

Which weight-loss programmes are as effective as Weight Watchers®?

Non-inferiority analysis

Abstract

Background

Three randomised controlled trials have provided strong evidence that Weight Watchers® is an effective weight-loss programme but there is insufficient evidence to determine whether three other weight-loss programmes are also effective.

Aim

To examine whether other group-based weight-loss programmes were not inferior to Weight Watchers.

Design and setting

A prospective cohort study using a non-inferiority analysis of 3290 adults referred through primary care.

Method

Participants who met the eligibility criteria for primary care obesity management treatment chose a free programme (Weight Watchers, Rosemary Conley Diet and Fitness Clubs, Slimming World or a NHS group programme) lasting 3 months; they were weighed at 3 months (programme end) and self-reported their weight at 12 months.

Results

At 3 months, weight loss achieved through Rosemary Conley and Slimming World was not inferior to Weight Watchers. The NHS group programme was inferior. At 12 months Slimming World and Rosemary Conley were not inferior to Weight Watchers, although participants using Slimming World lost significantly more weight than those using Weight Watchers. Data on the NHS group programme were inconclusive.

Conclusion

In the short term all commercial weight-loss programmes appear to result in similar weight loss but the NHS alternative appears to produce less weight loss. At 12 months Slimming World led to greater weight loss but the differences between commercial programmes was small and of minor clinical importance.

Keywords

obesity; primary health care; weight loss; weight reduction programmes.

INTRODUCTION

There has been a sharp increase in the prevalence of obesity resulting in more people being classified as obese and therefore at higher risk of disease.¹⁻³ Behavioural interventions to support weight loss that target physical activity and diet are part of the public health approach to prevent ill health.⁴ Two randomised controlled trials (RCTs) provide evidence of the effectiveness of primary care referrals to commercial weight-loss programmes.^{5,6} Participants attending commercial programmes available in the UK (Weight Watchers®, Rosemary Conley Diet and Fitness Clubs, and Slimming World) achieved significantly higher weight loss than those receiving usual care or primary care-based programmes.

Three RCTs comparing Weight Watchers with a minimal intervention control each showed significant weight loss in participants attending Weight Watchers, with an average difference of approximately 2.5 kg.⁵⁻⁸ However, there are no RCTs showing Rosemary Conley or Slimming World are effective at 12 months. One RCT compared Rosemary Conley, Slimming World, Weight Watchers, and an NHS group programme with a comparator group.⁵ This trial showed that only Weight Watchers had significantly greater weight loss than the comparator at 12 months. There was no evidence of longer-term effectiveness of

Rosemary Conley and Slimming World, yet confidence intervals (CIs) suggest the effect could be similar to Weight Watchers.

There are observational data that Weight Watchers may be more effective than other widely-used UK-based weight-loss programmes. Dixon and colleagues⁹ reported that participants attending Weight Watchers lost significantly more weight than those participating in Rosemary Conley (+0.24 kg) and Slimming World (+1.15 kg) at the end of 3-month programmes. These differences were significant, suggesting that some commercial weight-loss programmes may be more effective than others, but these data report weight loss in the first 3 months only and assessment of longer-term outcomes would also be valuable.

It is important to offer a range of services to accommodate people's preferences as this may encourage uptake. However, only one of the widely available commercial weight-loss programmes (Weight Watchers) has been proven to be effective; while the others may be effective, there is insufficient evidence to be sure. Therefore, this study compared the performance of the other programmes (Rosemary Conley, Slimming World, and an NHS group programme) to Weight Watchers using non-inferiority analysis. If the other widely available programmes are not inferior to Weight Watchers then that is reasonable evidence that they are also effective.

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How this fits in

There is evidence that some behavioural weight-loss programmes offered in primary care result in significant weight loss, in particular randomised controlled trial evidence supports Weight Watchers as an effective programme. However, it is not known whether other weight-loss programmes result in similar weight loss and could therefore be commissioned as part of a weight management care pathway. This study found that other commercial weight-loss programmes do not have inferior weight losses to Weight Watchers at 3 and 12 months follow-up but an NHS group weight-loss programme had inferior weight loss at 3 months.

METHOD

Study design

A prospective cohort study was performed using anonymised data routinely collected from the Lighten Up service database, a weight management service commissioned by South Birmingham Primary Care Trust.

