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Weight change in the first two months of a lifestyle intervention predicts weight changes 8 years later

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Abstract

Objective—Examine the relationship between 1- and 2-month weight loss (WL) and 8-year WL among participants enrolled in a lifestyle intervention.

Design & Methods—2290 Look AHEAD participants (BMI: 35.65±5.93kg/m^2) with type 2 diabetes received an intensive behavioral WL intervention.

Results—1 and 2-month WL were associated with yearly WL through Year 8 (p's<0.0001). At Month 1, participants losing 2-4% and >4% had 1.62 (95% CI:1.32,1.98) and 2.79 (95% CI: 2.21,3.52) times higher odds of achieving a ≥5% WL at Year 4 and 1.28 (95% CI:1.05,1.58) and

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CONFLICTS OF INTEREST STATEMENT

Dr. Cheskin is the Chair of the Scientific Advisory Board for Medifast, Inc. The remaining authors have no conflicts of interest to disclose.

1.77 (95% CI:1.40,2.24) times higher odds of achieving a ≥5% at Year 8, compared to those losing <2% initially. At Month 2, a 3-6% WL resulted in greater odds of achieving a ≥5% WL at Year 4 (OR=1.85; CI:1.48,2.32) and a >6% WL resulted in the greatest odds of achieving a ≥5% WL at Year 4 (OR=3.85; CI:3.05,4.88) and Year 8 (OR=2.28; CI:1.81,2.89), compared to those losing <3%. Differences in adherence between WL categories were observed as early as Month 2.

Conclusions—1 and 2-month WL was associated with 8-year WL. Future studies should examine whether alternative treatment strategies can be employed to improve treatment outcomes among those with low initial WL.

Keywords

weight loss; behavioral treatment; lifestyle intervention; type 2 diabetes

Introduction

There is great variability in both short-term and long-term weight loss (WL) in response to lifestyle interventions (1, 2, 3). For example, among individuals randomized to the lifestyle intervention of the Look AHEAD trial 68% achieved ≥5% WL (a common threshold for clinically meaningful WL) at Year 1 (2) and 50% at Year 8 (4). Thus, although many have success with lifestyle interventions, others do not achieve a clinically meaningful WL. Early identification of non-responders to lifestyle treatment may help improve long-term outcomes.

Weight loss achieved during the first two months of treatment is associated with 12 and 18-month WL (5, 6, 7). For example, Look AHEAD participants with a WL ≥2% at Month 1, or ≥3% at Month 2 had 4.8 and 8.4 times higher odds of achieving a ≥5% WL at Year 1, compared to those losing <2% or <3%, respectively (5). However, whether initial weight change also predicts weight change beyond 18 months is currently unknown. If early WL predicts long-term WL, this could lead to more effective long-term WL programs.

This paper expands upon our previous 1-year findings (5) and examines whether initial WL is also associated with 8-year WL among participants enrolled in a lifestyle intervention. Specifically, we examine the odds of achieving a clinically meaningful (≥5%) WL at Years 4 and 8 based on initial WL at Months 1 and 2. Further, we examine whether adherence differs between those with the greatest and least amount of WL at Month 2.

Methods

Participants

Individuals randomized to the intensive lifestyle intervention (ILI; n=2570) of the Look AHEAD trial were considered in these analyses. Participants had type 2 diabetes, were 45-76 years old, and had a BMI ≥25kg/m^2 (or ≥27kg/m^2 if taking insulin). Further inclusion/exclusion criteria have been previously reported (8). Study procedures were approved by each study site's institutional review board, and participants provided written informed consent.

Intervention

The lifestyle intervention has been extensively described elsewhere (4). In short, ILI participants attended weekly treatment meetings during Months 1-6 and 3 meetings per month during Months 7-12. During Years 2-8, the intensity of the intervention was significantly reduced.

Participants in ILI were prescribed a calorie goal of 1200-1800 kcal/day and were instructed to consume <30% of total calories from dietary fat. Meal replacements were provided and participants were instructed to replace two meals and one snack/day with a meal replacement product for Months 1-6, one meal and one snack per day during Months 7-12, and one meal or snack/day in Years 2-8. A home-based physical activity regimen was designed to gradually increase structured activity to ≥175 min/week by Month 6. The intervention had a strong behavioral emphasis.

