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## Article

# Three and Twelve Month Body Mass Outcomes After Attendance at a Community-Based Weight Management Intervention in the North West of England

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**Abstract:** Background: Research suggests that commercial weight management services are efficacious in helping people manage their body mass, but they typically only include education and advice on physical activity. The objective of this analysis was to assess 3- and 12-month body mass after attendance at a community-based weight management programme delivered by a commercial slimming group, which included the provision of tailored physical activity sessions by a local leisure trust between January 2009 and November 2014. Methods: After institutional ethical approval and participants giving informed consent, a retrospective analysis of a 12-week multi-component intervention, tier 2 community weight management service for adults in Wigan, North West England, United Kingdom, was undertaken. Participants' ( $n = 8514$ ) mean  $\pm$  SD age was  $47.4 \pm 14.3$  years and starting body mass was  $86.7 \pm 14.3$  kg. The main outcome measure was body mass (kg) at 0 months (baseline), 3 months (immediately post intervention) and 12 months. Significant differences in body mass were ascertained if  $p < 0.05$  using repeated measures ANOVA with Bonferroni post hoc test, with effect sizes calculated using partial eta squared. To confirm and account for missing data, the Last Observation Carried Forward (LOCF) approach was used. Results: Repeated measures ANOVA showed a significant effect of time ( $p < 0.01$ ,  $\eta_p^2 = 0.36$ ). Post hoc tests revealed there was a significant reduction in body mass from baseline to 3 months ( $86.7 \pm 14.3$  kg vs.  $81.2 \pm 13.6$  kg) and baseline to 12 months ( $79.7 \pm 14.0$  kg). The difference between 3 months and 12 months was also significant. LOCF confirmed a significant effect of time ( $p < 0.01$ ,  $\eta_p^2 = 0.42$ ), with all previously highlighted significant differences remaining. Conclusions: Significant reductions in body mass were reported at 3 and 12 months, providing evidence for the efficacy of the community weight management programme that included tailored physical activity opportunities for participants. Whilst comparisons to a resting control group cannot be made, partnerships between commercial slimming groups and local leisure providers should be encouraged and explored nationally.

**Keywords:** body mass; commercial weight loss programme; physical activity; weight loss; weight management; weight maintenance



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## 1. Background

The World Health Organization has described the increase in obesity as a “global epidemic” [1] and it is associated with a number of chronic health conditions such as type 2 diabetes, cardiovascular diseases and some cancers [2]. In the United Kingdom (UK), in 2022 approximately 64% of all adults were classified as living with overweight (Body Mass Index (BMI)  $25\text{--}29.9$  kg/m<sup>2</sup>) or obesity (BMI  $\geq 30$  kg/m<sup>2</sup>), with 29% classified as living with obesity [3]. Data show that 68.1% of adults in Wigan, UK, were classified as

living with overweight or obesity, compared with 66.1% in the North West and 64.6% across England [4].

Around the time of intervention implementation for this study, the National Institute for Health and Care Excellence (NICE) [5] recommended that adults should aim to lose no more than 0.5 to 1 kg a week for effective longer-term maintenance. Current guidance from the NHS also suggests losing 1 to 2 lbs, or 0.5 to 1 kg, a week [6]. To support the management of weight loss in people living with overweight or obesity, the most recent NICE guidance recommends the commissioning of multi-component lifestyle programmes, addressing dietary intake, physical activity and behaviour change [7]. In the current study, the focus was on dietary intake and physical activity, whereas behaviour change was not a focus.

Previous research indicates greater weight loss is achieved in weight management programmes that include both physical activity and diet rather than diet alone or physical activity [8,9]. In the UK, the most recent mapping exercise of services highlights that 61% of locally commissioned services across England offer multi-component programmes [10]. There are a substantial number of commercial sector organisations delivering group-based weight management programmes [11]. Their growth and impact has been mirrored by a more restricted public health sector expansion in services, which has been limited by available resources [12]. The availability of obesity services varies greatly across the UK, and there are limited weight management programmes available in the traditional primary care setting, so commercial weight management services are addressing this gap [11]. Early research into the effectiveness of commercial programmes demonstrated efficacy in the UK [13], and likewise in the US [14,15], although these interventions used extended treatment programmes that are not available through the National Health Service (NHS).