Setting and recruitment of participants

Eligible patients were invited to take part in a weight-loss programme by letter from their GP or referral from a health professional. GPs searched their computerised lists for patients aged ≥ 18 years with a raised body mass index (BMI) recorded in the previous 15 months. Raised BMI was defined among South Asians with no comorbidities as ≥ 25 kg/m² or with comorbidities as ≥ 23 kg/m², and among all ethnic groups (except South Asians) with no comorbidities as ≥ 30 kg/m² or with comorbidities as ≥ 28 kg/m². These BMI thresholds made patients eligible for primary care obesity management services. There is evidence to suggest that Asian populations have higher adiposity at lower BMIs but a review of the evidence by the National Institute of Health and Care Excellence¹⁰ failed to reach a conclusion as to what cut-off for Asians would be equivalent to a BMI of 30 in non-Asians. However, commissioners needed to set a threshold for eligibility for services.⁴ GPs excluded patients who had a medical contraindication for a weight-loss programme before a letter of invitation was posted. Interested patients telephoned a coordinating centre, free of charge, where the programme was explained. The telephone coordinating centre had a database of times, days, and venues of the weight-loss programmes in the area. Patients were excluded if they were unable to understand English or were pregnant.

Allocation

For this study, participants entered the service between May 2009 and March 2010 and the service was available to all practices in South Birmingham Primary Care Trust. Participants chose which weight-loss programme they wanted to attend.

Measurements

The outcome was change in body weight between baseline and 3 months (programme end) and change in body weight between baseline and 12 months. The weight-loss provider weighed participants at 3 months and self-reported weight was used when an objective measure could not be obtained. At 12 months participants self-reported their weight.

Demographic and baseline information

At baseline, participants reported their age, sex, ethnicity, postcode, and occupation to the telephone coordinating centre staff. Postcode was used to derive the Index of Multiple Deprivation (IMD), which is an area-based measure of socioeconomic status, which were categorised into quartiles.¹¹ Height was collected at baseline and BMI was calculated at baseline, 3 months, and 12 months.

Weight-loss interventions

Participants were offered a choice of four weight-loss programmes: Rosemary Conley, Slimming World, Weight Watchers, and an NHS group weight-loss programme. Participants were able to use vouchers paid for by the NHS for 3 months to attend the commercial programmes alongside those who paid to attend. Whereas, in the NHS programme attendees were only those that had been referred from primary care, therefore sometimes the start of the group session was delayed because of waiting for enough referrals. (Full details of the programmes can be found in Appendix 1).

On completion of their 12-week weight-loss programme the NHS coordinating centre telephoned participants to offer a 3-month weight maintenance intervention including a weight record card, information about weight management, and a phone call 3 months later to encourage regular self-weighing. Participants without weighing scales were given a voucher to obtain some for free.

Data analysis

Baseline weight was used for missing weights at follow-up and all analyses were conducted using the intention to treat principle. Baseline differences between the groups attending different programmes

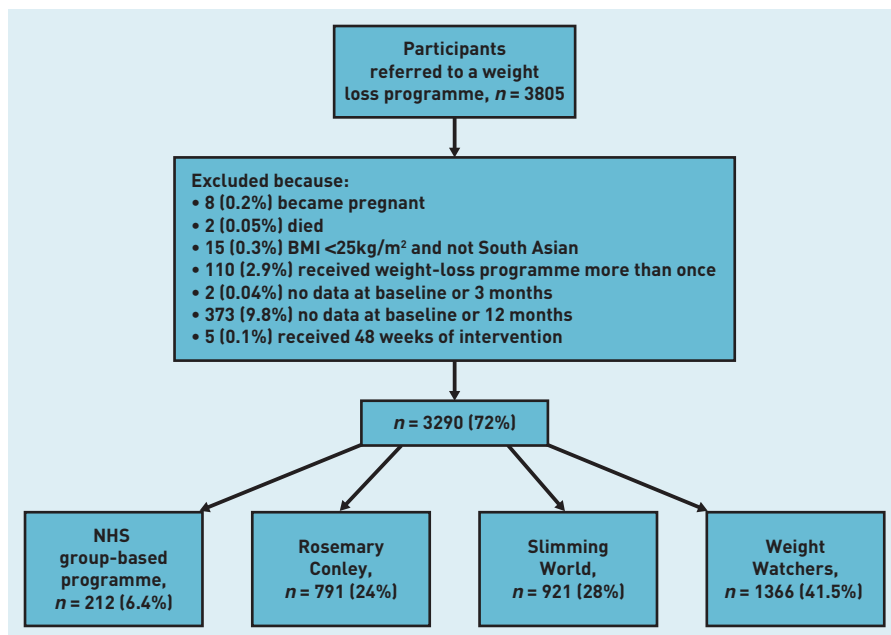


Figure 1. Participant inclusion.