Outcome measures

Weight was measured weekly at intervention visits and annually at assessment visits. Percent weight change at Months 1 and 2 was calculated using Session 5 and Session 9 weights, respectively. Procedures for dealing with missing weight measurements have been reported previously (5).

Program adherence was measured by: 1) number of intervention meetings attended during weeks 1-9; 2) number of self-reported meal replacements consumed during weeks 2-9; and 3) average self-reported minutes/week of moderate-intensity exercise during weeks 2-9.

Statistical analyses

Participants without Month 1 or 2 weights, at least one follow-up weight, and who underwent bariatric surgery were excluded from all analyses (Figure S1). Logistic regression modeling assessed the relationship between early WL and long-term WL (e.g., Years 4 and 8), defining long-term success as achievement of a ≥5% WL. Bivariate tests of association between 2-month weight category and demographic, diabetes-related, and adherence measures were assessed with two-way ANOVA F-tests for continuous and chi-square for categorical measures (Table S1). Pair-wise differences in adherence measures were examined using the differences of LSMEANS from the aforementioned unadjusted two-way ANOVA. Adjusted logistic regression covariates included clinical site, gender, race, age, and baseline BMI (Table 1). All analyses were conducted using SAS v9.4 (SAS Institute, Cary, NC).

Results

Baseline characteristics of the entire Look AHEAD cohort have been previously reported (8). Participants included in the analyses (n=2290) had a mean±SD baseline BMI of 35.65±5.93kg/m^2, 59.17% were female, 63.13% were Caucasian, and the mean age was 58.69±6.82 years. Participants were grouped into 1 of 3 categories designed to be roughly equivalent in size based upon 1-month weight change: WL <2% (mean WL= −0.32±2.75%; n=758); 2-4% (−2.96±0.56%; n=961); or >4% (−5.36±1.80%; n=562), and 2-month weight

change: WL <3% (mean WL: −0.93±2.61; n=634); 3-6% (−4.51±0.84; n=916); and >6% (−8.02±1.79; n=714).

The trajectory of weight change over the 8-year period using the initial WL groupings is shown in Figure 1. As illustrated, a greater WL at Month 1 or 2 was associated with greater WL at any given year over the 8-year period (p's<0.001).

The odds of achieving a ≥5% WL at Years 4 and 8 were significantly greater among individuals losing the most weight at Months 1 or 2 compared to those losing the least (Table 1). For example, compared to individuals losing <3% at Month 2, those achieving the greatest WL at Month 2 (>6%) had 3.85 (95% CI: 3.05,4.88) and 2.28 (95% CI: 1.81,2.89) higher odds of achieving a ≥5% WL at Years 4 and 8, respectively. Further, individuals losing 3-6% at Month 2 also had higher odds (OR=1.85; 95% CI: 1.48,2.32) of achieving a ≥5% WL at Year 4 but not Year 8 (OR=1.16; 95% CI: 0.93,1.45). Of those who achieved the goal of ≥5% WL at Year 8, 23% had a weight loss <3% at month 2, whereas 36.7% and 40.3% of participants had weight losses of 3-6% or >6% at 2 months, respectively.

Program adherence was good in all groups, but those losing <3% at Month 2 attended fewer meetings and consumed fewer meal replacements compared to the two groups with higher initial WL (all p<0.0001), and they participated in less physical activity than the highest WL group (p<0.0001; Figure 2). However, adherence at 2 months did not predict 8-year weight change, after controlling for baseline weight and 2-month weight change (p's>0.05). Further, the 2-month initial WL groups differed by gender, ethnicity, education, and insulin usage (p<0.05), but not in diabetes duration, age, initial BMI or waist circumference (Table S1).

Discussion

Weight loss achieved within the first 2 months of a lifestyle intervention was positively associated with WL 8 years later among individuals who were overweight and obese and had type 2 diabetes. This suggests that early WL may be a useful indicator of long-term success. Achievement of a ≥2% WL at Month 1 or ≥6% WL at Month 2 increased the likelihood of achieving a clinically significant WL at Year 8, compared to those losing <2% at Month 1 and <3% at Month 2, respectively. Given that the goal of obesity treatment programs is long-term WL maintenance, the current findings demonstrate the importance participants getting off to a good start in a lifestyle intervention.

