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What a difference a diet makes: Towards an understanding of differences between restrained dieters and restrained nondieters

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Abstract

Restrained eaters who are and are not dieting to lose weight have shown opposite eating regulation patterns in past research. To better understand these differences, restraint theory and the Three-Factor Model of Dieting was used to generate differential predictions about the mean and variability of restrained dieters (RDs) and restrained nondieters (RNDs) on the eating inventory Cognitive Restraint (CR) scale and the Restraint Scale (RS). Unrestrained nondieters served as a reference group. Eighty normal-weight female college students completed the CR, RS, and a measure of weight cycling. RDs, relative to RNDs, obtained higher and more homogeneous scores on the Cognitive Restraint, and higher and more heterogeneous scores on the RS. A post hoc analysis found that RDs had a much greater weight cycling history than RNDs. These findings are most consistent with the Three-Factor Model of Dieting, but also point to needed revisions both in this model and in traditional restraint theory.
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1. Introduction

Most studies using the Restraint Scale (RS) of Herman and Polivy (1980) have found that unrestrained and restrained eaters respond differently to forced preloads, with unrestrained eaters tending to decrease and restrained eaters tending to increase their consumption after a preload (Lowe, 1993; Ruderman, 1986). The so-called counterregulatory eating pattern shown by restrained eaters has been attributed to dieting, defined in terms of a self-imposed diet boundary (Herman & Polivy, 1984)

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and in terms of a pattern of cyclical, ultimately unsuccessful dieting (Heatherton, Herman, Polivy, King, & McCree, 1988; Heatherton & Polivy, 1992).

However, restrained eaters, identified by other self-report measures of dieting do not exhibit counterregulatory eating (Lowe & Maycock, 1988; Van Strien, Cleven, & Schippers, 2000; Westenhoefer, Broeckmann, Munch, & Pudel, 1994). Furthermore, self-labeled weight-loss dieters significantly decrease their eating following a preload (Lowe, 1995; Lowe, Whitlow, & Bellwoar, 1991). These findings have raised serious doubts about restraint theory's explanation for the counterregulatory eating of restrained eaters identified by the RS (Lowe, 1993, 2002, in review).

Lowe (1993, in review) suggested that if restrained eaters repeatedly go on and off diets (Heatherton et al., 1988), their vulnerability to counterregulatory eating might depend on where an individual is in the dieting cycle. When not currently on a diet, restrained eaters' vulnerability to counterregulatory eating would manifest itself. Such restrained nondieters (RNDs) would be likely to eventually become distressed by overeating, weight gain, and/or body dissatisfaction, and would therefore become motivated to begin a new weight-loss diet. Initiating a diet would transform the RND into a restrained dieter (RD) and immediately, if temporarily, reduce the dieter's vulnerability to counterregulatory eating (Lowe, 1993). According to this viewpoint, the finding that restrained eaters, identified by the Cognitive Restraint scale (CR) from the Eating Inventory (Stunkard & Messick, 1985) and the Dietary Restraint scale (from the Dutch Eating Behavior Questionnaire—Van Strien, Frijters, Bergers, & Defaers, 1986) do not exhibit counterregulatory eating can be explained by the greater proportion of restrictive dieters identified with these scales relative to the RS (Laessle, Tuschl, Kotthaus, & Pirke, 1989; Lowe, 1993).

Further insight into the behavioral differences between restrained eaters who are and are not currently dieting to lose weight might be gained by comparing RDs and RNDs on two of the most commonly used measures of restrained eating: the cognitive restraint scale from the eating inventory (Stunkard & Messick, 1985) and the restraint scale (Herman & Polivy, 1980). Both the models of Lowe (1993) and Heatherton et al. (1988) predict that RDs should score higher than RNDs on the CR, in the former case, because the CR describes restrictive behaviors that RDs would be more likely to exhibit, and, in the latter case, because RDs appear to be successful dieters, who should therefore score higher on the CR (Heatherton et al., 1988).

In addition, inasmuch as the CR scale measures many of the specific behaviors required for successful caloric restriction and weight loss, RDs' scores should not only be higher than the scores of the RNDs but should also be more homogeneous. Because RDs would need to engage in most of the behaviors described on the CR to lose weight, they should show less variability in their CR scores than RNDs. The prediction of greater homogeneity in CR scores among RDs is again consistent with both Lowe's (1993) description of current dieters and with Heatherton et al.'s (1988) description of successful dieters.

