

Evaluation of a Community Based Weight Management Service for Morbidly Obese Patients “The Live Life Better Service”

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Abstract

Background: There is limited evidence on the effectiveness of lifestyle interventions in achieving and maintaining a significant level of weight loss in morbidly obese patients. This study evaluated the impact on weight loss and psychological well-being of a community-based weight management service for morbidly obese patients (BMI ≥ 35 with related co-morbidities or BMI > 40) in Derbyshire county.

Methods: 539 participants entered the service since 2010 and 238 participants were still active within the service or had completed the 2-year intervention in April 2013. A one-group pre-post design was used to determine average weight loss (kg) and impact on mental health and wellbeing (using the validated CORE-OM questionnaire) amongst participants. Measurements were recorded at baseline, 12 weeks, 24 weeks, 1 year, 18 months and 2 years and significance ($p \leq 0.05$) was determined using the paired sample t-test.

Results: Statistically significant weight loss was recorded at each measurement point for those participants who remained engaged with the service (4.9 kg weight loss at 12 weeks to 18.2 kg at 2 years) with a significant positive impact on psychological well-being demonstrated by CORE-OM score.

Conclusions: Findings show clinically and statistically significant weight loss among participants with improvements in physical and mental health.

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Introduction

Obesity is a major public health issue within the UK and globally (Musingarimi, 2009, Ding et al., 2008 & Berghofer et al, 2008) primarily through impact on the prevalence of diabetes, cardiovascular disorders, some cancers, osteoarthritis and obstructive sleep apnoea (Wang et al., 2011 and Sassi, 2010). Based on current trends, it is projected that the prevalence of obesity (as defined by a BMI >30 or BMI \geq 28 with related co-morbidity) will have risen from 26% for men and women currently, to 41% - 48% in men and 35% - 43% in women by the year 2030 (Wang et al. 2011); this will likely result in approximately 668,000 extra cases of diabetes, 461,000 additional cases of heart disease and stroke, 130,000 additional cases of cancer, and loss of up to 6.3 million quality-adjusted life years (QALYs). The combined medical cost associated with the treatment of these diseases is estimated to increase by approximately £2-3 billion in the next 10-15 years should current trends continue (Foresight, 2007).

The Prospective Studies Collaboration (2009) conducted a pooled analysis of 57 cohort studies looking at the association between obesity and causes of mortality. The Collaboration found morbidly obese individuals (BMI 40-50) were approximately five times more likely to die from ischaemic heart disease than those with a BMI 22.5 to 25 (the upper end of the normal weight range). Individuals in the morbidly obese category were also 6.5 times more likely to die from stroke and at a 22.5 times higher risk of dying from diabetes.

There is currently limited evidence on the effectiveness of lifestyle, cognitive and behavioural change based interventions in achieving and maintaining a significant level of weight loss in morbidly obese patients (Body Mass Index \geq 35 with related co-morbidities or BMI > 40 when no co-morbidities are present) (Logue et al, 2014, Shuger et al, 2011). In contrast, Gloy et al. (2013) found that bariatric surgery in morbidly obese patients, albeit more costly and invasive than lifestyle based interventions, produces far better results (26kg more weight loss on average) and may improve symptoms of (or in some cases even eliminate) co-morbidities. However, as not all morbidly obese patients may be eligible or willing for bariatric surgery, it is increasingly important to rigorously evaluate whether non-surgical interventions for morbid obesity could yield sustainable weight loss benefits. We therefore, evaluated the effectiveness of a multicomponent weight management service in achieving weight loss and psychological wellbeing amongst service users.

Methods

In Derbyshire County a multicomponent Weight Management Service (the 'Live Life Better ' Service) has been available as part of the Derbyshire Obesity Referral Pathway since April 2010. Two types of intervention are offered; 1). An intensive lifestyle modification based programme involving psychological support, behaviour change strategies, physical activity, dietetic advice and occupational therapy where relevant; 2) A pre-bariatric surgery programme designed to help participants lose weight prior to surgery. This evaluation includes all individuals referred to the lifestyle based weight management programme (Intervention 1 above) (see also Appendix 1 flow chart). In order to access the service individuals had to meet the criteria set out in the Derbyshire Obesity Referral Pathway, the main criteria being a BMI \geq 35 with related co-morbidities (see Box 1) or a BMI >40 when no co-morbidities are present and registration with a General Practice in Derbyshire County.

