Predictors of initial vs. later weight loss: The role of eating habit change

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ABSTRACT

The present study investigated the utility of examining initial changes in behavioral and psychological dimensions, in addition to pretreatment levels, as predictors of subsequent weight loss.

Subjects included 377 obese women (average BMI = 33.0, SD= 6.2, average age = 41.3 years, SD=11.5) in treatment for obesity with a primary care physician. Patients' weight was assessed three (all subjects) or four (N=249) times, with an average interval between assessments of 1.5 months. Psychological assessment was conducted on our interactive web-site, which provides patients who take the test with immediate feedback. We examined early (T1 to T2) and later (T2 to T3, T2 to T4) weight changes, and their relationship with pretreatment, T2, and T1 to T2 (change score) measures of eating habits, depression, stress symptoms, perfectionism and age.

Regression analysis with pretreatment variables as predictors of initial weight loss found eating habits to be the best predictor, accounting for 6.5% of the variance in weight change. Patients with worse eating habits at pretreatment lost relatively more weight than patients with better habits. Initial weight change was significantly related to change in eating habits (r=.26), stress symptoms (r=.23), depression (r=.24), and perfectionism (r=.14), indicating that patients who lost the most weight also showed the biggest improvements in psychological variables.

Analyses of weight change from T2 to T3 and T2 to T4 showed early improvement in eating habits to be the best predictor of weight change, even with early weight loss included in the prediction model. Eating habits change accounted for 13.8% of the variance in T2 to T3 weight change, and 23.1% of the variance in T2 to T4 weight change. The association between changes in emotional variables and weight change appears to be due to their association with change in eating habits. This makes sense, since eating habits is the predictor variable with the most direct connection to weight change.

These findings illustrate the importance of behavior change in obesity treatment, and show that the rate of initial weight loss is not the most important predictor of later weight loss. Future studies should extend these findings with longer follow-up periods and a larger number of behavioral/psychological assessments.

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INTRODUCTION

Pretreatment measures of behavioral and psychological variables have proven to be weak and inconsistent predictors of weight loss. However, it is likely that **changes** in such variables are associated with concurrent changes in weight. In other words, an obese patient who shows significant improvement in eating habits is likely to show similar improvements in weight, and is

likely to continue to do well. In contrast, a patient who achieves rapid weight loss but no improvement in eating habits or other psychological variables is unlikely to be able to sustain the early success.

The present study examined the relative utility of changes in behavioral and psychological variables, in comparison to pretreatment levels of those same variables, as predictors of subsequent weight change.

METHOD

SUBJECTS

The study included 377 female patients with a BMI of at least 25 (mean = 33.0, SD = 6.0). Subjects ranged in age from 18 to 70 (mean = 41.3, SD = 11.5). All subjects were beginning treatment for obesity with a primary care physician.

PROCEDURE

Patient weight was assessed three (all subjects) or four (N=249) times, with an average interval between assessments of 1.5 months.

All subjects completed a behavioral /psychological questionnaire at the first two assessments. The assessment included measures of four psychological variables: depression, stress symptoms, perfectionism and uncontrolled eating.

Depression was assessed with 8 items, which demonstrated a fairly high level of internal consistency (alpha = .79). Items measured feelings of hopelessness, sadness, inferiority, worthlessness, and crying.

Stress Reactions comprised 6 items describing various symptoms commonly associated with stress (e.g., headaches, gastrointestinal complaints, difficulty concentrating, dizziness, trembling, profuse sweating and unusual fatigue). This scale had an alpha of .72.

Perfectionism was assessed with 8 items, tapping aspects of perfectionism such as disappointment with self, high expectations, guilt, preoccupation with mistakes, fear of failure, and need to be the best in everything. Alpha was .73.

Uncontrolled Eating was assessed with 12 items measuring a variety of eating behaviors, including rapid eating, eating in front of television, eating impulsively, emotional eating, eating to relax, and eating sweet and fatty foods. Alpha was .74.

STATISTICAL ANALYSIS

We examined early (Time1 to Time2) and later (Time2 to Time3, Time2 to Time4) weight changes, and their relationship with pretreatment, Time2 and Time1-Time2 (residual change scores) measures of uncontrolled eating, depression, stress symptoms, perfectionism, and age.

We used stepwise regression analysis to determine the best set of predictors of BMI change at Time2, Time3 and Time4.

RESULTS

TREATMENT OUTCOME

BMI declined significantly at each time point: T1-T2, t=22.5, p<.0001; T2-T3, t=11 .6, p<.0001; T3-T4, t=6.1, p<.0001 (see Figure 1).