A randomised controlled trial (RCT) comparing the impact of primary care weight provision with commercially delivered programmes in Germany, Australia and the UK demonstrated that greater efficacy was achieved with commercial programmes that are delivered in a community setting [16]. Participants lost twice the amount of body mass than those randomised to the primary care intervention delivered in healthcare settings. The authors offered no firm conclusions as to why this was the case, but speculated it could be due to the community sessions being more frequent throughout the week, having regular 'weigh ins' and also including peer support [16]. Previous research has found differences between commercial weight loss groups compared to health-sector-led weight loss groups [17]. Commercial groups in the community were more likely to attract younger people and females and have larger groups with greater adherence and retention [17]. Systematic reviews have also reported a lack of efficacy of primary care interventions and a negligible effect on participants' body mass beyond one-year follow-up [18,19].

The 'Lighten Up' RCT compared three commercial service programmes ('Weight Watchers', 'Rosemary Conley' and 'Slimming World') with community-based, primary care and control groups [11]. Weight Watchers led to −5.15 kg mean weight change at 12 weeks and −4.43 kg mean weight change at 12-month follow-up, compared to Rosemary Conley (−5.29 kg at 12 weeks and −3.27 kg at 12 months) and Slimming World (−4.25 kg at 12 weeks and −3.10 kg at 12 months). Weight Watchers achieved a greater weight loss than the exercise-only comparator groups. The proliferation of Weight Watchers in the UK has been supported by further research [16,20,21], although other studies would seem to support a similar body mass loss for both Slimming World and Rosemary Conley programmes [22,23]. Further studies involving Slimming World have reported on the effectiveness of both its health referral programme and self-referral, self-paying membership results, demonstrating comparable outcomes to the 'Lighten Up' study [12,24].

Typically, commercial weight loss programmes focus on diet and behaviour change and only provide education and advice (for example, using a booklet) on physical activity, rather than including a specific delivery or sessions on physical activity [25]. People who are living with overweight or obesity are less likely to engage in physical activity and often cite 'feeling too fat' or embarrassed to exercise [26]. Barriers to physical activity are

multifactorial, with people who are living with overweight or obesity reporting a wide range including the following: cost, accessibility of facilities and anxiety regarding 'walking in alone' [27]. Physical activity is important for weight maintenance [28]; thus, the inclusion of physical activity sessions within a weight management programme is fundamental for long-term success.

In January 2009, NHS partners in Wigan launched the 'Lose Weight Feel Great' (LWFG) care pathway, which included the commissioning of an access hub (to triage referrals), a health trainer service, a specialist weight management programme and a community weight management (CWM) programme. Slimming World was commissioned to deliver the CWM programme, which focussed on diet and behaviour change. A unique aspect of the weight management programme was the offering of physical activity sessions, which were delivered by the Leisure Trust and tailored to the individual. These behaviour change techniques have been found to be effective in changing physical activity and self-efficacy behaviour [29], and at the time Wigan's Joint Strategic Needs Assessment recommended the continuation for commissioning LWFG services until 2013 [30].

Despite this being a retrospective analysis of an old data set, the aim of this manuscript is to present a statistical analysis and interpretation of the findings, highlight areas of good practice in the approach as well as address strengths and limitations of the design.

## 2. Methods

### 2.1. Study Design

The current study presents a retrospective analysis of a multi-component tier 2 CWM programme for adults commissioned in Wigan, UK, between January 2009 and November 2014.

### 2.2. Ethical Approval and Consent to Participate

This study was granted approval by the University of Chester ethical advisory committee (reference 1166/16/NC/CSN). Consent for participating in the programme and sharing information was obtained by the LWFG access hub as part of the triage service provided.