Box 1: Related comorbidities listed in the Derbyshire Weight Reduction Referral Pathway:

Established cardiovascular disease
Osteoarthritis
Diabetes
Obstructive Sleep apnoea
Severe hypertension
Dyslipidaemia
Polycystic Ovarian Syndrome
Metabolic Syndrome

The data used in this evaluation represents an open cohort and covers the time period from when the service first started operating in April 2010 until 30th April 2013. This meant that not all participants had been enrolled in the service for a full two-year period at the point of data extraction and therefore only intermediate outcomes could be ascertained for them. Therefore, the evaluation includes a comparison of characteristics of participants who had either completed or were still engaged with the programme at various measurement milestones across the 2-year intervention. For a full breakdown of the participant journey and attrition through the service see Appendix 1. A one-group pre-post design was used to evaluate the effectiveness of the 'Live Life Better' Weight Management Programme. The primary outcome measure of this evaluation was the average amount of weight loss amongst participants in the 'Live Life Better' Programme. Secondary outcome measures focused on mental health and wellbeing.

Box 2: Overview of the intervention

All clients receive a joint first assessment appointment with a clinical psychologist and a weight reduction support worker. This is a holistic assessment to cover weight history, social circumstances, physical health, patterns of eating, drinking and activity and a brief screening and assessment of mental health and emotional factors linked to weight and eating. The appointment also addresses client motivation and reasons for wanting to engage with the service and begins to generate patient centred goals as well as to outline routine initial target weight loss goals of 5% during a specified time period. Routine measures are administered at this appointment and weight, height and BMI are checked.

Clients are then routinely booked in for a follow-up dietetic and physiotherapy assessment as needed and available and are also invited to attend routine weekly or fortnightly support worker led clinic appointments during the first 12 weeks. Clients are introduced to activity and nutrition diaries and usually given some homework goals to begin monitoring from week one.

Weight reduction support workers provide ongoing appointments throughout the duration of the programme with formal review points (including the re-administration of routine measures) every 12 to 24 weeks. Support workers plan with each client a series of lifestyle change goals to achieve weight loss based on client choice and preference as well as informed by the evidence base and best practice. The progress, impact and effectiveness of the programme is continually discussed and reviewed with each client as are decisions about the duration of the programme and the involvement of further multi-disciplinary team (MDT) input as needed (from psychology, dietetics or physiotherapy) as well as sign-posting out to other services as appropriate.

The MDT communicate with regular team meetings and electronic case records, opportunities for joint working and peer supervision and reflective practice groups to support a strong holistic approach to specialist weight management. The service has a strong emphasis on utilising psychological knowledge and approaches to facilitate health behaviour change and support workers are offered one to one supervision with psychologists to develop their skills, knowledge and competence in this area.

Participants' weight was recorded by the service at baseline (some baseline measures were taken from General Practice recorded readings) at 12 weeks, 24 weeks, 1 year, 18 months and 2 years. As the intervention involves a significant psychological support component, participants mental health was also recorded using the Clinical Outcomes of Routine Evaluation – Outcome Measure (CORE-OM). The CORE-OM is a reliable, validated (Evans et al., 1998, 2000 & 2002) 34 item self-reported questionnaire designed to measure change in the mental health of adults, in particular change resulting from psychological therapies. The CORE-OM assessment covers four domains: well-being, social functioning, problems and symptoms (for e.g. anxiety, depression, sleep-related disorders), risk to self (self-harm or suicide) and others (aggression); each item within the four domains is scored between 0 and 4 following which a scoring matrix is applied to generate an overall score indicating level of psychological distress. Table 1 shows the various levels of psychological distress indicated by the CORE scoring system and the cut-off level for each point.

Table 1 CORE-OM scoring system outline

Band (Level of psychological distress)	CORE Score
Severe	≥ 2.5
Moderately severe	2.0 - <2.5
Moderate	1.5 - <2.0
Mild	1.0 - <1.5
Low level	0.6 - <1.0
Healthy	0 - <0.6

A score below 1 means the individual has moved below the clinical cut-off point of psychological distress.

A CORE-OM score below one indicates low level psychological distress, while a score less than 0.6 is in the healthy range. The CORE-OM allows the assessment of meaningful and clinically psychological wellbeing improvement over the course of intervention (Evans, 2000).

In order to identify reasons for non-engagement with the 'Live Life Better' Service, a self-administered questionnaire (Appendix 2) was mailed out to the 50 most recent non-respondents (i.e. patients referred to the service who did not respond to the initial invitation to attend). The questionnaire asked for date of birth, postcode, current height and weight so that comparisons could be drawn with the intervention participants. The questionnaire also included an open ended question asking participants about reasons for non-participation in the service. Free text responses were coded and categorised into themes using a conventional qualitative content analysis as described by Hsieh and Shannon (2005).

