Weight Change During a Clinical Weight Management Program: An Observational Cohort Study

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ABSTRACT

Background: The objective of this analysis was to describe weight loss results at 12 months of a clinical weight management program in which patients selected their treatment preference.

Methods: 3,007 patients (mean ± SD; age = 50 ± 12 years, body mass index = 42 ± 8 kg·m^{-2}, 80% female, 51% black) enrolled in the program at Henry Ford Hospital self-selected a 1,200 to 2,000 kcals hypocaloric, 1,000 to 1,500 kcals low calorie, or 500 to 900 kcals very low calorie meal plan. Meal plans were instructed by a dietitian and the low calorie and very low calorie meal plans incorporated the use of commercial meal replacements. Regular biweekly appointments were conducted by a clinical exercise physiologist. Program termination was at the patient's discretion. Change in body weight was analyzed at 12 months by linear mixed modeling and using the baseline observation carried forward method with repeated measure analysis of variance.

Results: Average program participation was 5 months. Based on an intent-to-treat linear mixed modeling, the very low calorie group had the greatest 12-month weight loss (−13.9 ± 1.0 kg), followed by the low calorie and hypocaloric groups (−9.5 ± 0.6 and −6.0 ± 0.4 kg, respectively; $P < 0.05$ for both low calorie and hypocaloric vs very low calorie plan). The baseline observation carried forward analysis also demonstrated significant weight loss in all groups at 12 months.

Conclusion: In this real-world weight management program setting of patients who self-selected a meal plan and length of participation, both very low calorie and low calorie plans resulted in more weight loss at 12 months than the hypocaloric plan.
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INTRODUCTION

More than one-third of the US adult population is obese (body mass index [BMI] ≥30 kg·m^{-2}) and another one-third is overweight (i.e., BMI ≥25 but <30 kg·m^{-2}) with predictions that more than 50% will be obese by the year 2030 (1,2). The projected impact of the above on the development of comorbid diseases (e.g., diabetes, hypertension, heart disease) and increasing costs associated with treatment is grim (2). The National Institutes of Health recommend weight loss for any person with a BMI greater than 30 kg·m^{-2}, and for those with a BMI of 25 to 29.9 kg·m^{-2} and two or more cardiovascular related risk factors (3). Those with a BMI ≥40.0 kg·m^{-2} meet the current eligibility guidelines for bariatric surgery, but this might not be an option for some because of inadequate insurance coverage, while others may not desire a surgical remedy for other reasons (e.g.,

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surgical risk, fear of surgery, financial stability, family member support) (4).

Commercial weight-loss programs can help those who are overweight or have type I obesity (i.e., BMI 30 to 34.9 $kg \cdot m^{-2}$) (5). The development and implementation of effective, scalable, and affordable clinical weight management programs are needed to assist those with BMIs > 35 $kg \cdot m^{-2}$ (i.e., type II obesity and higher), including those with established metabolic or other chronic disease (6).

Randomized trials addressing weight loss using nonsurgical interventions often are associated with limited generalizability. This is due to, among other factors, exclusion criteria that limit study participation such as BMI at baseline, history of diabetes, smoking, and the ability to adhere to a research protocol. To enhance adherence, many of these studies eliminate financial barriers, either by providing clinical weight management services at no cost (7) or by including paid incentives for compliance (8,9). These types of efforts are unsustainable for the typical clinical program.

Our aim was to describe change in body weight at 12 months after enrollment and the cost effectiveness in a clinical weight management program using nonsurgical, evidence-based weight loss techniques and patient-centered decision-making.

SUBJECTS AND METHODS

This is a retrospective cohort study with intent-to-treat analysis of patients who participated in a clinical weight management program. Longitudinal data were collected prospectively at the 5 affiliated outpatient clinics in the Henry Ford Health System (Detroit, Michigan). The primary weight loss outcome was change in body weight at 12 months. Secondary outcomes include weight loss at 3 and 6 months, the percentage of patients achieving prespecified weight loss thresholds of 5% and 10% of initial body weight, and the effect of program adherence on weight loss. This study was approved by the institutional review board of Henry Ford Health System and was not sponsored by any funding agency or commercial source.

Recruitment

The cohort were patients (n = 3,007) who attended an initial appointment with a registered dietitian as part of the Henry Ford Hospital Clinical Weight Management program (CWMP) between January 2004 and December 2007. Program locations were within the city of Detroit and in the surrounding greater metropolitan area and represent an ethnically, racially, and economically diverse population.