However, Lowe's (1993) characterization of the current dieting factor from the Three-Factor Model of dieting and Heatherton et al.'s (1988) description of successful dieters lead to somewhat different predictions concerning the scores of RDs and RNDs on the restraint scale. If RS scores reflect the probability that a person has imposed a diet boundary on her eating (Herman & Polivy, 1984), then RDs should obtain the highest scores. Thus, it is logical to expect that RDs should obtain higher scores on the restraint scale than RNDs do. Heatherton et al., on the other hand, suggest the opposite; that is, inasmuch as the restraint scale taps unsuccessful dieting, RNDs should score as high or higher on it than RDs do. This is because RNDs (unsuccessful dieters) would keep alternating between dieting and disinhibited eating (both of which are measured by the RS), whereas RDs (successful dieters) would presumably be relatively successful in controlling their intake (and therefore show little or no overeating).

As for the homogeneity of RS scores, Heatherton et al. (1988) have suggested that dieters experience periods of successful restriction, interspersed with disinhibited eating. Inasmuch as Heatherton et al. consider the average dieter to be unsuccessful, their perspective suggests that RNDs should be more variable on the Restraint Scale than RDs (who, if more successful in maintaining control over their eating, would show less fluctuation between over- and undereating and, perhaps, smaller weight fluctuations as well).

In Lowe's model, current dieters' efforts to restrict their intake (as reflected in their ability to control their post-preload intake) would reduce their vulnerability to disinhibited eating, as long as their diet was in force. However, Lowe (1993) also assumes that current dieters typically have a significant history of on-and-off dieting. Thus, no clear-cut prediction can be made from the perspective of Lowe concerning the variability of the scores of RDs and RNDs on the RS. Nonetheless, if the predicted difference in homogeneity of CR scores between RDs and RNDs materializes, then it will be instructive to determine if this difference is specific to the cognitive restrained scale or is also found with the restrained scale.

In sum, the purpose of this study is to compare RDs and RNDs on their mean scores, and on the variability in their scores, on both the RS and the CR. A group of unrestrained nondieters (UNDs) was also included in the design to provide a reference point for evaluating the scores of the other two groups. The hypotheses were tested among normal-weight college women because most restraint research has involved this population and because the predictions of restraint theory may not apply to overweight individuals (Lowe, 1993).

2. Method

2.1. Participants

Participants were 80 normal-weight women recruited through announcements and visits to classes at an urban university campus. Volunteers ranged in age from 18 to 35 (mean = 24.3, S.D. = 3.3). The participants' body mass index (BMI, in kg/m^2) ranged from 16.43 to 24.95, with a mean of 21.3 (S.D. = 2.1). The participants were 58.8% Caucasian, 21.3% Asian/Pacific Islander, 11.3% African American, and 1.3% Hispanic (7.5% classified themselves as "other"). Exclusion criteria included a history of bulimia or anorexia (assessed via a question asking if the respondent was ever diagnosed with bulimia or anorexia nervosa), current use of medication known to affect appetite, and current participation in a formal weight-loss program. Inasmuch as past studies on restrained eating and dieting have been conducted primarily with women, men were excluded to make the results comparable to past findings. The research was approved by the Institutional Review Board at Drexel University.

2.2. Materials

Each participant received a packet consisting of a consent form, a Demographic and Dieting History Questionnaire, the RS, and the CR from the eating inventory (Stunkard & Messick, 1985). Three other questionnaires not pertinent to the present study were also administered. The questionnaires were presented in a standardized order, and the participants were instructed to complete the questionnaires in the order presented.

2.2.1. Demographic and dieting questionnaire

These questions assessed age, ethnicity, height, weight, and history of weight cycling. In addition, this questionnaire included the question "Are you currently dieting to lose weight?" (yes or no). Dieting status was determined by the answer to this question.