### 2.3. Participants

Following local consultation with a representative target audience, a high-profile marketing campaign was designed and implemented to promote the service to potential eligible participants who self-referred. Previous research has compared general practitioner (GP)-led referrals and self-referrals to weight management interventions and found that self-referral participants have higher motivation, thus enhancing the potential of sustained lifestyle change and adherence [31]. Eligibility criteria were as follows: adults  $\geq 18$  years, a BMI: 25–39.9 kg/m<sup>2</sup>, with or without co-morbidities, or a BMI: 40–44.9 kg/m<sup>2</sup> without co-morbidities, and be registered with a local GP or work within the Borough.

### 2.4. Intervention

The CWM service was commissioned to provide a free, weekly 2 h multi-component, evidence-based programme over twelve weeks and was delivered in line with NICE guidance for weight management programmes [7]. In brief, the LWFG programme offered support and advice around physical activity, healthy eating and behaviour change. Slimming World was the commercial provider delivering the programme, and an overview of the programme is reported elsewhere [12,32]. An additional 45 min physical activity session was provided by the Leisure Trust in Wigan. Following self-referral, participants completed a health screening questionnaire. This information was reviewed and eligible participants were triaged to the service by a separately commissioned telephone access hub.

In addition, before the first session all participants were contacted (via text or phone call) to remind them of the time and venue. This was to encourage initial engagement and the importance of attending every session was conveyed. The CWM service operated as a rolling weekly programme throughout the borough, which provided new participants the opportunity to access the programme immediately at a time and location that was

best suited to them. Participants were provided with information about different physical activity options which were available across the borough. The type of physical activities delivered included gym, exercise classes and aerobics. Participants who attended 9 out of the 12 Slimming World and physical activity sessions were identified as a 'completer' and included in the analysis. After 12 weeks, participants were invited to continue with Slimming World classes (free of charge if the goal weight was achieved, or GBP 4 per session if it was not) and to continue to attend the physical activity sessions, which were offered at a reduced rate. Physical activity beyond the 12 weeks was not recorded and cannot be reported.

### 2.5. Measurement

Body mass was collected by the access hub on behalf of the service providers. As cited in previous research [12], participants were weighed in light clothing using scales (SECA), which were regularly calibrated. Body mass (kg) was measured at 0 months (baseline), 3 months (immediately post intervention) and 12 months.

### 2.6. Statistical Analysis

Data were stored in Microsoft Excel and transferred to the Statistical Package for the Social Sciences (International Business Machines Corporation, version 26) for descriptive and inferential statistical analysis. Normality of data was checked using the Kolmogorov–Smirnov test. Since parametric assumptions could be met, differences in body mass from baseline to 3 and 12 months for all data were examined using repeated measures ANOVA. Post hoc follow up tests were performed using the Bonferroni method.

Due to the volume of missing data that is typical of real-world interventions, the Last Observation Carried Forward (LOCF) approach was carried out as has been performed in previous research [12,33]. Any missing data were replaced by (inputted as) the participants' previously observed value. The combination of the observed and inputted data was analysed using repeated measures ANOVA as if there were no missing data. Differences between younger and older adults' age, initial body mass, body mass change at 3 and 12 months and percentage change at 3 and 12 months were analysed using independent *t*-tests.

The alpha level of statistical significance was set at  $p < 0.05$ . Effect sizes were quantified using the partial eta squared ( $\eta^2$ ) statistic to examine the magnitude of differences between time points, with values of 0.1, 0.3 and  $> 0.5$  considered to be a small, medium and large effects, respectively. Data are presented as percentages or mean  $\pm$  SD unless otherwise stated.

## 3. Results

At baseline, participants' ( $n = 8514$ ) age was  $47.4 \pm 14.3$  years and body mass was  $86.7 \pm 14.3$  kg. Complete data at all time points were available for 3887 participants, for which repeated measures ANOVA revealed there was a significant effect of time ( $F(2, 7772) = 2217.9$ ,  $p < 0.01$ ,  $\eta_p^2 = 0.36$ ). Post hoc tests revealed there was a significant reduction in body mass from baseline to 3 months ( $86.7 \pm 14.29$  kg vs.  $81.17 \pm 13.60$  kg) and baseline to 12 months ( $86.7 \pm 14.29$  kg vs.  $79.71 \pm 14.02$  kg). The difference between 3 months and 12 months was also significant.