Although in general, adherence was excellent during the initial weeks of this study, individuals with poorer WL at Month 2 were already demonstrating poorer adherence at this time compared to those with larger initial WL. While previous reports clearly demonstrate that adherence is strongly associated with WL success(9, 10, 11), the current findings suggest that even at Month 2, lower levels of program adherence could be of concern. Lower levels of adherence and initial WL (i.e., <2% at Month 1 or <3% at Month 2) should be considered red flags for clinicians treating patients with obesity. Future studies should investigate whether providing additional support to these individuals early within a program can improve long-term WL.

With a recent emphasis on cost-effective interventions, an alternative approach would be to discontinue lifestyle treatment in those with low initial WL, as is recommended with newer pharmacotherapy regimens. While there are fewer safety concerns with lifestyle treatment than pharmacotherapy, continued participation in a lifestyle program that is not working may lead to frustration and decreased interest in future weight control efforts. Using initial WL as a criterion for deciding whether to continue a specific treatment may thus be a rational approach in lifestyle, as well as in drug treatments for obesity. If lifestyle treatment is discontinued, alternative treatment approaches could be considered (e.g., different diets, pharmacotherapy, etc.), or these individuals could consider re-attempting lifestyle treatment at a future time point when they are more ready to make the necessary lifestyle changes necessary for successful WL. However, these study findings may only be generalizable to participants with diabetes who receive an intensive lifestyle intervention which utilizes meal replacement products.

This study is the first to demonstrate that WL within the first 2 months of a lifestyle intervention is predictive of long-term WL success (i.e., 8 years later), offering new insight into the potential importance of the initial stages of a lifestyle intervention. Future studies should consider identifying individuals with low initial WL (i.e., <2% at Month 1, or <3% at Month 2) and examine whether it would be beneficial or cost effective to modify (e.g., offer additional support to or recommend alternative treatment options) or discontinue treatment for these individuals.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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What is already known about this subject?

- Post-treatment weight loss predicts long-term weight loss among individuals enrolled in behavioral weight loss programs.
- Recent evidence suggests that early weight loss, at 1-2 months, is predictive of 1-year weight loss success.
- However, it is unclear whether weight loss within the first few months of treatment also predicts long-term weight loss outcomes, beyond 1 year.

What this study adds

- This is the first study to examine the association between initial weight loss (i.e., weight loss within the first 2 months of treatment) and long-term weight loss (through 8 years of follow-up), among individuals enrolled in an intensive lifestyle intervention.
- This study demonstrates that initial weight loss is associated with 8-year weight loss, and that poor initial weight loss increases the likelihood of failing to achieve a clinically significant long-term weight loss.
- Individuals with poorer weight at Month 2 were already demonstrating poorer adherence at this time point compared to those with larger initial weight loss, demonstrating that early reductions in adherence and low initial weight loss should be considered red flags for clinicians treating patients with obesity.