A descriptive analysis was conducted to describe participant characteristics using proportions and means. Normality of continuous variables was assessed using histograms, Q-Q plots and measures of kurtosis and skewness. The paired t-test (or Wilcoxon signed-rank test if normality assumptions were violated) was used to assess statistically significant differences in outcomes. The proportions of the group losing any amount of weight compared to baseline and those losing at least 5% of weight (considered to be clinically significant weight loss) compared to baseline were recorded. Numerous studies have shown that a 5% weight is the minimum significant level of weight loss to result in health improvement (Christian et al, 2010). Moreover, findings from a Diabetes Prevention Program lifestyle intervention study showed that for every kilogram lost, there was a 16% reduction

in risk over and above a minimum weight loss of 2% (Diabetes Prevention Program Research Group, 2006). Similarly, paired sample t-tests were used to compare mean CORE-OM scores at each measurement point compared to baseline CORE-OM scores. Data were analysed using the statistical software package Stata version 13 (Statacorp. 2013. Stata Statistical Software Release: 13. College Station, TX: StataCorp LP.).

This evaluation was registered with the Clinical Audit Department of Derbyshire Community Health Services (the NHS provider organisation of the 'Live Life Better' Service) and was deemed exempt from review by the NHS ethics committee, being a service evaluation (DH 2011).

Results

At the time of the data extraction for the evaluation, 551 participants had been enrolled in the service; participants were at various stages of the intervention and 95 participants were yet to reach the final 24 month measurement point. 20 participants completed the two year intervention and had a full complement of measurements at the point of the evaluation. Table 2 summarises the baseline characteristics of participants who had successfully reached the various *a priori* measurement milestones across the two-year intervention; the diminishing numbers at successive measurement milestones in Table 2 represent progression of an open cohort of participants recruited at different time-points through the service rather than attrition. The lack of a measurement at a specified time point i.e. 12 weeks, 6 months does not necessarily mean that individual has 'dropped out' of the service; rather, that they have not been enrolled with the service long enough to reach that measurement milestone (appendix 1 details the number of participants at each stage of the programme).

Table 2 Baseline characteristics of overall cohort and participants at various measurement milestones