Because the terms "restrained eating" and "dieting" continue to be used interchangeably by some restraint researchers (e.g., Polivy & Herman, 1985, 1999), it is important to emphasize that scores on the RS are only minimally related to self-reported dieting. Stice, Cameron, Killen, Hayward, and Taylor (1999) found that answers to the question "are you currently on a diet?" showed a .32 correlation with RS scores. French and Jeffrey (1997) found that current dieting status showed only a .20 correlation with history of weight-loss dieting. Finally, Timmerman and Gregg (2003) recently found, in obese individuals, a correlation of .21 between the average of the subjects' daily intent to diet over 14 days and their RS scores. Thus, the analytic separation of restrained eating (assessed with the RS) and self-described "dieting to lose weight" is not difficult to accomplish.

It is also important to emphasize that current weight-loss dieters are a minority, even among restrained eaters. Lowe et al. (1991) found that 37% of restrained eaters said they were currently on a diet to lose weight. In two studies, Boon, Stroebe, Schut, and Jansen (1998) found that the percentage of restrained eaters who were currently dieting to be 32% and 37%, respectively. At a population level, a Harris poll found that while 72% of women and 44% of men had dieted in the past, only 16% were currently dieting (Jeffrey et al., 1984).

Inasmuch as the single dieting item formed the basis of distinguishing between restrained eaters who were and were not dieting to lose weight, it is important to summarize the evidence on the validity of assessing dieting status with these (and similar) questions. In two studies, Lowe (1995) and Lowe et al. (1991) found that those who said that they were currently dieting to lose weight significantly decreased, rather than increased, their food intake after a high-calorie preload. Restrained eaters who identify themselves as currently dieting to lose weight are more concerned about their food intake and less satisfied with their bodies than are restrained eaters who are not currently on a diet to lose weight (Rogers & Green, 1993). Restrained eaters who are currently dieting also think more about weight control and dieting than do restrained eaters who are not dieting (Boon et al., 1998). Self-reported weight-loss dieters expend more calories through exercise than those dieting to maintain weight or those who are not dieting (French, Jeffery, & Wing, 1994). Neumark-Sztainer, Jeffery, and French (1997) compared several questions asking about dieting and found that the more clear-cut the dieting question (e.g., currently dieting to lose weight vs. on a diet), the stronger the prediction of reduced caloric intake. In addition, while continuous measures of dietary restraint—the Dutch Eating Behavior Scale (Van Strien, Frijters, Bergers, & Defares, 1986) and the Dietary Intent Scale (Stice, 1998a)—prospectively predict weight increases over 9 months, self-labeled dieting to lose weight predicts weight loss (Stice, 1998b). Collectively, these findings indicate that although dieting was assessed in this study with a single question, the answer to this question appears to be a robust reflection of eating behavior, weight concerns, and weight change.

2.2.2. Revised RS (Herman & Polivy, 1980)

The 10-item RS is designed to measure self-imposed eating restriction for the purpose of weight control. It predicts increased consumption following a variety of disinhibiting stimuli (Herman & Polivy, 1984). The RS has acceptable test–retest reliability and internal consistency (Allison, Kalinsky, & Gorman, 1992). A median split was used to determine restraint status: those women scoring 14 or higher

were classified as restrained eaters ($n = 40$) and those women with a restraint score of less than 14 were classified as unrestrained eaters ($n = 40$).

2.2.3. CR scale of the eating inventory (Stunkard & Messick, 1985)

This 21-item subscale measures cognitive and behavioral strategies for reducing food intake. It has good evidence for its reliability and validity (Allison et al., 1992; Shearin, Russ, Hull, Clarkin, & Smith, 1994). Several studies have found that the CR scale is inversely related to food intake in laboratory and naturalistic settings (Allison et al., 1992; De Castro, 1995; Laessle et al., 1989).

2.3. Design and procedure

Participants consisted of female undergraduate and graduate students. Potential participants were told that the study examined the eating behavior of women. Participants were given a questionnaire packet, with instructions to complete all questions of each questionnaire in the order presented. Participants had the opportunity to complete the questionnaire packet that day, or take it home and return it within a week. When the student returned the questionnaire packet, she was given US$2.00 in remuneration and debriefed about the purpose of the study.

The three groups studied were defined as follows: RDs indicated that they were currently on a diet to lose weight and scored at or above the median restraint score; RNDs were not currently dieting and scored at or above the median restraint score; and unrestrained nondieters (UNDs) were not dieting and scored below the median on the RS.

3. Results

If a measure had less than 10% of its items missing, missing data were replaced by the mean score for that item. This procedure was followed for six participants who had missing CR item scores. If a measure had more than 10% of its items missing, the measure was excluded from analyses. Data analyses were based on the following number of subjects per group: RDs: 18, RNDs: 22, and UNDs: 40.