were checked by comparing frequency distributions of categorical variables and means of continuous variables (Table 1). Linear regression analysis was used to determine the mean differences and CIs between Weight Watchers, which is known to be effective, and the other weight-loss programmes. Between-programme differences in weight change were reported unadjusted and adjusted for age, sex, baseline BMI, ethnicity, and uptake of weight maintenance intervention (12 months analysis only). Continuous variables were mean centred and all categorical variables divided into binary variables. Deprivation

was divided into two groups (high and low) and for ethnicity participants were classified as white or non-white.

Non-inferiority analysis

The aim of non-inferiority analysis is to choose a margin where a treatment is not going to be worse than another treatment, that is, no difference in weight loss. Health benefits from weight loss appear roughly proportional to weight lost, so it is not possible to choose a margin that divides unbeneficial weight loss from useful. The non-inferiority margin was set at 1 kg at 3 months follow-up because it was believed that this might be the kind of difference that patients and commissioners would choose to commission one service over another, whereas a service producing differences of only hundreds of grams may be chosen on characteristics other than effectiveness. In weight-loss studies the difference in weight between treatments decreases as time passes because most participants regain weight and therefore mean weight-loss curves tend to converge.¹² This was accounted for by reducing the non-inferiority margin to 0.7 kg at 12-month follow-up. Further explanation is provided in Appendix 2. Following the CONSORT statement, if the CIs for the point estimate for the difference in weight between Weight Watchers and each of the other weight-loss services were inside the margins, the services would be declared not inferior to Weight Watchers.¹³

RESULTS

Follow-up rates at 3 months for the weight-loss programmes were 74.5% for NHS

Table 1. Characteristics of participants at baseline according to weight-loss programme. Values are n (%) unless stated otherwise.

Characteristics	All participants	Weight Watchers (n = 1366)	Slimming World (n = 921)	Rosemary Conley (n = 791)	NHS group programme (n = 212)
Male sex	436 (13.3)	166 (12.2)	123 (13.4)	91 (11.5)	56 (26.4)
Mean (SD) age, years	49.9 (14.9)	48.9 (15.2)	49.6 (14.5)	50.1 (14.4)	57.7 (14.4)
Ethnic group:					
White	2761 (83.9)	1179 (86.3)	827 (89.8)	583 (73.7)	172 (81.1)
Non-white	529 (16.1)	187 (13.7)	94 (10.2)	208 (26.3)	40 (18.9)
Deprivation:					
High	2850 (86.6)	1179 (86.3)	805 (87.4)	688 (87.0)	178 (84.0)
Low	440 (13.4)	187 (13.7)	116 (12.6)	103 (13.0)	34 (16.0)
Mean (SD) starting BMI, kg/m ²	35.1 (5.7)	35.2 (5.8)	35.7 (6.1)	34.3 (5.1)	34.5 (5.5)
Starting BMI, kg/m ² :					
<30	548 (16.7)	229 (16.8)	130 (14.1)	149 (18.8)	40 (18.9)
30–39	2210 (67.2)	906 (66.3)	613 (66.6)	549 (69.4)	142 (67.0)
≥40	532 (16.2)	231 (16.9)	178 (19.3)	93 (11.8)	30 (14.2)
Maintenance intervention	892 (27.1)	381 (27.9)	277 (30.1)	185 (23.4)	49 (23.1)

Table 2. Mean weight difference compared with Weight Watchers at 3 and 12 months

	Weight change baseline to 3 months, kg (SD)	Unadjusted mean weight difference at 3 months, kg (95% CI)	Adjusted mean weight difference at 3 months, kg (95% CI)	Weight change baseline to 12 months, kg (SD)	Unadjusted mean weight difference at 12 months, kg (95% CI)	Adjusted mean weight difference at 12 months, kg (95% CI)
Weight Watchers (constant)	-4.2 (4.1)	0.0	0.0	-3.7 (6.4)	0.0	0.0
NHS programme	-1.6 (2.2)	2.6 (2.0 to 3.1)	2.6 (2.1 to 3.2)	-2.5 (4.2)	1.2 (0.3 to 2.1)	1.2 (0.3 to 2.1)
Rosemary Conley	-3.3 (3.7)	0.9 (0.6 to 1.2)	0.7 (0.4 to 1.0)	-3.1 (5.6)	0.6 (0.0 to 1.1)	0.2 (-0.4 to 0.7)
Slimming World	-4.0 (3.9)	0.2 (-0.1 to 0.5)	0.3 (0.01 to 0.6)	-4.5 (7.0)	-0.8 (-1.4 to -0.3)	-0.7 (-1.2 to -0.2)