At 3 months, 85 participants' (1%) data were not reported, which increased to 4627 (54%) participants at 12 months. Repeated measures ANOVA of the LOCF data confirmed a significant effect of time ( $F(2, 17026) = 6177.12$ ,  $p < 0.01$ ,  $\eta_p^2 = 0.42$ ). Post hoc tests revealed there was a significant reduction in body mass from baseline to 3 months ( $86.7 \pm 14.3$  kg vs.  $82.3 \pm 13.8$  kg) and baseline to 12 months ( $86.7 \pm 14.3$  kg vs.  $81.7 \pm 14.0$  kg). The difference between 3 months and 12 months was also significant.

From baseline to 3 months, 93% of people lost weight, 1% did not change and 6% gained weight. From 3 months to 12 months, 55% of people lost weight, 3% did not change and 42% gained weight. From baseline to 12 months, 81% of people lost weight, 2% did

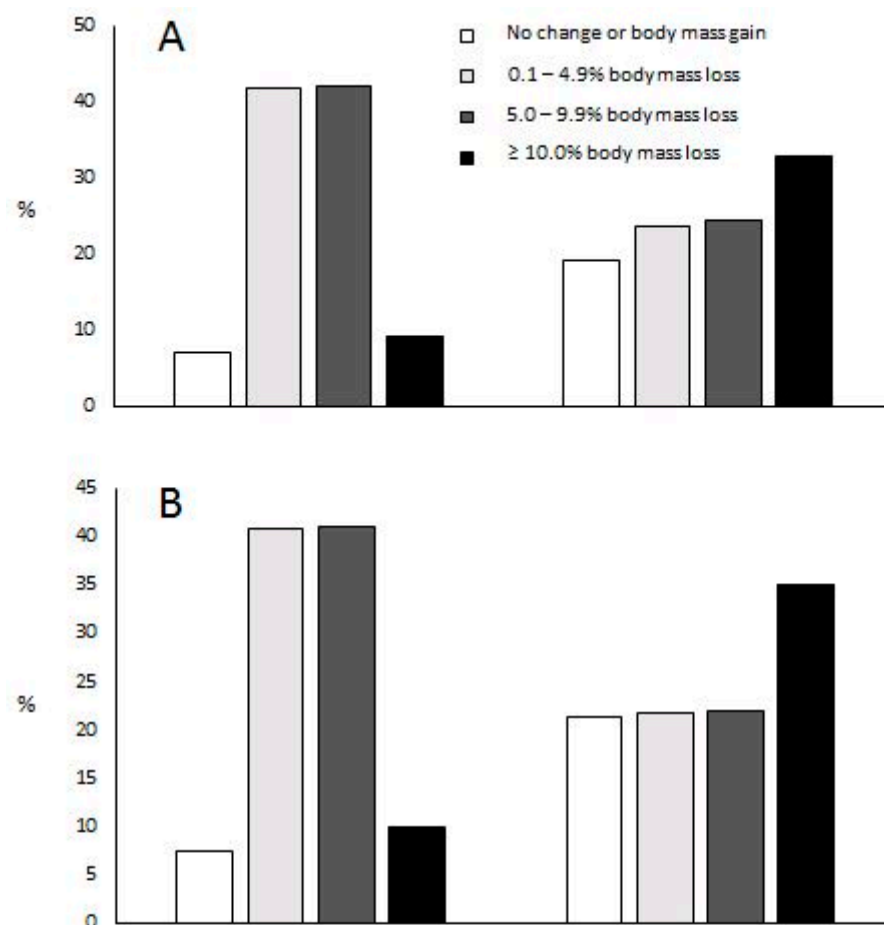
not change and 17% gained weight. A weight loss of 5% has been shown to be clinically meaningful [7] and from baseline to 3 months, 51.2% had achieved a greater than 5% weight loss, with 41.9% achieving less than this. There was no change or weight gain in 7% of participants.

The sample was categorised based on the median age of 48 years to ascertain any difference in weight outcomes, as shown in Table 1.

**Table 1.** Characteristics and weight loss outcomes for adults ( $\geq 49$  years) and younger adults ( $\leq 48$  years).