Clinical Weight-Loss Program

Figure 1 shows the typical appointment types and workflow associated with the CWMP. The philosophy of the CWMP was consistent with criteria established by the National Institutes of Health (10) using evidenced-based strategies such as meal replacements, goal setting, self-monitoring, and motivational interviewing. Before beginning the program, patients attended an information session to learn about the components of the CWMP including the 3 dietary plans. Patients who chose to enroll in the program met with a registered dietician who implemented a meal plan self-selected by the patient. The meal plan options included the following:

(a) Hypocaloric (HC), a reduced-calorie plan: HC was a whole-food-based meal plan that focused on low-fat and high-carbohydrate meals, portion control, and avoidance of high caloric density foods. The goal was a caloric deficit to elicit a 0.75 kg weight loss per week based on the Harris-Benedict equation with correction for self-reported daily physical activity level (11); targeted ~50% to 60% of calories from carbohydrates, ~20% to 30% protein, and ~10% to 20% fat.

(b) Low calorie (LC), a partial meal replacement plan: LC consisted of 1 portion-controlled meal (either a store-bought frozen entree or a self-prepared meal), 1 to 2 servings of fruit, ad libitum servings of nonstarchy vegetables,

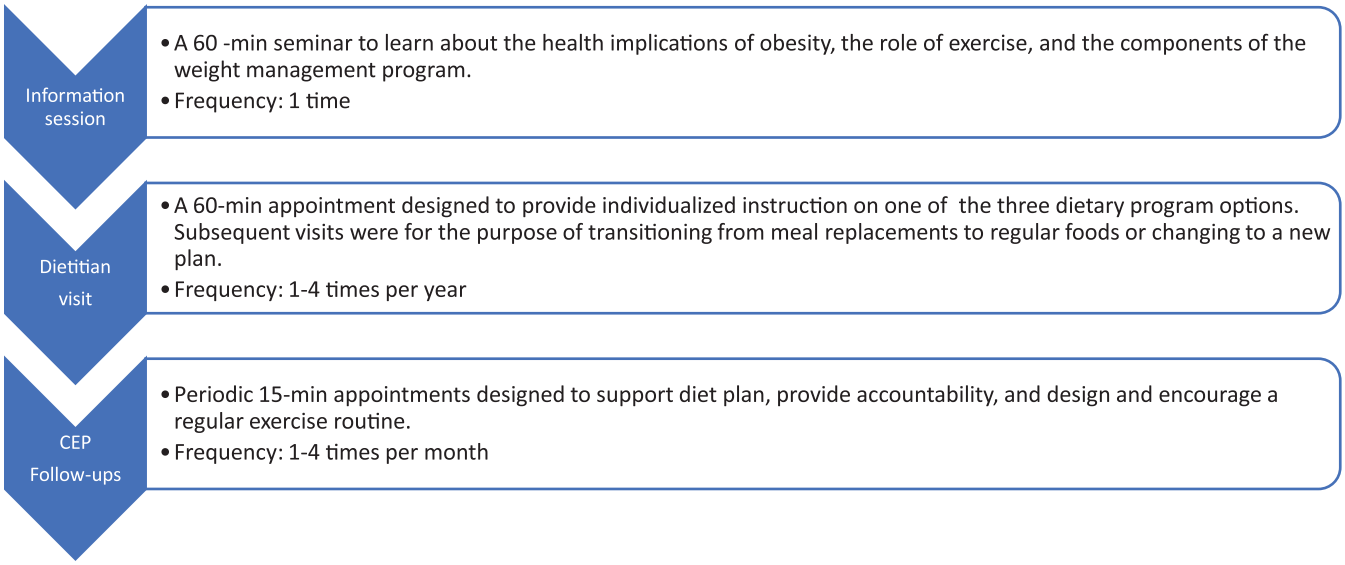

FIGURE 1. The clinical weight management program workflow. CEP = clinical exercise physiologist.

1 low-fat dairy, and 3 to 4 meal replacement foods providing a total intake of ~1,000 to 1,500 kcal·d^{-1}, depending on initial body weight. Meal replacement foods were self-selected from more than 100 varieties of prepackaged formula-based meal replacement foods (Robard, a Division of Food Science Corporation, Mount Laurel, New Jersey). These foods contained ~12 to 15 g of protein, ~0.5 to 2.5 g of total fat, 0 g of saturated and trans-fat content, and ~7 g of carbohydrate per serving. Nutrition bars and a variety of snack foods (e.g., pretzels, soy crisps) with ~10 to 15 g protein, ~18 to 25 g carbohydrate, and ~4 to 5 g fat were also available.

(c) Very low calorie (VLC), a complete meal replacement plan: VLC consisted of the consumption of 6 to 8 meal replacement foods per day, providing a caloric intake of ~600 to 900 kcal·d^{-1}, depending on initial body weight. A key strategy of this plan was to reduce hunger sensations by developing a low blood concentration ketosis induced by the low carbohydrate content of the meal replacements (12). If marked appetite suppression occurred, patients were instructed to consume the minimal amount of supplement per day to adhere to an adequate daily intake of protein, and the recommended daily allowance of vitamins and minerals.