SD = standard deviation.

group programme, 69.9% for Rosemary Conley, 81.4% for Slimming World, and 77.6% for Weight Watchers (Figure 1). At 12 months follow-up rates were 80.2% NHS group, 60.7% Rosemary Conley, 71.8% Slimming World, and 63.1% Weight Watchers. Forty-five per cent of weights were self-reported at 3 months.

Baseline characteristics

The percentage of participants that selected each programme was 6.4% NHS group, 24% Rosemary Conley, 28% Slimming World, and 41.5% Weight Watchers (Figure 1). Participants' mean age was 49.9 years, 83.9% were white, mean BMI was 35.1 kg/m², and 86.6% were classified in the two IMD quartiles with greatest deprivation. Only a small percentage of men attended each programme (11.5–26.4%). Deprivation, baseline BMI, and proportion receiving the weight maintenance intervention was similar across the programmes (Table 1).

Non-inferiority analysis

Table 2 shows using unadjusted data, participants attending Weight Watchers lost on average 4.2 kg (standard deviation [SD] = 4.1) at 3 months, reducing to 3.7 kg (SD = 6.4) at 12 months. Figure 2 shows the non-inferiority plot of adjusted mean differences and 95% CIs for the difference between each weight-loss programme and Weight Watchers. A mean weight difference of zero would indicate participants in the other programmes lost the same as those in Weight Watchers. The point estimates and CIs for weight loss at 3 months for Rosemary Conley and Slimming World are to the left of the non-inferiority line, indicating that they are non-inferior by the pre-specified margin of 1 kg. However, both estimates and CIs are to the right of the zero line, indicating that participants attending Weight Watchers lost slightly more weight than participants attending Slimming World or Rosemary Conley. The

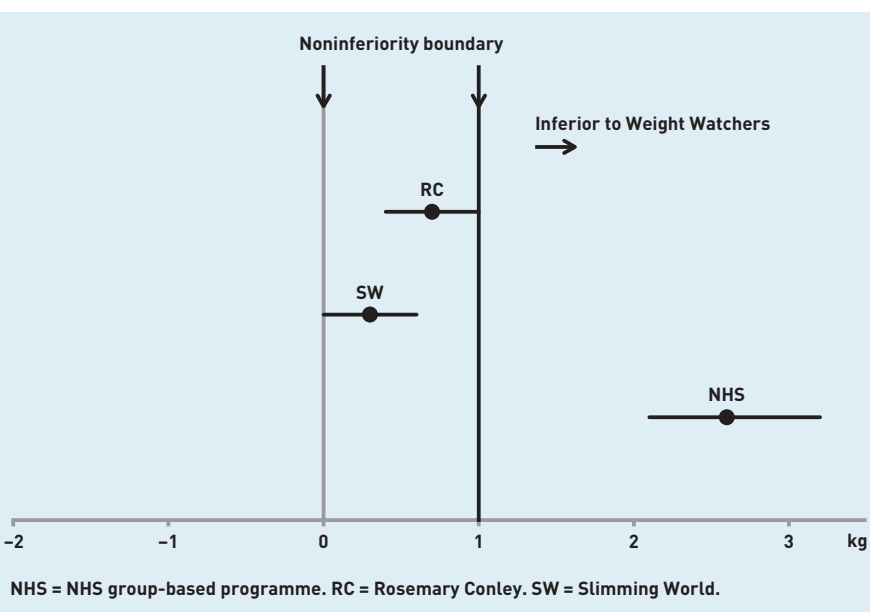
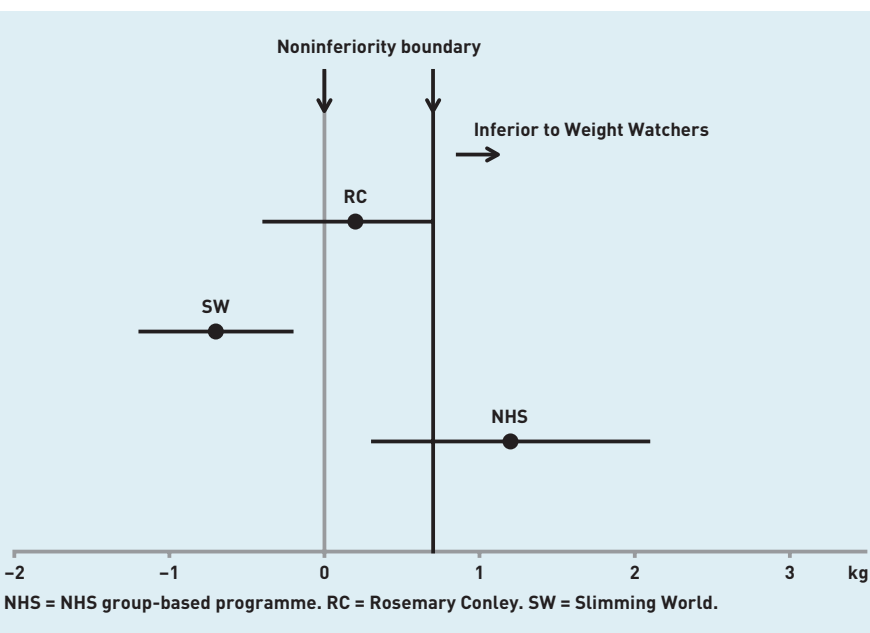