Characteristics of the overall cohort n (%)	Still active in the intervention at 12 weeks (%)	Still active in the intervention at 24 weeks (%)	Still active in the intervention at 1 year (%)	Still active in the intervention at 18 months (%)	Still active in the intervention at 2 years (%)	
Number of participants in the service (completed and still active at data extraction point) n=551 (100.0%)	242/551 (43.9)	150/551 (27.2)	79/551 (14.3)	41/551 (7.4)	20/551 (3.6)	
Male n= 161 (29.3%)	77 (31.8)	48 (32.0)	24 (30.4)	15 (36.6)	8 (40.0)	
Age at referral (in years) Mean age, SD (range): 45.7, SD 13.3 (16-77)	46.6, SD 12.7 (17-74)	47.9, SD 12.3 (21-74)	47.0, SD 12.2 (19-73)	49.0, SD 12.6 (25-73)	50.0, SD 13.9 (25-73)	
Ethnicity						
White British n= 169 (30.7)	112 (46.3)	66 (44.0)	30 (38.0)	10(24.4)	4 (20.0)	
White Other n= 3 (0.5)	1 (0.4)	1 (0.7)	1 (1.3)	0 (0.0)	0 (0.0)	
Black British n= 5 (0.9)	1 (0.4)	1 (0.7)	1 (1.3)	0 (0.0)	0 (0.0)	
Asian British n= 1 (0.2)	1 (0.4)	1 (0.7)	1 (1.3)	0 (0.0)	0 (0.0)	
Missing n= 373 (67.7)	127 (52.5)	81 (54.0)	46 (58.2)	31 (75.6)	16 (80.0)	
Participants with one or more comorbidities† n= 420 (76%)	193 (79.8)	128 (85.3)	73 (92.4)	39 (95.1)	19 (95.0)	
Hypertension n= 183 (33.2)	82 (33.9)	58 (38.7)	32 (40.5)	20 (48.8)	7 (35.0)	
Ischaemic heart disease n=21 (3.8)	9 (3.7)	8 (5.3)	2 (2.5)	2 (4.9)	2 (10.0)	
Diabetes n= 122 (22.1)	55 (22.7)	38 (25.3)	22 (27.9)	10 (24.4)	6 (30.0)	
Stroke n= 6 (1.1)	4 (1.7)	3 (2.0)	2 (2.5)	2 (4.9)	2 (10.0)	
Asthma or COPD n=90 (16.3)	33 (13.6)	17 (11.3)	12 (15.2)	7 (17.1)	3 (15.0)	
Chronic joint problems n= 137 (24.9)	75 (31.0)	48 (32.0)	27 (34.2)	15 (36.6)	8 (40.0)	
Osteoarthritis n= 65 (11.8)	32 (13.2)	23 (15.3)	9 (11.4)	2 (4.9)	2 (10.0)	
*Mild mental health concerns n= 93 (16.9)	39 (16.1)	26 (17.3)	14 (17.7)	8 (19.5)	4 (20.0)	
**Enduring mental health concerns n= 28 (5.1)	9 (3.7)	7 (4.7)	2 (2.5)	1 (2.4)	1 (5.0)	
Learning disability n= 12 (2.2)	7 (2.9)	5 (3.3)	2 (2.5)	1 (2.4)	1 (5.0)	
Smoking status						
Smoker n= 30 (5.4)	7 (2.9)	2 (1.3)	2 (2.5)	2 (4.9)	0 (0.0)	
Non-smoker n= 188 (34.1)	89 (36.8)	50 (33.3)	22 (27.9)	6 (14.6)	1 (5.0)	
Missing n=333 (60.4)	146 (60.3)	98 (65.3)	55 (69.6)	33 (80.5)	19 (90.0)	
National quintile of deprivation (IMD 2010)	1- most deprived n=126 (23.0%)	57 (23.8)	34 (22.8)	20 (25.3)	8 (19.5)	4 (20.0)
	2 n=166 (30.3%)	71 (29.6)	46 (30.9)	27 (34.2)	12 (29.3)	6 (30.0)
	3 n= 119 (21.7%)	52 (21.7)	36 (24.2)	17 (21.5)	8 (19.5)	4 (20.0)
	4 n= 85 (15.5%)	41 (17.1)	22 (14.8)	9 (11.4)	8 (19.5)	5 (25.0)
	5 – least deprived N= 52 (9.5%)	19 (7.9)	11 (7.4)	6 (7.6)	5 (12.2)	1 (5.0)
Mean Weight Baseline (in kg), SD (range): 139.4 , SD 28.6 (6- 262)	138.2, SD 27.6 (86.6- 250.6)	138.4, SD 30.0 (85.3-249.2)	135.2, SD 27.3 (95.6- 246)	133.2, SD 28.7 (94.8-202.1)	135.9, SD 30.2 (100-208)	

†Comorbidities assessed included hypertension, asthma, chronic obstructive pulmonary disease (COPD), mental health issues (mild and enduring), chronic joint problems, ischaemic heart disease, diabetes, stroke, osteoarthritis, learning disability

Note: All percentages expressed as a proportion of the numbers of people active in the service at a given milestone at the point of data extraction unless otherwise specified

*mild mental health concern defined as; mild anxiety and/or depression; the individual might be functioning ok with usual activities of daily living but struggling with some incidence of low mood, avoidance behaviours, disrupted social relationships, disturbed sleep.

**enduring mental health concern defined as; a persistent, pervasive, recurring and more disabling set of severe symptoms which has a significant impact on an individuals' quality of life and ability to function physically, psychologically, socially and practically day to day , e.g.; generalised anxiety disorder, post-traumatic stress disorder, psychosis, severe depression.

