7.2% at 24 months for the whole sample, no difference between diets ⇨ No correlation between FPQ scores and weight loss at any time-point	
Martins, 2017 (38)	46 women and men with obesity BMI: 33.3 ± 2.9 kg/m^2 Age: 34.4 ± 8.8 y	12-week supervised exercise program with three training conditions: MICT, HIIT, or short-duration HIIT RCT	**Food reward:** Food reward (LFPQ)	→ over time, no difference between conditions	Chronic HIIT had no independent effect on food reward compared with an isocaloric program of MICT in individuals with obesity.
			Food intake: Total daily energy intake (food diaries)	→ over time, no difference between conditions	
			Physiological: Body weight (N/A)	↓ over time with an overall reduction of (-1.2 ± 2.5 kg), difference between conditions N/A	
McVay, 2016 (39)	105 women and men with obesity BMI: 36 ± 6 kg/m^2 Age: 55 ± 11 y	48-week dietary intervention comparing 2 arms: low-fat diet (LFD) or low-carbohydrate diet (LCD) A secondary analysis of data from a randomised clinical trial	**Food reward:** Food preferences (FPQ(41))	*Difference between conditions: N/A	LFD and LCD decreased food preferences for high and low-energy foods.
			- High-fat/high-sugar	↓ by 13% (LCD), by 8% (LFD)*	
			- High-fat/high-complex carbohydrate	↓ by 17% (LCD), by 14% (LFD)*	
			- Low-fat food absolute congruency	↓ by 10% (LCD), by 5% (LFD)*	
			- Low-carbohydrate absolute congruency	→ (LCD), ↓ by 6% (LFD)*	
			Physiological: Body weight (N/A)	⇨ In the LCD, increase in preference for diet-congruent foods during the first 12 weeks of the intervention was associated with greater weight loss between 12 and 24 weeks	
Newman, 2016 (40)	53 women and men with obesity BMI: 32.3 ± 5.1 kg/m^2 Age: 56.5 ± 13.8 y	6-week low-fat (LF) or portion control (PC) diet matched for weight loss RCT	**Food reward:** Liking of regular-fat and LF foods (9-point hedonic scale)	↑ for LF food cream cheese only and not across all foods over time, no difference between diets	Low-fat or portion control diets did not change liking for most of the low fat and regular food.
			Food intake: Total daily energy intake (food diaries, FFQ)	↓ by 14% (LF) and by 22% (PC) over time but no difference between diets	
			Physiological: Body weight (scale)	↓ by 3% over time, no difference between diets	
Raynor, 2006 (41)	30 women and men with obesity Reduced variety BMI: 32.2 ± 2.8 kg/m^2 Age: 50.9 ± 8.4 y Control BMI: 32.3 ± 3.8 kg/m^2 Age: 48.2 ± 11.4 y	8-week behavioural intervention, which reduced variety of snack foods in the diet (reduced variety) or limit snack food intake to <1 serving/day (control) RCT	**Food reward:** Pleasantness of tasting chosen sweet or savoury high-energy dense snack (VAS)	↓ by 21% for the chosen snack food over time vs ↓ by 5% for other snack foods in the reduced variety condition, no change in the control.	Limiting snack variety decreased liking of eaten snack food over time and more than other snack foods not consistently consumed.
			Food intake: Energy intake from snacks per week (food diaries)	↓ by 63% (reduced variety) and by 51% (control) but no difference between conditions	
			Physiological: Body weight (calibrated scale)	↓ by 3.33 ± 2.61 kg post intervention, no difference between conditions	
Raynor, 2012 (42)	202 women and men with obesity BMI: 34.9 ± 4.3 kg/m^2	18-month behavioural intervention comparing 2 arms: Lifestyle + limited	**Food reward:** Pleasantness of tasting 2 chosen NND-EDFs (VAS)	↓ for only one of the chosen NND-EDF and more in the intervention (-7.4 ± 13.4 mm) than in the control (-1.4 ± 12.3 mm)	Limiting the variety of NND-EDF decrease the

	Age: 51.3 ± 9.5 y	variety of non-nutrient-dense, energy-dense foods (NND-EDFs) with a control (Lifestyle) RCT	**Food intake:** (24-h dietary recalls + 28-day FFQ)		pleasantness of one of the chosen food with no relationship with the decrease of energy intake from this food.
			- Energy intake from NND-EDFs	↓ by 56% (intervention) vs 40% (control) ⇨ No correlation between pleasantness and energy intake from NND-EDFs	
			- Total daily energy intake	↓ by 27% (intervention) and by 20% (control) over time, but no difference between conditions	
			Physiological: Body weight (calibrated digital scale)	↓ by 9.9 ± 7.6% (intervention), by 9.6 ± 9.2% (control), no difference between conditions	
Stice 2017 (43)	47 women and men with obesity Intervention BMI: 38.5 ± 9.8 kg/m^2 Age: 32.8 ± 8.3 y Control BMI: 35.0 ± 7.7 kg/m^2 Age: 32.4 ± 8.4 y	Four weekly training sessions comparing food response and attention training with a parallel generic response training (and 6-month follow-up) RCT	**Food reward:**		Food response training intervention reduced palatability ratings and monetary valuation of high-calorie foods, but not low-calorie foods, and resulted in greater body fat loss over a 4-week period, though this effect was not significant by 6-month follow-up.
			- Palatability of high-calorie foods (200 food pictures rated on a 10-point scale)	↓ over time, twice as more after a food response and attention training intervention than control	
			- Palatability of low-calorie foods	→ over time, no difference between conditions	
			- Willingness to pay for high calorie foods (<$1 to $10+ for a serving of each of the foods)	↓ (food response), → (generic response)	
			- Willingness to pay for low calorie foods	→ over time, no difference between conditions	
			Physiological: Body fat (ADP)	↓ (food response), → (generic response) No change after 6-month follow-up. ⇨ A marginal correlation between fat mass and palatability ratings for high-calorie foods	
			Other: Brain reward area activation (fMRI food image exposure paradigm)	↓ in reward (putamen, mid insula) regions in response to high-calorie vs low-calorie food images ⇨ Correlation between decrease in palatability and willingness to pay for high calories foods and decrease in brain activation in reward regions.	

BMI: Body Mass Index, LF: Low-fat, HF: High-fat, RCT: Randomised-control-trial, VAS: Visual Analogue Scale, WL: Weight loss, MIIT: Moderate Intensity Interval Training, HIIT: High Intensity Interval Training, LFPQ: Leeds Food Preferences Questionnaire, HFNS: High fat non-sweet foods, BIS: bio impedance spectroscopy, HFNS: High fat-non-sweet foods, LFS: Low fat sweet foods, N/A: Not available, S: Semaglutide condition, ADP: Air displacement plethysmography, RRV: Relative-reinforcing value of a food, TFEQ: Three Factor Eating Questionnaire, DXA: dual-energy X-ray absorptiometry, BWL: Behavioural weight loss, LC: low-carbohydrate diet, MC: medium-carbohydrate diet, LCD: low-carbohydrate diet, LFD: low-fat diet, FPQ: Food Preferences questionnaires, MICT: moderate-intensity continuous training, PC: portion control, FFQ: Food Frequency Questionnaire, NND-EDF: non-nutrient-dense-energy-dense foods,