Figure 2. Adjusted mean difference in weight change at 3 months.

Figure 3. Adjusted mean difference in weight change at 12 months.



NHS group programme was to the right of the non-inferiority line, indicating that it is inferior to Weight Watchers.

The pattern for the adjusted differences from Weight Watchers at 12 months was different (Figure 3) as participants attending Slimming World showed greater weight loss than Weight Watchers attendees, and Rosemary Conley was non-inferior to Weight Watchers. The point estimate for the difference between Weight Watchers and the NHS group was smaller at 12 months than 3 months, and CIs overlapped the non-inferiority margin, giving an inconclusive result.

DISCUSSION

Summary

Weight Watchers is the only behavioural weight-loss programme available in the UK that has been shown to be effective in clinical trials.⁵⁻⁸ In this observational study, the weight loss in participants attending Rosemary Conley and Slimming World was similar to that in users of Weight Watchers, giving evidence that these programmes are non-inferior. Slimming World may have greater weight loss at 12 months, although the difference was small. The NHS group programme was inferior to Weight Watchers at 3 months but these data were inconclusive at 12 months.

Strengths and limitations

The main strength of this study is the large sample size that enabled precise estimates of treatment effect and the study therefore had the power to estimate whether or not treatments were non-inferior. Non-inferiority analyses typically require larger sample sizes than traditional superiority analyses. The major weakness is that this is a non-randomised comparison and therefore could be subject to more biases and confounding than a corresponding RCT. However, participant characteristics appeared well balanced and there was no substantial difference between the unadjusted and adjusted analyses. It is doubtful that a trial of this size would ever be commissioned to investigate this question, given its inevitable cost.

This analytical approach was conservative using baseline weight (baseline observation carried forward) for people whose weight was unavailable at follow-up and this may have underestimated the impact that weight-loss programmes have on weight loss, although it may overestimate whether participants who were not followed up had in fact gained weight. Participants self-reported their weight at 12 months, which

may have led to under-reporting of weight, but this would be true for all programmes. The rate of self-reporting and loss to follow-up was similar across all programmes, therefore this is unlikely to have biased the findings.

The non-inferiority margin was pre-specified at 1 kg as this was considered to be the minimum difference that would be important when deciding which weight-loss programmes to commission, although the study accepts this might be seen as somewhat arbitrary. Readers can select a different margin and apply it to Figures 2 and 3.

Comparison with existing literature

The single trial that randomised participants to all four interventions⁵ produced inconclusive results on whether the NHS group, Slimming World, or Rosemary Conley were more effective than no support, while producing clear evidence of the effectiveness of Weight Watchers (at 12 months), which has also been subject to two other clinical trials.^{6,8} The trial also showed that commercial programmes considered together were effective.⁵ The study conducted the same non-inferiority analyses as it has done here on the Lighten Up trial results but all programmes were defined as inconclusive because of small numbers and therefore a lack of power.⁵ This left open the possibility that there are substantial differences in effectiveness between programmes. There are observational data such as this one; however, that shed light on the effectiveness of these programmes.