A one-way ANOVA comparing all three groups' scores on the CR was significant [$F(2,73) = 23.4$, $P \leq .001$]. Inasmuch as both models of dieting made the same directional predictions for RDs and RNDs on the CR scale, one-tailed tests were used to compare these groups. Tukey's HSD test indicated that RDs' mean score of 13.9 was significantly higher than the RNDs' mean score of 10.6 ($P = .02$). Both RDs and RNDs had significantly higher mean scores than the UNDs had (mean = 5.87; $P \leq .001$). Levene's test for the one-way ANOVA found heterogeneity of variance ($P = .039$). A Levene's test (based on a t test comparing the two groups) found that RDs were significantly less variable on the CR than RNDs were ($F = 5.24$, $P = .014$). There was no difference in the variability of scores between RDs and UNDs ($F < 1.0$, $P = .336$) or between RNDs and UNDs ($F = 2.61$, $P = .112$).

These results, along with those for the RS, are shown in Fig. 1.

A one-way ANOVA (followed by Tukey's HSD tests) revealed significant differences between all three groups on the RS [$F(2,77) = 82.74$, $P \leq .001$]. RDs had significantly higher scores than RNDs did (20.3 and 17.5, respectively; $P = .04$, two-tailed). Both the scores of the RDs and RNDs were significantly higher than the UND's scores (mean = 8.7; $P \leq .001$). The Levene's test was significant, indicating a heterogeneity of variance ($P = .006$). A series of Levene's tests revealed significant

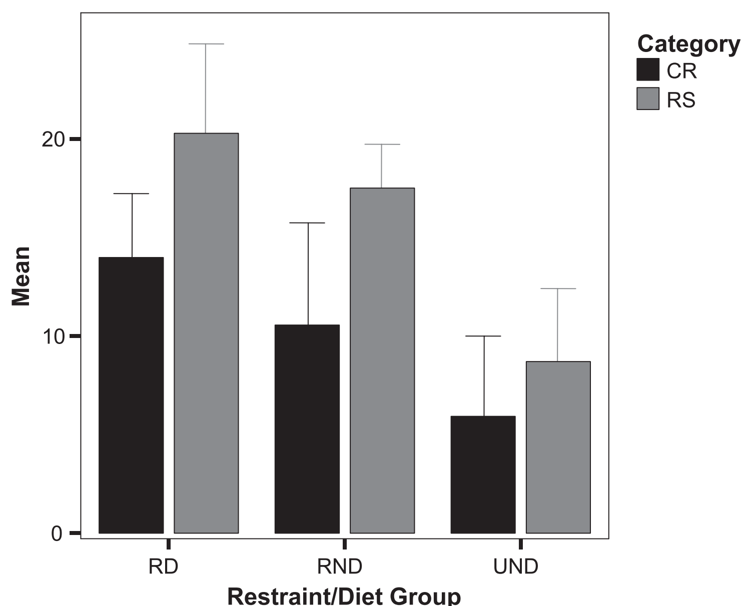

Fig. 1. Mean and variability scores of RDs, RNDs, and UNDs on the cognitive restraint scale and the restraint scale (error bars represent the standard deviation of each mean).

differences in the variance with both the RDs and UNDs, having more variance in their scores on the RS than the RNDs did ($F=8.97$, $P=.005$ and $F=8.79$, $P=.004$, respectively). However, there was no difference in the homogeneity of variance when comparing RDs and UNDs ($F<1.0$, $P=.380$).

The fact that RDs scored higher than RNDs on the CR indicates that they are currently engaging in more dieting behaviors; the fact that they scored higher on the RS suggests that they may also have engaged in more frequent weight-loss dieting in the past (Heatherton et al., 1988). Inasmuch as a measure of weight cycling history was included in the Demographic and Dieting History Questionnaire, we tested the latter possibility by comparing RDs and RNDs (along with UNDs) on their history of weight cycling. The weight-cycling measure asked respondents how many times in the past they had lost different amounts of weight (0–4, 5–9, 10–14, 15–19, and 20+ lbs). This measure has been used in a number of previous studies (e.g., Bartlett, Wadden, & Vogt, 1996; Friedman, Schwartz, & Brownell, 1998). One-way ANOVAs were used to analyze both the total number of past weight losses (regardless of size of the weight loss) and the total amount of weight lost (measured by multiplying the number of times a person lost weight in a particular range by the midpoint of the range and summing the products).