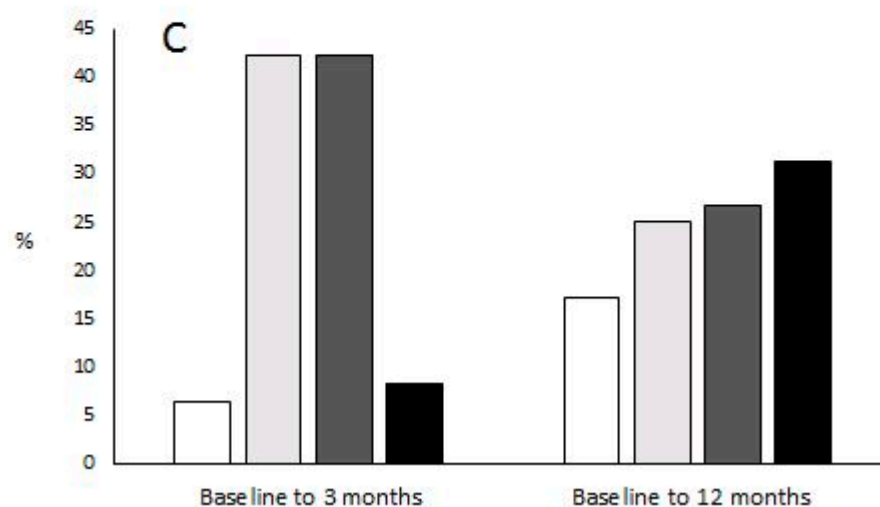
	Adults $\leq 48$ Years ( $n = 4453$ )		Adults $\geq 49$ Years ( $n = 4061$ )		T-Value	p-Value
	Mean	SD	Mean	SD		
Age (years)	35.82	8.21	60.04	7.11	−145.52	<0.001
Baseline body mass (kg)	88.40	14.63	85.16	13.70	10.53	<0.001
Body mass change at 3 months (kg)	−4.63	3.50	−4.55	3.18	2.403	<0.05
Body mass change at 12 months (kg)	−6.48	8.65	−6.14	7.23	1.33	0.18
% change at 3 months	−5.21	3.74	−5.20	3.52	−1.61	0.87
% change at 12 months	−7.07	9.10	−7.07	7.95	0.01	0.99

A proportion of the sample achieved a much greater than the clinically meaningful 5% body mass loss, so those who achieved a 10% loss or greater at 3 and 12 months are highlighted in Figure 1.



**Figure 1.** Cont.





**Figure 1.** The percentage of the whole sample (Panel A), adults  $\leq 48$  years (Panel B) and adults  $\geq 49$  years (Panel C) whose body mass did not change or who gained body mass and who achieved 0.1–4.9% body mass loss, achieved 5.0–9.9% body mass loss and achieved  $\geq 10.0\%$  body mass loss between baseline and 3 months and baseline and 12 months.

#### 4. Discussion

The key finding from the analysis of this weight loss intervention is that a partnership between a commercial weight management provider and leisure trust can lead to significant and clinically meaningful body mass loss in participants.

NICE recommends multi-component weight management interventions as a treatment for people with obesity [7]. However, there is limited evidence of successful non-commercial programmes [2,3]. Contrary to this, there is a growing body of evidence which demonstrates that commercial weight management programmes can lead to significant weight loss at 3 and 12 months [12,22,23]. Physical activity is an important component for sustained weight loss; however, it tends to be overlooked in some commercial weight loss programmes [24]. Our analysis evaluates the efficacy of Wigan's CWM programme on weight loss on a large sample who were encouraged to complete a specific physical activity component.

At 3 months, 51.2% achieved greater than a 5% body mass loss, which is recommended by NICE [7]. Evidence suggests that this amount of loss leads to health benefits, including decreased intra-abdominal fat and increased multi-organ insulin sensitivity [34]. The findings are similar to previous evaluations of commercial weight loss programmes, which highlights that they are effective in producing clinically significant body mass loss [11]. Furthermore, a 10% body mass loss has additional benefits, including improving cardio-metabolic outcomes such as blood pressure and lipid profiles. In total, 33 % of the current sample achieved this, which is high, possibly because those not losing body mass may have purposely avoided the 12-month measurement.

