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Outcome expectations and realizations as predictors of weight regain among dieters

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Abstract

This prospective study tested whether (a) baseline outcome expectations regarding the benefits of a weight-loss diet, (b) 6-month outcome realizations regarding perceived benefits actually experienced, and/or (c) the interaction between them predicted 6–12 month weight regain among overweight/obese women randomized to one of four popular weight-loss diets ($N=311$). Positive 6-month realizations regarding improvements in physical shape and appearance predicted less 6–12 month weight regain among Atkins diet participants only ($n=70$), controlling for baseline expectations, the expectations-realization interaction, and initial weight loss. Atkins participants displayed three distinct patterns of regain based on levels of 6-month realizations and initial weight loss. Experimental research should investigate whether improving realizations leads to reduced weight regain in response to this popular diet.

Keywords

Outcome expectations; outcome realizations; obesity; weight loss; diet

1. Introduction

Behavioral weight-loss treatment often produces initial, but not long-term success (Jeffery, et al., 2000). To explain this, theorists have suggested that discrepancies between individuals' unrealistic initial expectations regarding the benefits of weight loss coupled with failure to achieve or "realize" those benefits may lead to poor adherence and weight regain (Cooper & Fairburn, 2001; Polivy & Herman, 2002; Rothman, 2000).

The relationship between outcome expectations (initial expectations of the physical and psychosocial benefits of engaging in health behaviors), outcome realizations (the perceived benefits actually experienced by engaging in such behaviors), and the discrepancy between them (the interaction of two these variables) has been examined primarily in the area of exercise adherence. Research on outcome expectations alone have yielded equivocal results

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(Williams, Anderson, & Winett, 2005). Outcome realizations alone (Brassington, Atienza, Perczek, DiLorenzo, & King, 2002; Wilcox, Castro, & King, 2006; Williams, et al., 2008) and interactions between expectations and realizations (Neff & King, 1995; Wilcox, et al., 2006) have predicted long-term exercise adherence in a number of studies. In contrast, one study found that discrepancies did not predict long-term adherence, but were associated with study dropout (Sears & Stanton, 2001).

Outcome expectations and realizations have not been systematically examined in the weight-loss literature. Higher expectations and dissatisfaction with psychosocial benefits of weight loss were independently associated with long-term weight gain in a prospective study (Finch, et al., 2005), but the interaction between the two variables was not included. In one study that did include the interaction, discrepancies between weight-loss expectations and the perceived benefits actually experienced did not impact weight regain (Gorin, et al., 2007); however, retrospective measurement of expectations may have biased the results. Conclusions about the nature and predictive utility of weight-loss outcome expectations and realizations are thus limited by research that has not simultaneously examined each variable and the interaction between them in a single analysis, or has relied upon retrospective assessments.

We aimed to address methodological gaps in the literature by prospectively examining whether baseline outcome expectations, outcome realizations assessed at 6 months, and/or the interaction (i.e., discrepancy) between them predicted weight regain during a 6–12 month follow-up among women participating in a weight-loss diet.

2. Method

2.1. Participants and Procedure

Data were collected as part of a randomized trial of four popular weight-loss diets (Aktins, Zone, LEARN, and Ornish). The trial is described in detail elsewhere (Gardner, et al., 2007). Briefly, overweight/obese women ($N=311$) were aged 41 ± 6 years, with 16 ± 2 years of education; 29% were ethnic minorities. Participants completed baseline weight, height, and outcome expectations assessments prior to being randomized to attend eight weekly 1-hour classes led by a registered dietitian and focused on one of the four weight-loss diet books. Participants were then encouraged to follow their assigned diet for 10 months. The Stanford University Human Subjects Committee approved the trial and all participants provided written informed consent. Trial results indicated that 12-month weight loss in the Atkins group was greater than Zone; weight losses in the Zone, Ornish, and LEARN groups did not differ (Gardner, et al., 2007).

2.2. Measures

2.2.1. Weight and height—At baseline, 6, and 12 months, weight was measured to the nearest tenth kilogram using a calibrated scale. Height at baseline was measured to the nearest millimeter using a standard wall-mounted stadiometer.

2.2.2. Outcome expectations—At baseline, participants rated the degree of change they expected in 15 physical (e.g., shape and appearance; fitness) and psychological domains (e.g., depression; confidence and well-being) due to participation in a weight-loss program. Higher scores indicated greater expected improvement. Anchors ranged from 0–1 (“get worse”), 2–3 (“no change”), 4–7 (“moderate improvement”), to 8–10 (“extreme improvement”). Participants also identified the one domain most important to them. Versions for physical activity have demonstrated adequate test-retest reliability and

concurrent validity (King, Haskell, & DeBusk, 1989) and internal consistency (Wilcox, et al., 2006).

2.2.3. Outcome realizations—At 6 months, participants rated the degree to which the 15 domains had changed over the previous 3–4 months due to participation in their assigned diet. Higher scores on the 0–10 scale indicated greater perceived improvement.