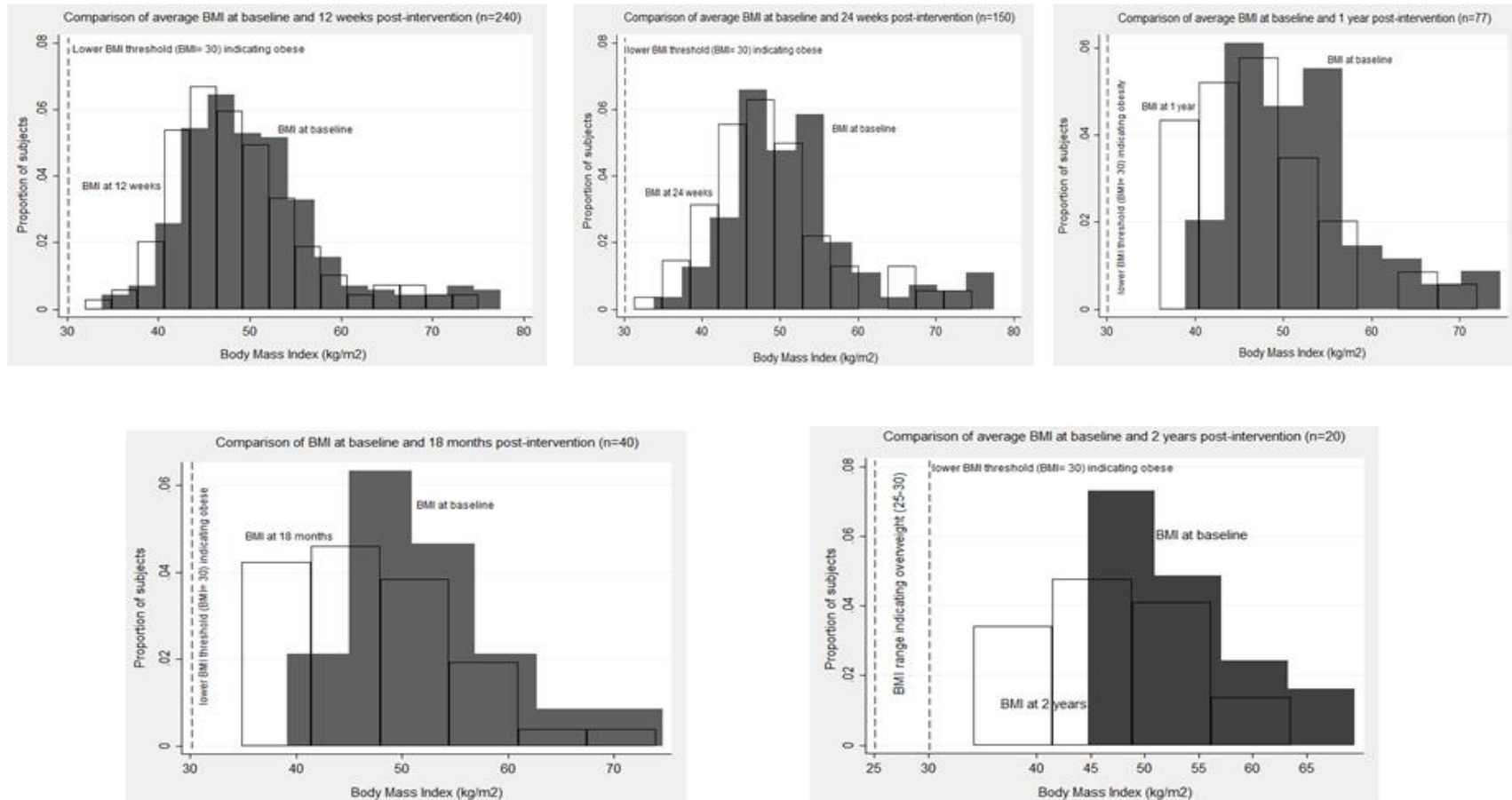
Table 3 Weight Loss Outcomes

Numbers of service-users at each measurement milestone N= 551 (%)	Mean weight loss (SD)	Mean Weight loss in kg (95% Confidence Interval); p value	Proportion of sample at the measurement point losing any amount of weight n (%)	Proportion of sample at the measurement point losing at least 5% of baseline weight n (%)	Proportion of sample at the measurement point losing at least 7.5% of baseline weight n (%)
Weight measured in kg					
Baseline* (n=489; 88.7%)	139.4 (28.6)	Baseline measurement			
12 weeks (n=242; 44.1%)	138.2 (27.6)	4.9 (4.3-5.5) p<.0001	223/242 (92.2)	63 (26.0)	17 (7.0)
24 weeks (n=150;27.2%)	138.4 (30.0)	8.4 (7.3-9.5) p<.0001	141/150 (94.0)	82 (54.7)	43 (28.7)
1 year (n= 79; 14.3%)	135.2 (27.3)	11.8 (10.2-13.4) p<.0001	77/79 (97.5)	62 (78.5)	41 (51.9)
18 months (n =41; 7.4%)	133.2 (28.7)	14.9 (12.2-17.5) p<.0001	41/41 (100.0)	36 (87.8)	29 (70.7)
2 years (n=20; 3.6%)	135.9 (30.2)	18.2 (14.4-22.0) p<.0001	20/20 (100.0)	20 (100.0)	17 (85.0)
BMI measured in kg/m²					
Baseline* (n=487; 88.4%)	50.0 (7.9)	Baseline measurement			
12 weeks (n=240; 43.6%)	48.9 (7.7)	1.8 (1.6-1.9); p<0.0001			
24 weeks (n=150;27.2%)	48.8 (8.2)	2.9 (2.5-3.3); p<0.0001			
1 year (n= 77; 14.0%)	47.4 (7.7)	4.2 (3.6-4.7); p<0.0001			
18 months (n =40; 7.3%)	47.0 (8.3)	5.2 (4.4-6.0); p<0.0001			
2 years (n=20; 3.6%)	47.0 (7.4)	6.2 (5.0-7.4); p=0.0001			

*Not all of the 551 participants who were referred to the service had a weight recorded at baseline hence the total sample with baseline measurements is 489. Percentages in the first column have been calculated as a proportion of the initially enrolled 551 participants to represent the individuals reaching various milestones but should not be interpreted as attrition rates as this was an open cohort.