In the present analysis, there was significant weight loss at 12 months, with 81% of the sample losing weight, with an average weight loss of 6.3 kg from baseline to 12 months in the complete cases. This is higher than that found previously [11], where body mass loss for Slimming World was 3.1 kg at 12 months. The main difference between the two weight management programmes was the addition of physical activity sessions in the current analysis. In the current analysis, participants undertook a 45 min physical activity session for at least 9 out of the 12 weeks. They were also provided with the opportunity to continue with the physical activity sessions at the end of the programme at a reduced cost.

Whilst initial physical activity status, physical fitness and readiness for behaviour change were not measured, the programme provided participants with specific opportunities to increase their physical activity during and after the programme. The physical activities offered were tailored to individual needs and could be accessed at the participants' convenience. This can influence physical activity behaviour in adults and removing barriers such as lack of choice and cost can encourage adherence [35].

The American College of Sports Medicine physical activity guidelines include specific recommendations for how much physical activity is needed for body mass loss and maintenance. To prevent weight gain, 150–250 min per week is needed and to prevent weight gain after weight loss, 200–300 min is needed [28]. Physical activity is particularly important for the maintenance of weight loss [36]. Greater time spent in physical activity during leisure and/or energy expenditure post-intervention was associated with enhanced weight loss maintenance in 170 people living with obesity at 12 and 24 months post-intervention [36]. This suggests that greater physical activity behaviour can help to maintain clinically relevant weight loss. However, physical activity should always be undertaken and promoted regardless of any changes to body mass due to the independent health benefits [37].

The mean age of participants ( $47.4 \pm 14.3$  years) is comparable to other weight loss interventions [12]. We investigated the difference between adults' body mass loss outcomes based on a median age of 48 years. Whilst there was a significant change at 3 months with adults  $\leq 48$  years reporting greater body mass loss than adults  $\geq 49$  years, there was no difference at 12 months or in % change at all time points. This supports previous findings, where no significant difference was found in body mass loss between younger and older adults [38]. However, 35 years was the authors' upper cut-off for young adults, given the considerable risk for weight gain and obesity observed prior to this. They selected 50 years as the upper cut-off for older adults because this corresponds with the onset of menopause, which represents a distinct set of weight-related issues, and people beyond that were excluded from analysis. Such analysis is not possible here, since the sex of participants was not provided.

Results from a systematic review [18] reported no difference in changes in body mass as a result of the length of the weight management programme, i.e., 3, 6 or 12 months. In the context of current guidance and recent audits [7,11], programmes in England are most likely to be commissioned for 3 months, although evidence from the 'Lighten Up' study [11] demonstrated that '12-week weight management courses' could produce statistically significant body mass loss in a proportion of those engaged, which the findings of the current study support. In addition, where commissioned weight management programmes are incorporated as part of on-going service operations (in the case of commercial providers), the opportunity is available for participants to continue as part of a fee-paying structure. There was a willingness to continue, with 95% of participants requesting support for making payment for the programme, even after taking into consideration income differences [39].

Obesity is a multi-factorial problem with many different causes and significant implications for health throughout the life course. As previously identified, with the majority of adults in England either living with overweight or obesity, and a substantial number of children on the same trajectory, local action is needed. There is no one single solution, so whole-system approaches are needed and are encouraged to lead to population-level changes [40]. A collaborative partnership between a commercial weight loss provider and a local leisure provider as shown in this manuscript has shown promise as one part of the system.

This is particularly important considering that the COVID-19 pandemic disrupted many aspects of daily life worldwide, especially reducing physical activity and increasing sedentary behaviour. Public health interventions implemented to curb the spread of COVID-19 could have unintended consequences that adversely influence long-term health outcomes beyond short-term death rates. A study that examined worldwide trends in physical activity found that worldwide step counts did not return to pre-pandemic levels in the 2 years following COVID-19 [41].