All of the psychological variables showed significant improvement from Time 1 to Time 2: Uncontrolled Eating, t=19.0, p<.0001; Stress Reactions, t=13.9, p<.0001; Depression, t=11.1, p<.0001; Perfectionism, t=9.5, p<.0001 (see Figure 2).

CORRELATES OF BMI CHANGE

Correlations between pretreatment variables and BMI change are presented in Table 1. We found that higher scores on Uncontrolled Eating were associated with greater BMI change from T1 to T2 and T2 to T3. This finding indicates that patients with worse eating habits lost relatively more weight than patients with better habits.

In contrast, we found that changes in psychological variables were more consistent predictors of concurrent and subsequent BMI change (Table 2). In fact, improvement in eating habits was even more strongly related to subsequent BMI change (T2-T3, T2-T4) than was previous BMI change (T1-T2).

REGRESSION ANALYSES

We first used pretreatment variables to predict BMI change (Table 3). We found that Uncontrolled Eating was the best predictor, accounting for 6% of the variance in BMI change at T2 and T3.

A second analysis included psychological variables at Time 2 as well as T1 to T2 change scores (BMI and psychological variables), to predict subsequent BMI change (Table 4). Improvement in eating habits was the best predictor of BMI change from T2 to T3 and from T2 to T4, accounting for 13.8% and 23.1% of the variance. In both cases eating habits improvement was a better predictor than previous BMI change (T1 to T2).

DISCUSSION

Pretreatment variables were weak predictors of weight loss. Only pretreatment eating habits was significant related to weight change. Patients with more uncontrolled eating at pretreatment lost more weight.

The "advantage" of bad habits proved short-lived. At later time points, better habits, as well as lower scores on stress, depression and perfectionism, were associated with greater subsequent weight loss. Regression analysis showed that the improvement in eating habits was the best predictor of weight loss.

These results highlight the importance of behavior change in obesity treatment. It appears that behavior change predicts subsequent weight loss even more strongly than previous weight loss.

Table 1
Correlations between initial and later BMI change[1] and pretreatment variables

	BMI Change Time1-Time2[2]	BMI Change Time1-Time3[2]	BMI Change Time1-Time4[3]
Age	.03	.03	.09
Uncontrolled Eating[4]	.23**	.24**	.07

Stress Reactions[4]	.09	.12	.02
Depression[4]	.02	.01	.01
Perfectionism[4]	.09	.11	.09

Note. $^{*}p<.01$ $^{**}p<.0001$ [1] Change = residualized change, representing change relative to that predicted by the previous score on that variable. [2] N=377 [3] N=249 [4] Higher scores indicate more symptoms.

Table 2
Correlations between initial and later BMI change[1] and change[1] in psychological variables

	BMI Change Time1-Time2[2]	BMI Change Time1-Time3[2]	BMI Change Time1-Time4[3]
BMI Change Time 1-Time2	-----	.24**	.35**
Uncontrolled Eating Time2			
Uncontrolled Eating Change Time1-Time2	.26**	.38**	.43**
Stress Reactions Time2			
Stress Reactions Change Time1-Time2	.23**	.23**	.30**
Depression Time2			
Depression Change Time1-Time2	.22**	.13*	.26**

Perfectionism Time2			
Perfectionism Change Time1-Time2	.14*	.12*	.10

Note. *p<.05 **p<.0001 [1] Change = residualized change, representing change relative to that predicted by the previous score on that variable. [2] N=377 [3] N=249

Table 3
Stepwise Multiple Regression Summaries for Pretreatment Predictors

Dependent Variable	Step	Variable Entered	r^2mult(adj)	F	*dfs*
BMI Change Time1-Time2	1	Uncontrolled Eating	.06	24.3***	1.375
BMI Change Time1-Time3	1	Uncontrolled Eating	.06	23.9***	1.375
BMI Change Time1-Time4	1	no significant predictors			

Note. ***p<.0001

Table 4
Stepwise Multiple Regression Summaries for Time 2 Predictors

Dependent Variable	Step	Variable Entered	Partial r^2	F	*dfs*
BMI Change Time2-Time3	1	Uncontrolled Eating Change T1-T2	.138	64.7***	1.375
	2	BMI Change T1-T2	.023	10.3**	1.374
	3	Uncontrolled Eating - T2	.012	5.4*	1.373
BMI Change Time2-Time4	1	Uncontrolled Eating Change T1-T2	.231	57.1***	1.247
	2	BMI Change T1-T2	.063	20.6***	1.246
	3	Perfectionism - T2	.014	4.6*	1.245

Note. ***p<.05 **p<.01 *p<.0001