Table 3 shows mean weight loss outcomes (measured in kg as well as BMI) in those participants who had their weight recorded at baseline and then at each measurement point. At each measurement point there was a significant overall weight loss with the amount of weight loss increasing over time.

Figure 1: BMI distribution at each measurement point compared to baseline



BMI reduction in participants with data available at each measurement point (new average BMI shown as clear overlapping histogram) compared with their BMI at baseline (shown as darker coloured histogram)

Table 4 Psychological wellbeing

CORE scores at various measurement milestones	Number of participants measured (%)	Mean score, SD (range)	Mean difference† (95% CI)	Significance Level
CORE at baseline	352	1.5, 0.8(0.02-3.7)	reference	-
CORE at 12 weeks	228	0.9, 0.6 (0-3)	0.6 (0.5-0.6)	P<0.0001
CORE at 24 weeks	144	0.9, 0.6 (0-2.8)	0.5 (0.5-0.6)	P<0.0001
CORE at 1 year	70	0.9, 0.6 (0-2.7)	0.7 (0.6-0.9)	P<0.0001
CORE at 18 months	37	0.8, 0.5 (0-2.2)	0.8 (0.6-1.1)	P<0.001
CORE at 2 years	18	0.9, 0.5 (0.2-1.5)	0.7 (0.4-1.1)	P=0.0004

Percentages in second column calculated as a proportion of the total cohort (n=551); †Calculated as mean(CORE score at baseline- CORE score at relevant measurement milestone); a mean difference>0 suggests an improvement in mental health and psychological well-being as compared to baseline

The data displayed in Table 4 shows a statistically significant mean reduction in CORE-OM score at each measurement point compared to baseline. The mean reduction even as early as 12 weeks into the intervention was large enough to reduce the CORE-OM score to a level that is below the clinical cut-off point (a score of 1), indicating a clinically meaningful reduction in psychological distress. However the reducing sample size indicates this should be interpreted with caution.

The response rate for the self-administered questionnaire survey of non-respondents (as defined in the methods) was 14% (n=7). Most responses indicated the individuals had very specific issues with the service, including: not being able to attend the initial appointment, being told that they could not attend this service at the same time as a commercial weight management service and being incorrectly referred to the service by their General Practice and not being informed that they had actually been referred to the service. Respondents to the questionnaire had a mean weight of 121.2kg, mean age of 49 with 43% of respondents coming from the most deprived quintile, 29% from the second most deprived quintile and 14% from the third quintile and 14% from the fifth (least deprived quintile) based on IMD 2010.

Discussion

To our knowledge this study is one of very few to evaluate a lifestyle based specialist weight management service that targets morbidly obese individuals. We found that a multi-component intensive lifestyle-based weight-management service achieved a clinically significant amount of weight loss in over 26% of participants at 12 weeks and over 50% of participants at 6 months (24 weeks). The proportion of participants losing at least 5% of their baseline bodyweight continued to increase over the 12-month, 18-month and 2-year time-points.

A 5% - 10% weight loss has been shown by numerous studies (Jung 1997, Chaput 2005, Wilding and Williams, 1998, Khaodhiar and Blackburn, 2001) to produce tangible and clinically meaningful impact on health (particularly cardiovascular risk factors) including; reduced blood pressure, improved blood lipid profile, reduced left ventricular mass, improved mental health, reduction in back and joint pain and reduced symptoms of breathlessness and obstructive sleep apnoea. More recently Wing et al (2011) found that a modest weight loss of 5%-10% was associated with significant improvements in cardiovascular risk factors at a one year follow-up point, but that larger weight losses resulted in larger benefits.