Dixon and colleagues⁹ found that participants using Weight Watchers or Rosemary Conley lost statistically significantly more weight than participants using Slimming World at the end of 3-month programmes. However, the authors' view is that it is better to have a range of services available, even if there are minor differences in weight loss, providing that all are effective,¹⁴ so a non-inferiority approach was adopted in this analysis. This pattern of results is somewhat different from those of Dixon *et al's* study.⁹ While at 3 months Weight Watchers appeared more effective than Slimming World and Rosemary Conley, these data suggest the differences were very small and inside the non-inferiority margin. These results were based on a substantially larger, ethnically, and socioeconomic diverse sample. The study used baseline observation carried forward to impute weight that was missing, which implies zero weight change at

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Ethical approval

All data were anonymised and collected as part of a service evaluation, therefore no ethical approval was required.

Provenance

Freely submitted; externally peer reviewed.

Competing interests

Paul Aveyard and Amanda L Lewis have received hospitality from Weight Watchers and Slimming World on two occasions. Paul Aveyard and Amanda L Lewis, Amanda J Daley, and Kate Jolly are participating in a publically-funded trial where the treatment courses are donated by Rosemary Conley and Slimming World. Paul Aveyard is participating in a publically-funded trial where the treatment courses are donated by Weight Watchers.

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follow-up, whereas Dixon and colleagues⁹ used last observation carried forward. There is no reason to assume that the different imputation methods should lead to substantial differences between treatments, although it would affect the estimate of the amount of weight lost perhaps resulting in greater weight losses compared with these findings.

The most likely explanation for Dixon and colleagues⁹ findings is attendance. Only 36% of people attending Slimming World completed the course of treatment compared with 56% for Weight Watchers and 45% for Rosemary Conley; attendance has been shown to be associated with greater weight loss.⁶ The study by Dixon and colleagues⁹ used only data collected by the services themselves, that is, only people that continued to attend had weight data. Even if people who attended for a while then dropped out of treatment but continued using the methods they were taught and continued to lose weight, the last observation carried forward method would impute a lower weight loss than might have been the case at 3 months. In the current study, participants who had dropped out of treatment were telephoned

to obtain their weight, therefore rates of follow-up in this study were higher.

The finding that the NHS group programme was inferior to Weight Watchers is in line with data reported from the Lighten Up trial and there is evidence that other configurations of services provided by NHS personnel are ineffective.⁵ Commercial programmes are also substantially cheaper.⁵

Implications for research and practice

While Slimming World was superior to Weight Watchers at 12 months, in practical terms this difference was small. The study would advocate that public health authorities commission all three commercial weight-loss programmes since all result in similar amounts of weight loss and the choice is likely to extend the take up of these programmes.

In the Lighten Up trial the study found that the difference at 12 months was 70% of that at 3 months, which is why in this analysis the study used a non-inferiority margin of 1 kg at 3 months and 0.7 kg at 12 months. A difference of 1 kg at 3 months is equivalent to a difference of 0.7 kg at 12 months.

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Appendix 1. A brief overview of the content of the included behavioural weight management programmes