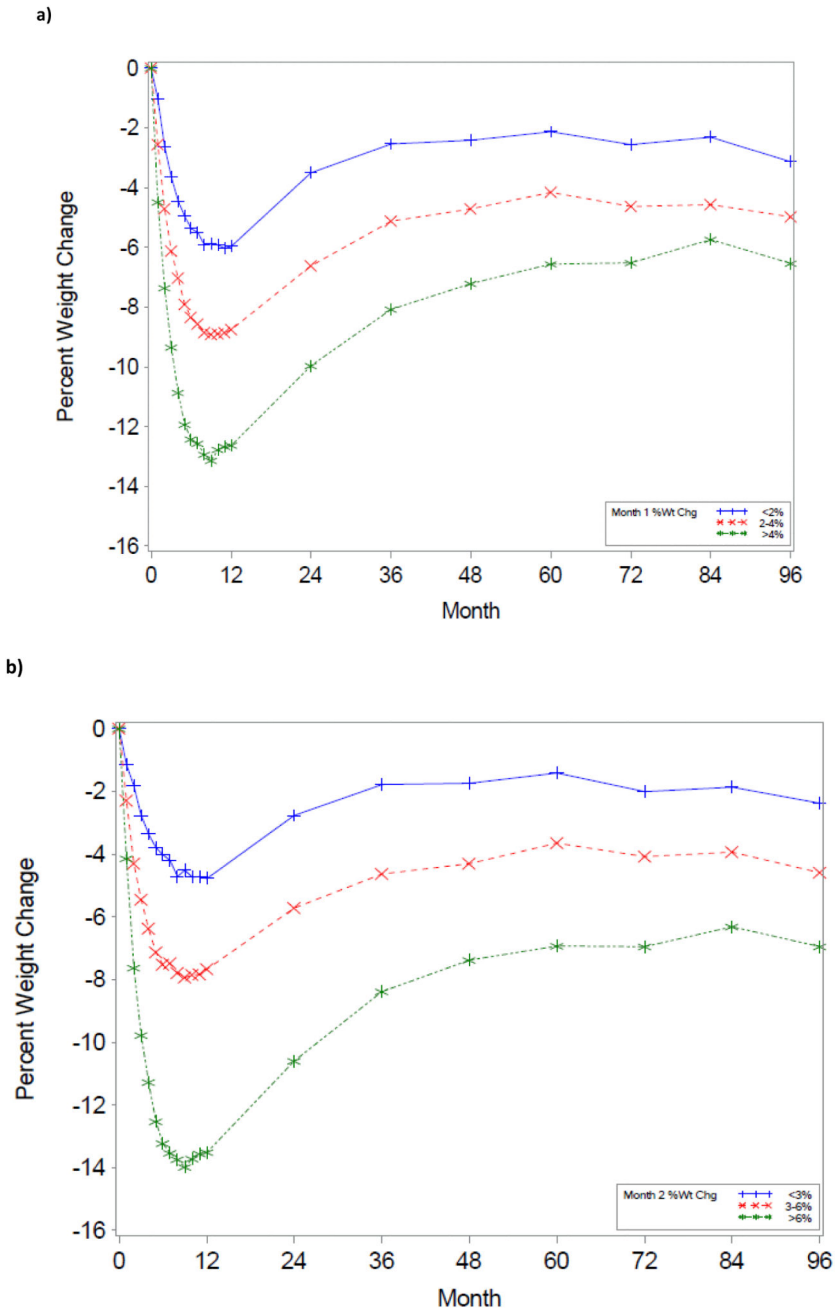

Figure 1.

Title: Weight change trajectories over an 8-year period, based upon 1-month (a) and 2-month (b) weight change