Methodological and population differences between studies make it difficult to compare the weight loss outcomes achieved by the 'Live Life Better' Service which works with a very distinct sub-group of the obese population, that has high level of multiple comorbidity and require a tailored rather than 'one size fits all' approach to weight loss as offered by traditional weight loss and slimming groups/services. Commercial slimming clubs have been shown to be successful in helping 31% - 51% of participants lose at least 5% of their initial bodyweight, although the time period this is measured across is never more than 12 months and in some studies no more than 12 weeks (Jolly et al, 2011, Jebb et al, 2011, Stubbs et al, 2013). Moreover, the participants in these studies are likely to be different in terms of low initial bodyweight and lower rate of co-morbidities than those who access the 'Live Life Better' Service. The Glasgow and Clyde Weight Management Service saw 24% of participants maintaining a weight loss of at least 5% at 12 months from baseline (Logue et al, 2014). However when dealing with a morbidly obese population it may be that a higher percentage of weight loss is required, with the Scottish Intercollegiate Guidelines Network (SIGN) stating that patients with a BMI ≥ 35 should aim for a 15% - 20% weight loss in order to have a significant impact on related comorbidities (SIGN, 2010).

Setting aside the evidence we have generated to illustrate that the 'Live Life Better' Service has produced statistically significant weight loss in compliant participants, Figure 1 contextualises this success in terms of the BMI reduction achieved by the number of participants at each measurement point. Although the reduction in BMI is statistically significant and meaningful to the individual the proportional decrease is relatively small when compared with the values expected following bariatric surgery which lie in the range of 8.2 kg/m² (Kashyap et al, 2013) – 24.8kg/m² (Sovik et al, 2011) at 2 years follow-up.

The main issue for the individuals who responded to the survey was a misunderstanding of what the service was or involved an issue with the nature of the referral by their General Practice. This implies that individuals referred to the service did not have an understanding of the nature of intervention they were being referred to and therefore did not understand why they had received invitations to attend the service. This is further supported by the high attrition rate from referral to

initial attendance, once actively engaged with the service participants are much less likely to disengage. The Derbyshire Obesity Pathway stipulates that all referrals to weight management services have to be through Primary Care professionals (predominantly General Practice). It may be worth considering other referral route into the Live Life Better Service, particularly the option of self-referral.

Limitations

The main limitation of this evaluation is the absence of a control group for comparison. An attempt was made to form a proxy control group comprising individuals referred to the service who had then 'dropped-out' but the response rate was too low to make this approach viable.

Another major limitation of this evaluation is the attrition rate of participants; between referral and first appointment 11.3% of referrals did not have any further contact with the service. Once participants are actively engaged with the service and have moved through the 12 week measurement point they are much less likely to lose contact with the service. The data contained in appendix 1 shows an apparently large attrition rate however this flow chart illustrates the number of individuals who attended each measurement point as a proxy for 'numbers still engaged with the service'; this pragmatic approach to measurement is likely to substantially overestimate the attrition rate as there were a large number of individuals who had not reached the next measurement point e.g. were between the 24-week and 52-week point and so were still engaged with the service but were not included as a completer at 52 weeks because they had not yet been enrolled with the service for that length of time.

The results of this evaluation may not be generalisable to a wider population but they do indicate that this service can be effective in producing clinically significant weight loss amongst participants who continue to engage with the service.

Implications for Public Health and Clinical Practice

This evaluation provides additional evidence of the effectiveness of lifestyle change based interventions in helping to reduce weight and improve the general health of a morbidly obese population without resorting to surgical intervention. There needs to be a concerted effort to improve the health of the population and address how we effectively prevent individual becoming obese in the first instance. However for the foreseeable future there will be a significant proportion of the population who are morbidly obese and as such will need services that help mitigate the impact of morbid obesity on the individual; and there will need to be options other than bariatric surgery that are available to individuals who are either not suitable (due to weight, co-morbidities, smoking status, unstable mental health and/or social circumstances) or do not wish to pursue a surgical solution to their weight for various reasons (e.g. they do not want large amounts of weight loss and /or excess skin, restrictions on food and drink intake, lifelong supplementation etc. or the potential risks/complications associated with surgery). Essentially the Live Life Better Service gives individuals a choice, builds a sense of self-efficacy and provides simultaneous improvements in psychological well-being as reflected in the CORE scores.

Conclusion

This evaluation has demonstrated that a non-surgical multi-component lifestyle-based intervention can be effective in delivering clinically significant weight loss in a morbidly obese population and impacting on individual's physical and mental health. Robust research (ideally in the form of a randomised control trial) is required on this type of multi-component service which can potentially offer an alternative to bariatric surgery for those individuals who require intensive support but do not wish to undergo surgery. More research is also required to address why people do not access or fail to attend weight management interventions and ways in which the retention rates of such services can be improved.

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Conflicts of Interest

All authors report no conflict of interest in relation to this paper.