3. Results

3.1. Preliminary Analyses

In the original trial, 45 participants did not complete the 6-month weight assessment. In the present study, one did not complete the baseline outcome expectations measure and four more did not complete the 6-month outcome realizations measure. Baseline weight and body mass index (BMI) did not differ between those who did and did not complete the 6- and 12-month weight assessments ($p \geq .44$). If missing, 12-month weight was carried forward from baseline. Given the impact of extreme outliers on sample estimates, we removed from the dataset one Atkins participant whose 6–12 month weight loss (-17.4 kg) was $>$ four standard deviations below the Atkins mean. In the resulting sample ($n=260$), mean weight and BMI at baseline were 85.6 ± 12.4 kg and 31.7 ± 3.6 kg/m², respectively, and did not differ across diet groups ($p \geq .21$).

We examined the outcome expectations domain of greatest perceived importance to participants. Consistent with obese women's weight-loss treatment goals and expectations reported elsewhere (Cooper & Fairburn, 2001; Foster, Wadden, Vogt, & Brewer, 1997; Gorin, et al., 2007), physical shape and appearance was rated as most important by the highest proportion of participants (28% of 248 respondents). (For completeness, we evaluated the next two most highly rated domains [confidence/well-being, 19%; fitness, 17%] but did not find them predictive of 6–12 month weight regain.) Thus, subsequent analyses focused on outcome expectations and realizations regarding physical shape and appearance. Descriptive data are displayed in Table 1. Mean baseline expectations did not differ between participants who did and did not complete the 6- and 12-month weight assessments ($p \geq .23$), nor did they differ by diet group or ethnicity ($p = .10$).

3.2. Correlations by Diet Group

Spearman correlations of 6–12 month weight regain with baseline outcome expectations, 6-month outcome realizations, and initial weight loss from baseline to 6 months indicated that in the Atkins group, only positive 6-month realizations regarding shape and appearance correlated with less regain, $r = -.28$, $p = .02$. No significant correlations emerged in the remaining diet groups ($p \geq .13$); hence, further analyses concerned the Atkins group only.

3.3. Primary Analyses in Atkins Group

We examined whether baseline outcome expectations, 6-month outcome realizations, the interaction between them, and initial weight loss from baseline to 6 months predicted 6–12 month weight regain in the Atkins group using simultaneous regression. Predictor variables were centered using the corresponding median (Kraemer & Blasey, 2004). Controlling for all other predictors, positive 6-month realizations regarding shape and appearance predicted less regain ($\beta = -.35$, $p = .04$) such that a 2.5-point increase in realizations was associated with a 1.12 kg decrease in regain. Neither baseline expectations ($\beta = .21$, $p = .14$), the interaction term ($\beta = -.05$, $p = .72$), nor initial weight loss ($\beta = .07$, $p = .67$) were significant predictors in this model.

Of note, 6-month outcome realizations were highly correlated with initial weight loss from baseline to 6-months, $r = -.68$, $p = .001$. While highly correlated predictors can introduce bias in regression analyses (Cohen, Cohen, West, & Aiken, 2003; McGee, Reed, & Yano, 1984), this likelihood was reduced given that multicollinearity diagnostics were well within acceptable limits (i.e., tolerance indices $\leq .10$; Tabachnick & Fidell, 2001). A simplified regression without initial weight loss as a predictor yielded similar results: realizations predicted regain ($\beta = -.39$, $p = .003$) while expectations ($\beta = .19$, $p = .15$) and the interaction ($\beta = -.06$, $p = .62$) did not.

Given the high correlation between outcome realizations and initial weight loss, we descriptively examined both variables in relation to patterns of 6–12 month weight regain. We identified six clinically meaningful subgroups in a 2 (initial weight loss) $\times$ 3 (realizations) structure. “Larger” initial weight loss was defined as losing more than 6.25 kg (weight loss $\geq 51^{\text{st}}$ percentile). “Smaller” initial weight loss was defined as losing less than or equal to 6.25 kg (weight loss $< 51^{\text{st}}$ percentile). Using outcome realizations scale anchors, “extremely positive” realizations corresponded to scores from 8–10, “moderately positive” to scores from 4–7, and “negative” to scores from 0–3. No participants with smaller initial weight losses had extremely positive realizations. The remaining five subgroups revealed three distinct patterns of regain.

In the first pattern, two subgroups with larger initial weight losses and positive realizations regained little weight, essentially maintaining from 6–12 months (Figure 1, triangle markers). Participants in the first subgroup, with larger initial weight losses ($Mdn = -9.1$ kg) and moderately positive realizations, regained a median of 1.0 kg ($n = 18$; dashed line). Those in the second subgroup, with larger initial weight losses ($Mdn = -10.8$ kg) and extremely positive realizations, regained a median of 0.1 kg ($n = 15$; dotted line).

In the second pattern, two subgroups with smaller initial weight losses tended to regain weight from 6–12 months—regardless of realizations (Figure 1, circle markers). Participants in the first subgroup, with smaller initial weight losses ($Mdn = -0.3$ kg) and negative realizations, regained a median of 2.4 kg ($n = 18$; solid line). Those in the second subgroup, with smaller initial weight losses ($Mdn = -3.8$ kg) and moderately positive realizations, regained a median of 2.1 kg ($n = 16$; dashed line).