Follow-up and Support

Participants in the program attended periodic 15-min counseling sessions with a clinical exercise physiologist who received formalized training in motivational interviewing. The frequency of these visits were typically every 2 weeks, but frequency could vary depending on the patient and the meal plan. These sessions included a discussion of exercise and dietary adherence, a behavioral educational topic (e.g., binge eating, exercise adherence, record keeping), and monitoring of weights and other vitals (i.e., blood pressure and heart rate).

Exercise was prescribed based upon American College of Sports Medicine recommendations for weight loss. This included > 250 min per week of moderate-intensity aerobic exercise. The Borg 6-20 was used to guide exercise intensity, with moderate intensity defined as fairly light 11 to hard 15.

Patients were encouraged to use the BetterMD.net website to record exercise and dietary habits, participate in support group forums, communicate with weight management staff, and receive health and weight loss education. Meal replacement could also be ordered through the BetterMD website and delivered directly to the patient's home. These purchases were monitored by program staff to promote meal plan adherence. Additionally, for patients who selected the LC or VLC plans, blood chemistry values were monitored regularly by their primary care physician for electrolyte and renal function status.

Meal Plan Restrictions

Participants were restricted from the VLC if they had renal dysfunction, type 1 diabetes, gallstones, active gout, or a history of eating disorders. Patients undergoing cancer treatment, who were pregnant, or breastfeeding were typically not permitted to participate in the CWMP.

Program Cost

Those participants with health maintenance organization insurance coverage (~85% of cohort) did not pay for program counseling sessions. However, these patients were responsible for the cost of the initial information session ($25) and the cost of meal replacements, between $50 and $75 per week, depending on the number of daily supplements required. Those without this insurance coverage for weight management paid from $475 to $627 for 1 year of counseling ($275 for initial 4 months and either $100 or $176 each 4-month period thereafter with the difference related to the number of monthly counseling visits).

Data Collection

Body weight was measured at the informational session (baseline) and during each return visit with the clinical exercise physiologist using digital scales. For the present analysis, body weights at 3, 6, and 12 months (± 2 weeks) were identified. For missing weight values because of loss to follow-up or termination of the weight management program, the hospital's electronic health record was accessed to capture any weights that were measured at physician visits within the specified collection window. This method of body weight capture has been previously validated (11). Self-reported body weight was not used for analysis. Waist circumferences were measured at baseline only at the level of the umbilicus. Height was self-reported.

Although patients were encouraged to continue in the program until reaching their weight loss goal, program duration was determined by each patient. Throughout participation in the program patients were counseled about the importance of the continuation of intentional exercise, weight monitoring, behavioral strategies, and the use of supplements (as needed).

Statistical Analysis

Unless noted, data are mean ± standard deviation (SD). Baseline demographics were assessed between weight loss intervention groups using analysis of variance and χ^2, as appropriate. The linear mixed modeling (LMM) method was used for the primary analysis, which was body weight change between baseline and 12 months. LMM handles missing data points without the bias of imputing or carrying forward data. Additionally, the LMM approach can analyze the fixed and random effects that potentially affect patients' weight loss over time (13). Random effects are useful for explaining variability in the dependent variable (e.g., weight loss at 12 months) attributable to the natural heterogeneity across individuals over time, especially from unmeasured characteristics.

The baseline observation carried forward (BOCF) for missing follow-up data points was also performed using repeated measures analysis of variance as a *traditional* analysis comparison. Post-hoc analyses of weight change at

3 and 6 months were also performed, and the Bonferroni correction was applied. A sensitivity analysis using repeated measures analysis of variance was performed on patients with complete case data. These *completers* were defined as those with a weight recorded at each time point (i.e., baseline, 3, 6, and 12 months).

For the weight loss adherence analysis, patients who attended at least one face-to-face counseling appointment per month during the initial 3 months were considered *adherers*. All analyses were performed using SPSS version 14.0 (SPSS, Inc., Chicago, Illinois, 2005). The alpha level was <0.05 analyses, except adjusted to <0.016 (Bonferroni correction) for multiple analyses comparisons.

RESULTS

Patients

A total of 3,007 subjects completed an initial registered dietician visit for instruction on their desired meal plan. Of these, 2,316 had data available for LMM analysis, 877 for the completer's analysis, and all patients were assessed using the BOCF technique (Figure 2). At the 3-month time point there was a missing weight value for 24% of the cohort. At 6 and 12 months there were missing weights for 40% and 54% of the cohort, respectively.