The ANOVA for number of past weight losses was significant [$F(2,77)=19.1$, $P\leq.001$]. Post hoc tests revealed that RDs had a significantly higher number of cycles than RNDs ($P=.008$) and UNDs ($P\leq.001$) had. RNDs also had a significantly higher number of cycles than UNDs had ($P=.015$). Similar results were found for total weight loss [$F(2,77)=16.9$, $P\leq.001$]. Tukey's HSD revealed that RDs, with a mean total weight loss of 19.94 lbs, lost significantly more weight than both the RNDs (mean weight loss of 8.6 lbs; $P=.004$) and UNDs did (mean weight loss of 2.1 lbs; $P\leq.001$). The history of total weight loss of the RNDs was marginally greater than that of the UNDs ($P=.065$).

4. Discussion

The purpose of this study was to compare predictions from restraint theory (Herman & Polivy, 1984) and the Three-Factor Model of Dieting (Lowe, 1993) concerning the mean and variability of the scores of RDs and RNDs on the restraint scale and cognitive restraint. UNDs were included in the analyses as a reference group.

For the CR scale, the two dieting models generated similar predictions that were borne out by the data: the CR scores of the RDs were both higher and less variable than the CR scores of the RNDs. This presumably indicates that RDs, in line with their weight-loss aspirations, are consistently engaging in more weight-loss behaviors than RNDs do (although it does not necessarily mean that they are also more successful at losing weight). If this inference is correct, it could explain why RDs are able to sharply limit their intake following consumption of a high-calorie preload that threatens to undermine their goal of reduced caloric intake (Lowe, 1995; Lowe et al., 1991).

For the RS, the two dieting models made somewhat different predictions. Because several of the RS items refer to concerns about dieting, eating, or weight, we predicted that RDs would score higher than RNDs would; no clear-cut prediction could be made about the level of variability of RDs and RNDs on the restraint scale. The predictions from restraint theory were that RDs would score lower than RNDs on the restraint scale and would also be less variable in their RS scores. The findings were most consistent with predictions from the Three-Factor Model of Dieting: RDs scored significantly higher than the RNDs did on the restraint scale and also exhibited significantly greater heterogeneity in their RS scores.

Though not originally planned as part of the study, an analysis of weight-cycling history scores found that RDs also had a much greater history of weight cycling than RNDs had. This finding must be interpreted cautiously inasmuch as it was not predicted a priori. Nonetheless, in the context of other recent findings on restraint and dieting, the overall pattern of results points to an interpretation of the findings that is at odds with the assumptions made in both restraint theory and the Three-Factor Model of Dieting.

Restraint theory suggests that most restrained eaters are unsuccessful dieters (Heatherton et al., 1988). RDs would be viewed by restraint theorists as successful dieters because they score higher than RNDs do on the CR scale and are able to regulate their intake following a high-calorie preload. Therefore, restraint theory would predict that RDs would (1) score lower than RNDs on the RS; (2) be less variable than RNDs on the RS (Heatherton et al., 1988); and (3) have less of a weight-cycling history than RNDs. The results obtained were opposite to these predictions.

The Three-Factor Model of Dieting views current dieting as a state variable, that is, as a temporary and presumably short-lived effort to counteract weight gain or body dissatisfaction by losing weight (Lowe, 1993). The finding that RDs scored higher and more homogeneously than RNDs did on the CR is consistent with this assumption. However, two findings suggest that current weight-loss dieting also reflects a "trait" variable of higher levels of past (unsuccessful) dieting: RDs scored higher than RNDs on the RS and on the measure of weight-cycling history. If self-initiated weight-loss dieting is a reflection of both current and past dieting, there are two major implications.

First, these findings suggest that unsuccessful dieting cannot account for counterregulatory eating. Because RDs scored higher than RNDs on both the RS and on weight-cycling history, their higher level of "unsuccessful dieting" should make them more susceptible than RNDs to counterregulatory

eating.[1] However, Lowe (1995) and Lowe et al. (1991) have shown that RDs show clear behavioral regulation, rather than heightened counterregulation, following a high-calorie preload. This, along with an abundance of other evidence (Lowe, 1993, in review), suggests that the cause of restrained eaters' counterregulatory eating cannot be chronic, unsuccessful dieting (Heatherton et al., 1988).