In the third pattern, the few participants with larger initial weight losses ($Mdn = -10.2$ kg) but negative realizations regained a median of 6.2 kg ($n = 3$; Figure 1, square marker).

4. Discussion

Among women randomized to an Atkins weight-loss diet, positive 6-month outcome realizations regarding perceived improvements in physical shape and appearance predicted less weight regain during a 6–12 month follow-up, after controlling for baseline outcome expectations and the interaction between expectations and realizations. The result mirrors research highlighting the importance of realizations for long-term health behavior change success (Brassington, et al., 2002; Finch, et al., 2005; Neff & King, 1995; Wilcox, et al., 2006).

Neither baseline expectations nor the interaction (i.e., discrepancy) between expectations and realizations predicted regain in the Atkins group. The former is consistent with previous research (Ames, et al., 2005). The interaction’s failure to predict regain runs counter to theories suggesting that discrepancies between inflated expectations and subsequent dissatisfaction lead to poor long-term outcomes (Polivy & Herman, 2002; Rothman, 2000), although the finding is consistent with one study in which discrepancies did not predict long-term exercise adherence (Sears & Stanton, 2001). Atkins participants reported

improvements in shape and appearance that were close to their expectations, particularly relative to other diet groups; it is possible that this narrower range of expectation-realization discrepancies impacted the results. Alternatively, current theories—though intuitively appealing—may overemphasize outcome expectations and discrepancies in shaping behavior.

A descriptive analysis revealed three distinct patterns of 6–12 month regain based on Atkins participants' initial weight losses from baseline to 6 months and 6-month outcome realizations. First, those who initially lost larger amounts of weight and reported positive realizations regained very little from 6–12 months, an ideal combination. Second, regardless of realizations, participants who initially lost smaller amounts of weight tended to gain weight from 6–12 months. Initial lack of weight loss appeared to increase the risk for subsequent gain, consistent with recent findings that a “slow start” to weight loss is associated with worse long-term maintenance (Nackers, Ross, & Perri, 2010). Third, the extremely few participants who initially lost larger amounts of weight and yet reported negative realizations regained considerable weight. Though small, this may represent another group at high risk.

Limitations to this study include its applicability only to the generally successful Atkins diet group (Gardner, et al., 2007). Smaller weight loss ranges may have restricted the detection of patterns in the remaining groups. Generalizability also is limited by the predominantly middle-aged, well-educated female sample, and replication in larger samples is indicated. Lastly, restricted sample sizes precluded examination of whether outcome expectation domains of greatest perceived importance differed by ethnicity, leaving room for future research.

This study's strengths include its prospective design, evaluation of a popular “real-world” diet, focus on the domain of physical shape and appearance judged important by participants, and pre-planned, novel test of outcome expectations, realizations, and their interaction when predicting weight regain. Future research should determine the mechanisms through which realizations impact regain. For example, it is possible that positive realizations lead to long-term weight loss by fostering adherence to weight control behaviors, including dietary, physical activity, and self-monitoring behaviors which may contribute to success (Wing & Phelan, 2005). (Of note, greater adherence to prescribed dietary restrictions was associated with greater 12-month weight loss in this trial (Alhassan, Kim, Bersamin, King, & Gardner, 2008).) Conversely, negative realizations—even when initial weight loss is objectively “successful”—may lead to regain through abandonment of weight control behaviors. While acknowledging the difficulty of altering realizations (Jeffery, Linde, Finch, Rothman, & King, 2006), experimental research is needed to determine whether improving the perceived benefits of weight loss could improve adherence, and subsequently, long-term weight outcomes. Our descriptive results also suggest that inadequate initial weight loss is a potential predictor of regain. Additional prospective research to identify subgroups at high risk for regain offers opportunities to better tailor interventions and improve long-term success.

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Figure 1.
Median weight change relative to baseline, by initial weight loss and outcome realization categories

Table 1Descriptive data (mean $\pm$ standard deviation)

	Atkins (n = 70)	Zone (n = 66)	LEARN (n = 60)	Ornish (n = 64)
Baseline outcome expectations ¹	6.8 $\pm$ 1.7	7.4 $\pm$ 1.3	7.3 $\pm$ 1.4	7.4 $\pm$ 1.4
6-month outcome realizations ¹	5.2 $\pm$ 2.5	3.6 $\pm$ 2.2	4.9 $\pm$ 2.4	4.0 $\pm$ 2.2
Weight change (kg)				
Baseline-6 months (initial loss)	-6.6 $\pm$ 5.8	-2.5 $\pm$ 5.7	-4.0 $\pm$ 5.7	-2.8 $\pm$ 4.7
6-12 months ² (regain)	1.6 $\pm$ 3.2	0.6 $\pm$ 3.5	0.7 $\pm$ 3.6	0.2 $\pm$ 3.7
Baseline-12 months ²	-5.0 $\pm$ 7.2	-1.9 $\pm$ 5.9	-3.3 $\pm$ 6.2	-2.6 $\pm$ 6.5

¹ Outcome expectations and realizations refer to changes in physical shape and appearance.

² If missing, 12-month weight was carried forward from baseline.