There was no statistical difference in the percentage of participants who self-selected each of the meal plans (Table 1). Patients who selected the VLC plan were younger; had a higher baseline weight, BMI, and waist circumference; and more excess weight. There were no statistical differences in weight, BMI, or excess weight between the HC and LC groups. Patients in the HC group participated for fewer days in the weight management program, while there was no difference in length of participation between the LC and VLC groups. Ninety-four percent of the study cohort reported at least 1 previous weight loss attempt. Most often reported (71%) was the use of commercial programs (e.g., Weight Watchers, Jenny Craig). Only 7% had previously participated in a CWMP.

Weight Loss at 12 Months: LMM Analysis

The LMM regression coefficients used to predict the final model are provided in Table 2. A total of 691 patients (23%) were not included in the LMM analysis (Figure 1) because they either had missing data at all follow-up time points (n = 355) or were missing one of the key independent predictors of body weight used in the modeling (n = 336). The accuracy of the final model illustrates strong agreement between the predicted and the observed weights (r = 0.95; $P < 0.05$). The predictor variables (fixed and random combined) accounted for 94.5% of the variance in weight among patients in this study at 12 months.

Based on the LMM model, the VLC group had the greatest weight loss at 12 months (Figure 3), although each of the other meal plans yielded significant weight reduction. Maximal weight loss for all meal plans was attained at 6 months. Both the LC and VLC groups regained some weight by 12 months while the HC group continued to lose weight.

The LMM regression coefficients (Table 2) indicate that participating in the program for at least 6 months yielded 1.9 kg more weight loss at 12 months vs only 3 months of participation. Additionally, males had a 1.8 kg greater weight loss than females, and white patients lost 5.6 kg and 4.0 kg more than either black or *other* nonwhite/black races. Those with diabetes lost 1.7 kg less weight than nondiabetic patients. Also, those not reporting regular exercise at baseline lost 0.5 kg more than those who were exercising. Finally, those who were adherent in the initial 3 months of participation lost 3.4 kg more weight than nonadherent patients.

Weight Loss at 12 Months: BOCF Analysis

All 3,007 subjects who attended an orientation session were included in the intent-to-treat BOCF analysis (Figure 4). Of

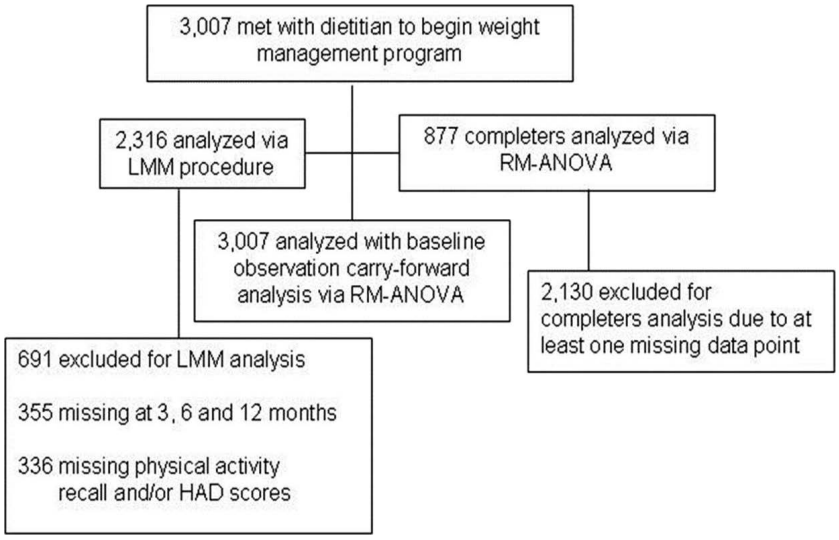

FIGURE 2. Consort flow diagram of patients for data analysis. HAD = hostility, anxiety, and depression; LMM = linear mixed modeling; RM ANOVA = repeated measures analysis of variance.

TABLE 1. Subject demographics at program entry.

Parameter	All	HC	LC	VLC
N	3007	1044	993	970
Female, (%)	80[a]	77	83	81
Race, (%)				
Black	53[a]	58	57	45
White	41	37	38	47
Other	3	3	3	4
Unknown	3	2	3	4
Age (y)[b]	49 ± 12[a]	52 ± 12	50 ± 11	46 ± 11
Weight (kg)[b]	117 ± 26[a]	114 ± 25	114 ± 25	122 ± 29[c]
BMI ($kg \cdot m^{-2}$)[b]	42 ± 8[a]	40 ± 8	41 ± 8	43 ± 9[c]
Excess weight (kg)[b]	54 ± 24[a]	51 ± 23	52 ± 23	59 ± 26[c]
Waist Circumference (cm)[b]				
Females	117 ± 16[a]	116 ± 17	116 ± 15	118 ± 16[c]
Males	131 ± 16[a]	128 ± 15	129 ± 14	136 ± 17[c]
Medically Insured, n (%)	2971 (99)	1033 (99)	982 (99)	955 (98)
Insurance coverage for weight management program, n (%)	2663 (89)	961 (92)	873 (88)	829 (85)
Program Duration (d)		137 ± 129[d]	152 ± 124	145 ± 123