### *Limitations and Strengths*

The main limitation of this study is the retrospective design and lack of a control group, which means that cause and effect cannot be established and firm conclusions regarding the contribution of physical activity to weight loss cannot be drawn. There is potential self-selection bias, as participants were self-referred so may have had higher motivation to lose weight and participate in physical activity. Therefore, the participants cannot be considered an unbiased, random sample of people living with overweight or obesity. We are also unaware of the breakdown of the multi-component programme components, including the integration of physical activity, healthy eating and behaviour change and the professional competence factors such as qualifications and training of the facilitators and those collecting the data.

Data were collected by the Wigan CWM programme and whilst they complied with guidance on the type of information to collect [42], several key outcomes were not collected including sex, height, socio-economic status and initial physical activity behaviour, restricting analyses that could be performed. This inconsistency in data collection has been highlighted as a problem in a national review of weight management programmes across England [10]. Only 59% of locally commissioned weight management services in England currently follow-up participants for 12 months or more and there is a lack of consistency in outcomes collected, with only 54% of services using the Standard Evaluation Framework for weight management [10].

Despite the limitations, the current study has several strengths. The aim to evaluate the efficacy of a community-based weight management programme has been achieved. Similar to the evaluation of other commercial weight loss programmes [12,23], it collected data from a real-life setting, which reflects the challenges that individuals face when trying to manage their body mass.

The sample size is large ( $n = 8514$ ), which considering the population of Wigan (approximately 320,975) [43] is a suitable representation. There was a decline in people receiving a weight management intervention from primary care in a cohort of 91,413 people with overweight or obesity from the Clinical Practice Research Data link between 2005 and 2012 [44]. During this time, over 90% of people living with overweight were not provided with weight management support. Given that recruitment on the current programme was via self-referral, this indicates the acceptability of the approach to weight management.

Finally, efficacy data indicate the potential impact that this type of collaboration between a commercial weight loss provider and a local leisure trust can have. Despite the lack of data collected on physical activity, one of the key strengths of the current study is that the programme included a weekly session on physical activity delivered in a localised setting, which addressed the needs of the participants. The inclusion of physical activity in weight management interventions helps maintain weight loss [36] and is a component that is rarely included in commercial weight loss programmes. However, considering that obesity is a chronic and relapsing disease that requires long-term follow-up, interventions must consider going beyond short-term interventions and research should be appropriately resourced and funded to also monitor and evaluate in the longer term. This will allow the development of weight management strategies that are both efficacious and effective in real-world community settings.

### **5. Conclusions**

A collaborative partnership between a commercial weight loss provider and a local leisure trust can result in clinically significant weight loss at 12 months. Removing barriers to physical activity including cost and providing a range of activities in the local area may help people who are living with overweight and obesity to lose and maintain weight loss. This is therefore conducive to whole-system ways of working to combat the rising prevalence of obesity. However, there is a need for more comprehensive data collection, and weight management providers and local authorities in the UK should ensure they

adhere to recommendations set by NICE as well as follow standard evaluation frameworks for the rigorous collection of data.

**Author Contributions:** O.F. and N.C. conceived the study and received permission from Wigan Leisure Trust to publish the data. O.F., N.C. and D.R.B. undertook the data analysis and compiled the manuscript. All authors have read and agreed to the published version of the manuscript.

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**Informed Consent Statement:** Informed consent was obtained from all participants involved in the study.

**Data Availability Statement:** Data are available on written request by Wigan Leisure Trust.

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**Conflicts of Interest:** N.C. is former Sport and Health manager for Wigan Leisure Trust and was provided with full access to the data for analysis. The authors declare they have analysed the data provided to them by Wigan Leisure Trust fairly and objectively. Slimming World were commissioned by Wigan Leisure Trust to deliver weight management services and none of the authors were involved with this tender. There are no contracts or clauses which prohibit the publication of findings to the authors' knowledge.

## Abbreviations

ANOVA	Analysis of Variance
BMI	Body Mass Index
CWM	Community weight management
LOCF	Last Observation Carried Forward
LWFG	Lose Weight Feel Great
NICE	National Institute for Health and Care Excellence
NHS	National Health Service
RCT	Randomised controlled trial

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