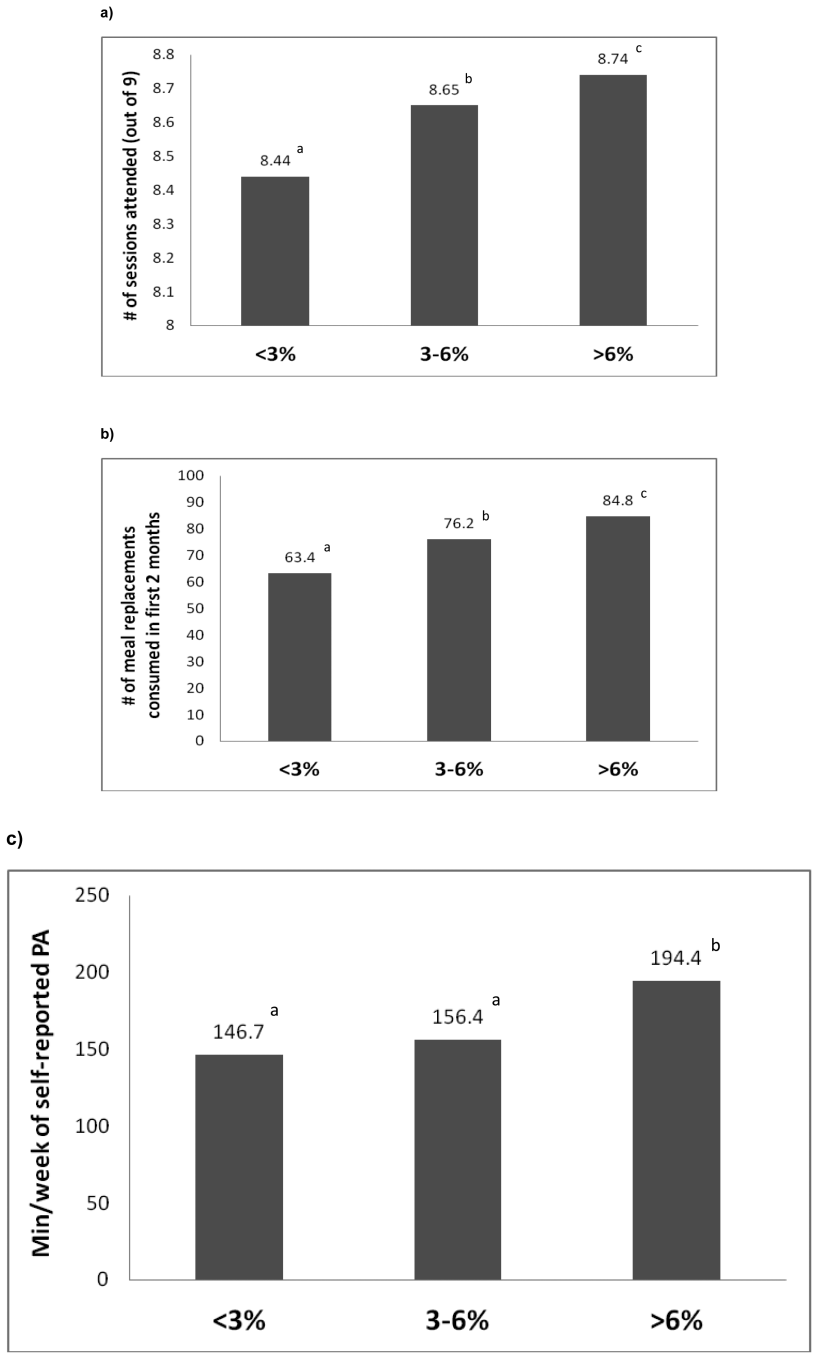

Figure 2.

Title: Number of sessions attended (a), meal replacements consumed (b), and weekly minutes of physical activity (c) stratified by initial weight loss category at Month 2.

Legend: PA = physical activity; Values with similar superscripts indicates that groups are similar to one another ($p>0.05$). Note: Findings presented are from unadjusted models. However the results were unaltered after adjusting for age, race/ethnicity, gender, clinical site, and baseline BMI.

Table 1

Odds of achieving a >5% weight loss at Year 4 or Year 8 based upon change in body weight at Months 1 and 2

		Achieve a ≥5% weight loss at Year 4	Achieve a ≥5% weight loss at Year 8
1 month			
	<2% WL	1.0 (ref)	1.0 (ref)
	2-4% WL		
	Unadjusted	1.62 (1.32, 1.98)	1.28 (1.05, 1.58)
	Adjusted	1.68 (1.36, 2.08)	1.29 (1.04, 1.60)
	> 4% WL		
	Unadjusted	2.79 (2.21, 3.52)	1.77 (1.40, 2.24)
	Adjusted	2.99 (3.34, 3.83)	1.99 (1.54, 2.55)
2 months			
	< 3% WL	1.0 (ref)	1.0 (ref)
	3-6% WL		
	Unadjusted	1.85 (1.48, 2.32)	1.16 (0.93, 1.45)
	Adjusted	1.96 (1.55, 2.47)	1.23 (0.97, 1.55)
	> 6% WL		
	Unadjusted	3.85 (3.05, 4.88)	2.28 (1.81, 2.89)
	Adjusted	4.33 (3.36, 5.58)	2.78 (2.15, 3.57)

Odds (95% confidence interval); Adjusted models include age, race/ethnicity, gender, clinic site, and baseline BMI. Note: Secondary analyses testing for differential effects of covariates on longer-term weight loss revealed no significant interactions between gender, race, age, or baseline BMI and early weight loss category (data not shown).