HC = hypocaloric meal plan; LC = low calorie, partial meal replacement meal plan; VLC = very low calorie complete meal replacement meal plan; BMI = body mass index
[a]$P < 0.05$ for variance between groups
[b]Values are mean ± SD unless otherwise specified
[c]$P < 0.05$ for VLC versus HC and VLC versus LC
[d]$P < 0.05$ for HC versus LC and HC versus VLC

note, 54% (n = 1,618) of the subjects had their baseline weight carried forward to the 12-month time point because they did not have a reported weight for any time points. The 12-month weight loss was not statistically different between the VLC and LC groups. Both groups showed greater weight loss at 12 months than the HC group. The VLC group lost more than twice as much weight as the HC group.

Weight Loss at 12 Months: Complete Case Sensitivity Analysis

There were 877 patients with complete weight data at each time point (HC = 310, LC = 319, and VLC = 248). At 12 months there was a significant difference in the change in body weight between all meal plans (Figure 4). The VLC group lost approximately 1.5 times the weight loss of the LC group and approximately 3 times the amount of weight loss of the HC group.

Weight Loss Threshold Analysis

Table 3 lists the percentage of patients in each meal plan who achieved 2 typical target weight-loss thresholds reported in the literature: 5% and 10% reduction of baseline body weight. Data used for this analysis was from those who had a weight value at a given time point (i.e., 3, 6, and 12 months). In general, at each time point a greater percentage of patients achieved a threshold weight loss percentage in the VLC group than for the other plans. A similar finding is reported for the LC versus the HC group.

Weight Loss Adherence Analysis

In the adherence analysis, the initial 3 months of participation are demonstrated in Figure 5 using the complete case data. Within each meal plan and at each time point (i.e., 3, 6, and 12 months) weight loss was significantly greater ($P < 0.01$) for the adherent participants. Body weight at 12 months remained below the baseline weight for all groups but only the adherent groups maintained their body weight below their 3-month weight.

DISCUSSION

Based on the LMM analysis these data show that a physician-referred, clinic-based weight management program resulted in significant weight loss at 12 months among overweight and obese patients, regardless of the weight loss meal plan selected. In addition, the use of meal replacements, as used in the LC and VLC plans, resulted in significantly greater weight loss than the HC meal plan. These findings are considered robust as confirmed by the sensitivity analysis using complete case data. The difference of weight loss observed between meal plans was likely primarily reflective

TABLE 2. Linear mixed model regression coefficients.[a]

Dependent Variable, Weight (kg)	Regression Coefficients	*P* Value (Two-Tailed)
Intercept	101.47	<0.0001
Diet Plan = HC (vs VLC)	8.62	<0.0001
Diet Plan = LC (vs VLC)	4.41	<0.0001
Number of Months = 3 (vs 12)	1.85	<0.001
Number of Months = 6 (vs 12)	–1.92	<0.0001
Sex = Male (vs Female)	–1.80	<0.0001
Race = Black (vs White)	5.64	<0.0001
Race = Unknown (vs White)	4.04	0.033
Adherent (vs Non-Adherent)	–3.37	<0.0001
Diabetic (vs Non-Diabetic)	1.73	<0.0001
Some Exercise at baseline (vs No Exercise)	0.50	0.043
Initial Body Weight (≥116.1 kg)	0.94	<0.0001
Age (≤49.6 years)	–0.04	<0.001
HAD (≥12 points)	0.03	0.074

HC = hypocaloric meal plan; LC = low calorie partial meal replacement meal plan; VLC = very low calorie complete meal replacement meal plan; HAD = hostility, anxiety, and depression.
[a]This table contains the intercept and the maximum likelihood estimators of the fixed effects parameters (or regression coefficients) in the final model produced by the linear mixed model analysis. These coefficients represent the key outcome of the analytical results adjusted for all effects in the model. Data for initial body weight, age and HAD score were centered at 116.1 kg, 49.6 years and 12.7 points, respectively. The coefficient relates to unit changes in these parameters from these centered values

of the aggressiveness of each meal plan with respect to caloric restriction, and to the adherence of patients to both the weight loss and weight maintenance phases of the program.

Multiple randomized, controlled studies using a variety of meal plans have shown weight loss success both in the short (6 months) and long (12 months and 2 years) term (14). However, few clinically based, real-world weight management program data are available (15). Our outcome data are unique in that they: (a) were gathered from both an urban and suburban setting resulting in a significant number of black enrollees; (b) were the result of a program that primarily used clinical exercise physiologists for in-person behavioral coaching; (c) included a large percentage of patients who have a weight loss counseling insurance plan benefit; and (d) were generated from patients who self-selected their desired meal plan. Our results suggest that, on average, patients in this type of program who attend at least once a month for 3 months (i.e., adherers) can achieve as much as a 6% to 18% weight loss depending on the meal plan selected.

The use of meal replacements in racial and ethnic minority populations has been shown previously to be successful (16). Importantly, our data report weight loss success in a cohort of patients in a large metropolitan setting, in which more than 50% of the cohort was black. Based on the LMM analysis, compared with white patients, black patients and patients of other nonblack/white race participating in our program were predicted to have 5.6 and 4.0 kg less weight loss at 12 months, respectively. Reasons for differences in weight loss between races may be related to effects on resting energy expenditure, suggesting physiologic mechanisms for these differences (17). These likely interact with cultural factors and make weight loss more complex and variable for nonwhite individuals.

In agreement with Franz et al. (14), we report that weight loss reached its peak by 6 months for each group,

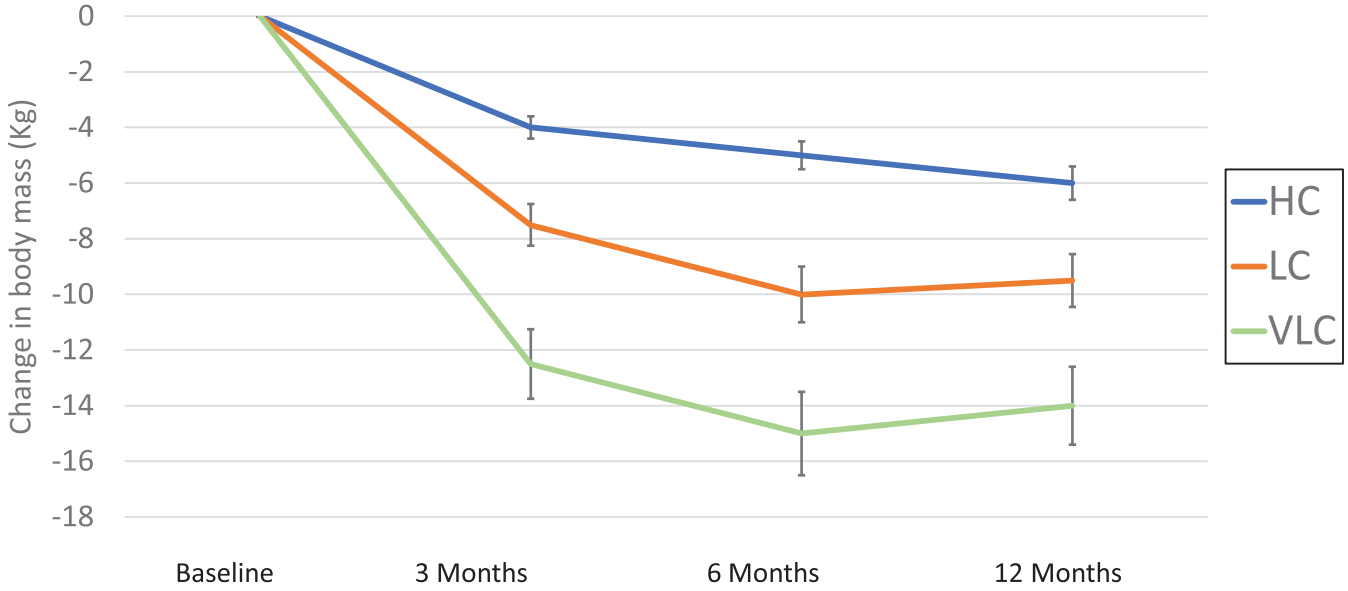

FIGURE 3. The linear mixed model showing 3, 6, and 12-month weight loss for the hypocaloric (HC) meal plan data; low calorie (LC) meal plan data; and very low calorie (VLC) meal plans (n = 2,316).

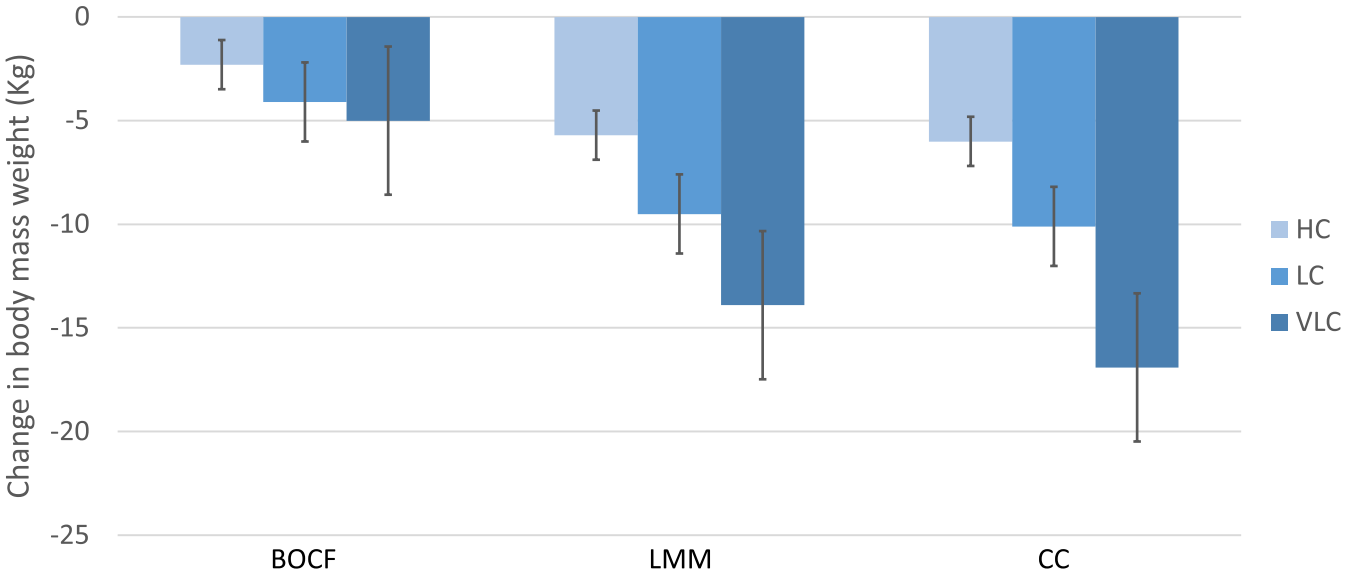

FIGURE 4. 12-month weight loss comparison between data using the baseline observation carried forward (BOCF) analysis (n = 3,007), complete case (CC) analysis (n = 316, 319, and 248 for hypocaloric [HC], low calorie [LC], and very low calorie [VLC] meal plans, respectively), and linear mixed model (LMM) analysis (n = 2,316). $P < 0.05$ for between and within group differences.

with little change at 12 months. The maximal amount of weight loss was the same or greater than a number of randomized studies aimed at providing practical weight loss methods (14). Importantly, all groups in the current study remained at a significantly lower weight at 12 months follow-up as compared to baseline. Weight loss at 12 months in the VLC group (~14 kg) was similar than that of Wadden et al. (16), who reported a 12-kg reduction from baseline among patients who participated in a randomized, controlled trial which also used a VLC meal plan. Since most clinical trials provide significant methods of promoting adherence that are beyond the scope of a busy clinical weight management program, our results provide important data to suggest that similar results can be achieved in a clinical program.

Adherence to weight management is related to early total weight loss (18–20). Patients in our cohort who were adherent to the program over the initial 3 months lost an average of 3.4 kg more weight at 12 months than those who were nonadherent. Importantly, the adherence criterion used for this analysis was quite liberal in that it only required 1 face-to-face visit per month for the first 3 months of participation. This suggests that in a clinical setting very minimal contact may be enough to provide weight loss success when this type of weight loss process is implemented.

Successful weight loss is difficult to define and dependent upon many factors. These include the amount of weight loss considered effective for health benefits, the goal weight loss of the patient, and the method (e.g., exercise vs diet) used. Two initial weight loss goals shared with all patients were the clinical weight loss thresholds of 5% and 10%, since these are often used as clinically meaningful weight loss goals (3,21,22). The data for our cohort demonstrate that patients selecting the more aggressive meal plans were much more likely to achieve these common weight loss thresholds (Table 3).

There were several unavoidable limitations of this observational study. Selection bias may have resulted in unmeasured differences in patients who chose each meal

TABLE 3. Patients achieving 5% or 10% weight loss thresholds.

	HC, n/N (%)	LC, n/N (%)	VLC, n/N (%)
Achieved or Maintained 5% Weight Loss			
3 months	269/772 (35)	520/763 (68)	610/738 (83)
6 months	268/626 (43)	394/605 (65)	422/560 (75)
12 months	165/518 (32)	238/486 (49)	226/385 (59)
Achieved or Maintained 10% Weight Loss			
3 months	63/772 (8)	267/763 (35)	448/738 (61)
6 months	97/626 (15)	253/605 (42)	340/560 (61)
12 months	78/518 (15)	140/486 (29)	157/385 (41)

HC = hypocaloric meal plan; LC = low calorie partial meal replacement meal plan; VLC = very low calorie complete meal replacement meal plan

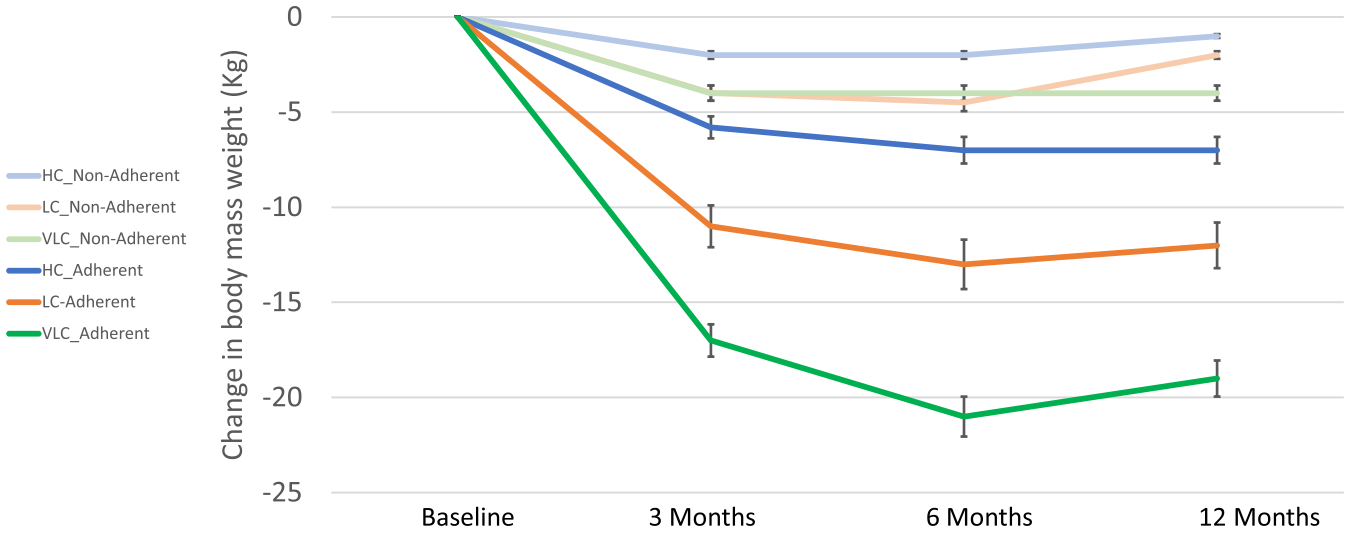

FIGURE 5. Change in body weight by diet plan groups and adherence to clinic visits through 3, 6, and 12 months among patients with data at all time points. Hypocaloric (HC) plan (adherent: n = 228; nonadherent: n = 82). Low calorie (LC) plan (adherent: n = 245; nonadherent: n = 74). Very low calorie (VLC) plan (adherent: n = 208; nonadherent: n = 40). $P < 0.05$, repeated measures analysis of variance for between and within group difference.

plan. It is possible that the greater weight loss observed for the more aggressive meal plans was because of patient-level factors, such as motivation to lose weight. Self-selection may have also created cohort differences in socioeconomic status. This potential confounder is countered by the fact that most patients had insurance coverage (89%) for weight management or were willing to pay the initial $275 to participate, suggesting program cost did not impede initial participation. Another limitation is loss to follow-up as there was no systematic effort to personally contact those with missing data points. Since our hospital has an active electronic health record, we were able to obtain many (77%) clinically measured weights in patients who *dropped out* of the program before 6 or 12 months (by abstraction from the electronic health record). Additionally, the BOCF and LMM analyses were conservative statistical methods used to address the issue of missing weight data. Finally, diet, exercise, and physical activity adherence were not measured. Thus, the influence of these is unknown. Since this study was not designed to compare diet plans, but rather to report results of self-selection of a weight loss plan in a real-world setting, this limitation may have only a minimal effect on the primary aim. Regarding exercise and physical activity, while exercise alone has a minimal effect on weight loss, it is a strong predictor of weight maintenance (14). However, the exercise prescription to patients was not different between dietary groups; thus, we would not expect any difference in exercise and physical activity between groups.

In conclusion, this study reports that clinically meaningful weight loss can be achieved and sustained to 12 months using various self-selected meal plan options in a real-world, non–grant-supported program. Because the majority of the program was delivered by health coaches with a clinical exercise physiology background, and supplemented with registered dietician visits, we believe these data are generalizable to those participating in clinical weight management programs in both an urban and suburban setting.

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