Second, the fact that current dieters have been on more weight-loss diets in the past may provide insight into the causal relationship between dieting and problems with eating regulation. This finding is most consistent with the hypothesis that problems with eating regulation result in dieting rather than the reverse. If dieting is the primary cause of eating regulation problems, as restraint theory has long argued (Herman & Polivy, 1975; Polivy & Herman, 1985), then current dieters should show enhanced, rather than reduced, counterregulatory tendencies. An alternative to suggesting that current dieting causes eating regulation problems is to suggest that a history of on-and-off dieting is responsible (Heatherton et al., 1988; Heatherton & Polivy, 1992; Lowe, 1993). However, the current study also contradicts this alternative. Therefore, the present results are most consistent with the hypothesis that problems with eating regulation may produce the need to diet (and diet repeatedly over time), rather than the reverse (Lowe, 2002, in review).

The fact that current dieters have a greater weight-cycling history than restrained nondieters is also inconsistent with the Three-Factor Model of Dieting (Lowe, 1993). This model assumed that RDs were fundamentally the same as RNDs but just happened to be dieting at the time they were recruited for a study. Given the brevity of most diets, several months later many RDs and RNDs presumably would have traded places. However, the current results suggest that current dieting status also reflects past dieting status. The high scores of the RDs on the RS and weight cycling indicate that they have dieted more often than RNDs have in the past. Although restraint theory suggests that such a chronic dieting history should increase susceptibility to counterregulatory eating (Heatherton & Polivy, 1992; Polivy & Herman, 1985), the present data, combined with past findings (Lowe, 1993), indicate that this is not the case.

The most parsimonious explanation for this pattern of findings is that current dieting status represents a proxy risk factor (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001) for vulnerability to problems with eating and weight control; that is, although weight-loss dieting may be a current marker of temporarily successful eating control, it may also be a historical marker of unsuccessful eating control. Thus, chronic dieting may often be diagnostic of, and a consequence of, a predisposition toward overeating and weight gain (Pasman, Saris, & Westerterp-Plantenga, 1999). This conclusion is consistent with the evidence that dieting status is a prospective predictor of long-term weight gain (Stice et al., 1999). Therefore, self-initiated dieting may reflect both a response to a recent weight gain and a vulnerability to long-term weight gain.

[1] Also relevant in this regard is that RDs were significantly more variable in their RS scores than RNDs. According to restraint theory, unsuccessful dieters, represented here by RNDs, are "more likely to exhibit periods of restraint punctuated by episodes of disinhibited eating" (Heatherton et al., 1988, p. 19). The question therefore arises as to why RDs were more, rather than less, variable than RNDs on the RS. One possibility is that RDs may themselves consist of two kinds of dieters: those who repeatedly lose weight only to regain it (and would therefore receive the highest RS scores) and those who have successfully lost weight in the past and kept it off (so-called weight suppressors, see Lowe, 1993). Inasmuch as the former group would presumably score considerably higher on the RS than the latter group will, RDs overall would have substantial variability in their RS scores.

In sum, the findings of the present study provide the basis for a new understanding of the behavioral differences found between current dieters and restrained nondieters in past studies. The findings suggest that among normal-weight young women, the individuals at greatest risk for eating regulation problems are those who have an extensive history of weight-loss dieting but are not currently dieting to lose weight.[2] Such individuals would presumably have a predisposition toward overeating and weight gain but would currently be doing little, if anything, to counteract it (Lowe, in review).

It is important to note that two of the present findings—that RDs showed greater heterogeneity of variance than RNDs on the RS and had a greater history of weight cycling—were not predicted a priori. Thus, while all the results reported here require replication, it is especially important to replicate these two findings. Furthermore, the results were obtained with nonclinical participants and, therefore, the generalizability of the results to clinical populations remains unknown. Nonetheless, the findings reported here may have important new implications for understanding the complex relationship between dieting, on one hand, and eating and weight problems, on the other.

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[2] Because the present study found that current dieting is itself related to the extent of past weight-loss dieting, obtaining large numbers of such individuals may be somewhat difficult.

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