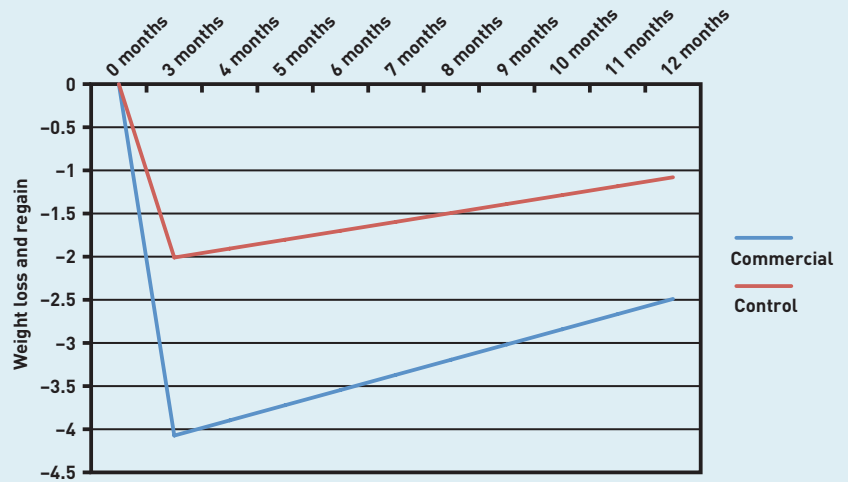
Weight Watchers is group-based; the participant was able to join at any time. There is one-to-one support for new members and during weighing. This is followed by a group talk from the leader with discussion. Meetings took place in community venues for 1 hour duration. Core programme material delivered over 5 weeks included: food points system (based on age, sex, height, weight, and activity), beating hunger, taking more physical activity, eating out, and keeping motivated. Other sessions delivered to the whole group covered recipes, health and nutrition, and keeping active. The plan aims for 500 kcal deficit/day leading to 0.5–1 kg loss per week. Physical activity is encouraged, with the objective to gradually build up to 10 000 steps daily. Predominant behaviour change strategies used included: Stages of Change, food and activity diaries, goal setting, and evaluation of progress. Rewards are given for every 3.2 kg (7 lb) lost, at 5% and 10% of body weight.

Slimming World is group-based; the participant was able to join at any time. Meetings took place in community venues for 1.5 hours duration. Also included is access to website, magazines, and one-to-one telephone support from consultant or other members. Members are encouraged to eat mainly low-energy dense foods to achieve satiety, plus some extras rich in calcium and fibre, with controlled amounts of high-energy dense foods. Weight-loss goals are set by the individual. Physical activity is encouraged, with gradual build up to 30 minutes moderately intense activity 5 days a week. The theoretical background is based on transactional analysis and motivational interviewing. Predominant behaviour change strategies used included: weekly weighing; group support; group praise for weight loss, new decisions and continued commitment even in absence of weight loss. Awards for 3.2 kg (7 lb) lost and loss of 10% of body weight. Individual support if needed using self-monitoring of food and emotions, for and against evaluations, visualisation techniques, and personal eating plans.

Rosemary Conley is group-based; the participant was able to join at any time. Meetings took place in community venues for 1.5 hours duration. There is one-to-one support during weighing and to establish a calorie allowance. Additional support is available via email and telephone. Goals are staged: either 1–1.5 kg per week with goal of 1 stone loss or 0.5–1 kg per week with 3.2 kg (7 lb) initial goal. Sessions include 45 minutes optional exercise class. Extra exercise sessions may be offered for an additional fee. The theoretical background is based on role modelling, group support, and uses visualisation and reframing to support behaviour change. Predominant behaviour change strategies used include: rewards for slimmers who maintain weight or lose, slimmer of the week and certificates for 3.2 and 6.35 kg milestones.

The NHS Programme was an NHS group-based programme run in community venues by support workers trained by the dietetics service. This provided six weekly 2-hour sessions, with follow-up sessions at 9 and 12 weeks. All participants joined together in week one of the programme. Its particular focus was on long-term changes in eating behaviour patterns, achieving a balanced diet and increasing physical activity in daily life and it used an interactive style. Topics covered included: managing behaviour around food and relapse prevention; the eatwell plate; nutrition information; planning strategies to deal with lapses into previous dietary behaviours; interactive visual aids to show fat and sugar content of foods and recipe adaptation. Theoretical background was based on the cycle of change (Prochaska and DiClemente). Discussion of the benefits of physical activity, setting goals, and finding activities to fit into life. Predominant behaviour change strategies used include: goal setting; stages of change; and self-monitoring via food diary.

Appendix 2. Additional explanation for reducing the non-inferiority margin at 12 months follow-up.



Weight loss and regain of Lighten Up trial groups

In the Lighten Up trial participants were randomised to commercially provided weight-loss interventions or a comparator group and the weight loss assessed at 3 months and 12 months. The graph shows that the group who received the commercial interventions lost more weight initially but gained it faster than the comparator group that lost less weight. This is because they have more to regain. If these lines are projected forward they will meet at some point in the future.

In a non-inferiority analysis we choose a band within which we say we are indifferent to differences in effectiveness. If the margin within which we declare we are indifferent were constant with time we would declare non-inferiority for all treatments because the weight-loss curves might become close or meet. This would ignore the evidence that the risk from excess adiposity appears proportional to the years spent obese and that weight loss for a period is a worthwhile goal.¹