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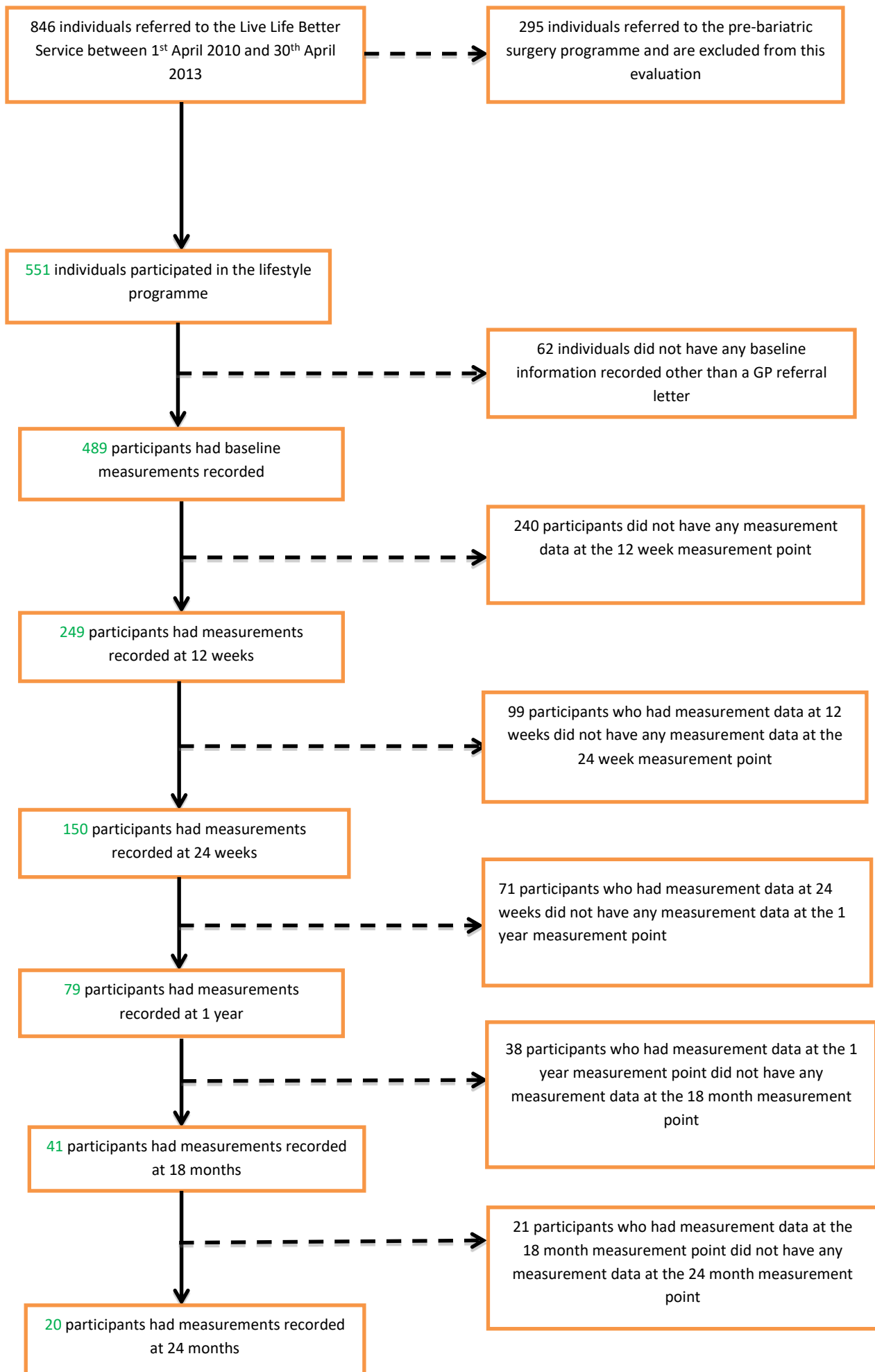
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Appendix 1 – Participant journey through the Live Life Better Service



Appendix 2 - Live Life Better Service Non-User Questionnaire

Date of Birth - _____

Postcode - _____

Please use the box below to tell us why you declined to participate in the service?

Below please write down your current weight, if you are unsure of what your weight is, when you do so please tell me if this is an approximate or actually measured value. It will help us most if you can give an accurate measured value then please put down your best guess and circle the word approximate.

Current Weight: - _____ Approximate / Actual

Height: - _____ Approximate / Actual

We are looking to gain further insight from individuals previously referred to our service in the form of focus groups. If you would be willing to be part of a focus group in the future please tick this box:

